Supplemental Table 1. Tumor Sites in Humans and Experimental Animals for 111 Distinct Group-1 Agents in the IARC Monographs Volume 1 through Volume 109*

Yann Grosse¹, Pascale Lajoie²,³, Mélissa Billard², Daniel Krewski²,⁴,⁵, Jerry Rice⁶, Robert A. Baan¹,+, Vincent Cogliano⁷, Michael Bird² and Jan M. Zielinski²,⁵,++

¹International Agency for Research on Cancer, Lyon, France
²McLaughlin Centre for Population Health Risk Assessment, University of Ottawa, Ottawa, Canada
³Division of Cancer Care and Epidemiology, Queens University Cancer Research Institute, Kingston, Canada
⁴Risk Sciences International, Ottawa, Canada
⁵School of Epidemiology and Public Health, University of Ottawa, Ottawa, Canada
⁶School of Medicine, Georgetown University, Washington, D.C., USA
⁷Integrated Risk Information System, US Environmental Protection Agency, Washington, D.C., USA

+ Retired
++Deceased

*An electronic version of Supplemental Table 1 in Excel format is available at from the International Agency for Research on Cancer (IARC) at http://publications.iarc.fr/578 as Table A1 of Annex 1, as part of IARC Scientific Publication No. 165, Tumour Site Concordance and Mechanisms of Human Cancer. Supplemental Table 1 is reproduced here with permission of the International Agency for Research on Cancer.
Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs

| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|---------------------------------------|--------------------------------------|---------|------|-----------|-------------------------------|----------|
| A              | 1            | Aristolochic acid | Mechanistic upgrade* | Aristolochic acid I (see comments) | Rat | Forestomach | Squamous cell carcinoma | Schmeiser et al. (1990) (Vol 100A p. 355), M, Wistar, d.w. |          |
| A              | 1            | Aristolochic acid | Mechanistic upgrade* | Aristolochic acid I and II (44/56) (see comments) | Rat | Forestomach | Squamous cell carcinoma | Hwang et al. (2006) (Vol 100A p.356), M, Sprague-Dawley, g. |          |
| A              | 1            | Aristolochic acid | Mechanistic upgrade* | Aristolochic acid I and II (77/21) (see comments) | Rat | Renal pelvis | Transitional cell carcinoma | Mengs et al. (1982) (Vol 82 p.87, Vol 100A p.353), M, Wistar, g. |          |
| A              | 2            | Aristolochic acid, plants containing | Renal pelvis, ureter | Aristolochic acid I and II (77/21) (see comments) | Rat | Forestomach | Squamous cell carcinoma | Mengs et al. (1982) (Vol 82 p.87, Vol 100A p.353), MF, Wistar, g.; Mengs (1983) (Vol 82, p.88, Vol 100A p.354), M, Wistar, g. |          |
| A              | 3            | Azathioprine | Non-Hodgkin lymphoma, skin (squamous cell carcinoma) | Azathioprine | Mouse | Thymus | Lymphoma | Imamura et al. (1973) (Vol 26 p. 51), MF, C57BL, s.c.; Casey (1968b) (Vol 26 p. 52), M, New Zealand Black, i.m.; Casey (1968a), (Vol 26 p.52), M, New Zealand Black, i.m. |          |
| A              | 3            | Azathioprine | Non-Hodgkin lymphoma, skin (squamous cell carcinoma) | Azathioprine | Mouse | Lymphoid tissue | Lymphoma | Mitrou et al. (1979a) (Vol 26 p. 51-52), F, New Zealand Black & New Zealand White, s.c.; Mitrou et al. (1979b) (Vol 26 p. 51-52), F, New Zealand Black & New Zealand White, s.c.; Ito et al. (1989), F, B6C3F1, p.o.; Brambilla et al. (1971), MF, Swiss, i.p. |          |
| A              | 4            | Busulfan | Acute myeloid leukaemia | | | | | | No data on animal experiments listed because of limited evidence of carcinogenicity |          |
| A              | 5            | Chlorambucil | Acute myeloid leukaemia | Chlorambucil | Mouse | Lymphoid tissue | Lymphoma | Weisburger et al.(1975), MF, Swiss, i.p.; Cavaliere et al. (1990), F, Balb/c, g. |          |
| A              | 6            | Chlornaphazine | Bladder | | | | | | No data on animal experiments listed because of limited evidence of carcinogenicity |          |
| A              | 7            | Cyclophosphamide | Acute myeloid leukaemia, bladder | Cyclophosphamide | Mouse | Mammary gland | Adeno-carcinoma | Walker & Anver (1979), F, New Zealand Black, New Zealand White, s.c.; Schmähl & Osswald (1979), F, NMR, s.c. |          |
| A              | 7            | Cyclophosphamide | Acute myeloid leukaemia, bladder | Cyclophosphamide | Mouse | Lymphoid tissue | Lymphoma | Walker & Boile (1971), F, New Zealand Black; New Zealand White, s.c.; Walker & Boile (1973), MF, New Zealand Black; New Zealand White, s.c. |          |
| A              | 7            | Cyclophosphamide | Acute myeloid leukaemia, bladder | Cyclophosphamide | Mouse | Lung | Bronchiolo-alveolar carcinoma | McClain et al. (2001), MF, CD-1, g.; Weisburger et al. (1975), MF, Swiss, i.p.; Shimkin et al. (1966), MF, AU, i.p. |          |
| Volume | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|--------|--------------|-------|------------------------------------------|---------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| A      | 7            | Cyclophosphamide | Acute myeloid leukaemia, bladder         |                                      |                                      | Cyclophosphamide | Rat  | Urinary bladder | Transitional cell carcinoma | Habs & Schmähr (1983), M, Sprague-Dawley, d.w.; Schmähr & Habs (1983), M, Sprague-Dawley, d.w.; Schmähr & Habs (1979), M, Sprague-Dawley, d.w. |
| A      | 8            | Ciclosporine     | Non-Hodgkin lymphoma, squamous cell carcinoma |                                      |                                      |                     |      |              |                                 | No data on animal experiments listed because of limited evidence of carcinogenicity |
| A      | 9            | Diethylstilbestrol | Breast (exposure while pregnant), vagina (clear cell adenocarcinoma, exposure in utero), cervix (clear cell adenocarcinoma, exposure in utero) | Endometrium, cervix (squamous cell carcinoma, exposure in utero), tests (exposure in utero) | Diethylstilbestrol | Mouse  | Uterus, uterine cervix | Adeno-carcinoma | Greenman et al. (1986), F, C3H/HeN-MTV, p.o.; Waalkes et al. (2006a,b), F, CD-1, s.c.; Walker & Haven (1997), F, CD-1, DES-lineage-2 M; Gray et al. (1996), F, CD-1, TGF α, s.c.; Couse et al. (1997), F, Wild type fvb/N, MTER, s.c.; Newbold et al. (1990), F, CD-1, s.c.; Newbold et al. (1998), F, CD-1, in utero-s.c.; Turusov et al. (1992), F, CBA DES-lineage-2 M, in utero-s.c. |
| A      | 9            | Diethylstilbestrol | Breast (exposure while pregnant), vagina (clear cell adenocarcinoma, exposure in utero), cervix (clear cell adenocarcinoma, exposure in utero) | Endometrium, cervix (squamous cell carcinoma, exposure in utero), tests (exposure in utero) | Diethylstilbestrol | Hamster | Kidney | Renal cell carcinoma | Liehr & Wheeler (1983), M, Syrian golden, s.c.; Goldfarb & Pugh (1990), F, Syrian golden, s.c. |
| A      | 10           | Estrogen-only menopausal therapy | Endometrium, ovary | Breast | Estradiol | Mouse  | Lymphoid tissue | Lymphoma | Bischoff et al. (1942a) (Vol 21 p. 299), F, Marsh-Buffalo, s.c.; Bischoff et al., (1942b) (Vol 21 p. 299), M, Marsh-Buffalo, i.v. |
| A      | 10           | Estrogen-only menopausal therapy | Endometrium, ovary | Breast | Estradiol | Mouse  | Mammary gland | Adeno-carcinoma | Highman et al. (1980) (Vol 72 p. 467), F, C3H/HeJ MTV+, p.o.; Rudali et al. (1971) (Vol 21 p. 302), M, C3H x RIII F1 MTV+, s.c. |
| A      | 10           | Estrogen-only menopausal therapy | Endometrium, ovary | Breast | Estradiol | Hamster | Kidney | Renal cell carcinoma | Goldfarb & Pugh (1990), M, Syrian golden, s.c.; Kirkman, (1959) p. 59-75 (Vol 21 p. 303), MF, heterogenous origin, s.c. |
| A      | 10           | Estrogen-only menopausal therapy | Endometrium, ovary | Breast | Estradiol | Rat     | Mammary gland | Adeno-carcinoma | Shull et al. (1997) (Vol 72 p. 468), F, ACI, s.c.; Blank et al., (2008), F, ACI, s.c.; MacKenzie (1955), F, Wistar albino & albino strains, s.c. |
| A      | 10           | Estrogen-only menopausal therapy | Endometrium, ovary | Breast | Estradiol dipropionate | Mouse  | Lymphoid tissue | Lymphoma | Kirschbaum et al. (1953), M, Balb/c, s.c.; Gardner & Dougherty (1944) (Vol 21), MF, C3H, s.c. |
| A      | 10           | Estrogen-only menopausal therapy | Endometrium, ovary | Breast | Estradiol benzoate | Mouse  | Uterus, uterine cervix | Squamous cell carcinoma | Pan & Gardner (1948) (Vol 21), F, C3HePM, s.c.; Allen & Gardner (1941) (Vol 21), F, C57xCBA, s.c. |
Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs

| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|---------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| A 11           | Estrogen-progestogen menopausal therapy (combined) | Breast, endometrium (increased risk for estrogen-induced endometrial cancer decreases with the number of days per month that progestogens are used) | Ethinylestradiol + ethynodiol diacetate, Ethinylestradiol + norethynodrel | Rat | Mammary gland | Adeno-carcinoma | Committee on Safety of Medicines (1972), MF, NR, p.o.; Committee on Safety of Medicines (1972), F, NR, p.o. | No data on animal experiments listed because of limited evidence of carcinogenicity |
| A 12           | Estrogen-progestogen oral contraceptives (combined) | Breast, cervix, liver | | | | | | | |
| A 13           | Etoposide | Mechanistic upgrade* | Acute myeloid leukaemia | | | | | | No data on animal experiments listed because of inadequate evidence of carcinogenicity |
| A 14           | Etoposide in combination with cisplatin and bleomycin | Acute myeloid leukaemia | | | | | | | No data in animals available |
| A 15           | Melphalan | Acute myeloid leukaemia | | | | | | | Sufficient evidence in experimental animals but no organ sites identified due to the absence of two (or more) studies of adequate design and quality pointing at the same organ site (with a similar histological origin) in the same species. |
| A 16           | Methoxsalen in combination with UVA | Skin (squamous cell carcinoma) | Methoxsalen in combination with UVA | Mouse | Skin | Squamous cell carcinoma | Dunnick et al. (1991) (Vol 100A p. 367), MF, HRA/Skh, p.o.; Griffin et al. (1958) (Vol 24 p. 107; Vol 100A p. 367), F, Swiss, i.p.; Nagayo et al. (1983) (Vol 100A p. 369), F, SKH: hairless-1, sk.; Dube et al. (1977) (Vol 24 p. 106), F, SKH hairless; HRS/J/An1, sk.; Dubertret et al. (1979) (Vol 24 p. 106), MF, Swiss; XVIIInc/Z, sk. & i.p. | |
| A 17           | MOPP and other combined chemotherapy including alkylating agents | Acute myeloid leukaemia, lung | | | | | | | No animal data available |
| A 18           | Phenacetin | Renal pelvis, ureter | Phenacetin | Mouse | Kidney | Renal cell carcinoma | Nakarishi et al. (1982) (Vol 100A p. 392), M, B6C3F1, p.o. | |
| A 18           | Phenacetin | Renal pelvis, ureter | Phenacetin | Rat | Kidney | Renal cell carcinoma | Johansson (1981) (Vol 100A p. 391), M, Sprague-Dawley, p.o. | |
| A 18           | Phenacetin | Renal pelvis, ureter | Phenacetin | Rat | Renal pelvis | Transitional cell carcinoma | Isaka et al. (1979) (Vol 100A p. 393; Vol 24 p. 141), M, Sprague-Dawley, p.o. | |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-----------------|--------------|-------|------------------------------------------|--------------------------------------|--------------------------------------|---------|------|-----------|-----------------------------------|----------|
| A 19            |              | Phenacetin, analgesic mixtures containing | Renal pelvis, ureter                 |                                      |                                      |         |      |           |                                   | No data on animal experiments listed because of limited evidence of carcinogenicity |
| A 20            |              | 1-(2-Chloroethyl)-3-(4-methylcyclohexyl)-1-nitrosourea (Methyl-CCNU) | Acute myeloid leukaemia              |                                      |                                      |         |      |           |                                   | No data on animal experiments listed because of limited evidence of carcinogenicity |
| A 21            |              | Tamoxifen | Endometrium                              | Tamoxifen                           | Rat                                  | Liver   |      | Hepatocellular carcinoma          | Greaves et al. (1993); Hard et al. (1993); Hrisimaki et al. (1993); Ahotupa et al. (1994); Williams et al. (1997); Karki et al. (2000), MF, Alderley Wistar; Sprague-Dawley; g.; Hasmann et al. (1994); Carthew et al. (1995a); Carthew et al. (1995b); Dragan et al. (1995), MF, Wistar, Lewis; Fischer 344, Alderley Park, p.o. | |
| A 22            |              | Thiotepa  | Leukaemia                                | Thiotepa                            | Mouse                                | Lymphoid tissue | Lymphoma | NCI (1978), MF, B6C3F1, i.p.   |                                   | |
| A 23            |              | Treosulfan | Acute myeloid leukaemia                  |                                      |                                      |         |      |           |                                   | No animal data available |
| B 24            |              | Clonorchis sinensis (infection with) | Cholangiocarcinoma                    |                                      |                                      |         |      |           |                                   | No data on animal experiments listed because of limited evidence of carcinogenicity |
| B 25            |              | Epstein-Barr virus | Burkitt lymphoma, immunosuppression-related non-Hodgkin lymphoma, extranodal NK/T-cell lymphoma (nasal type), Hodgkin lymphoma, nasopharyngeal carcinoma | Lympho-epithelioma-like carcinoma, gastric carcinoma |                                      |         |      |           |                                   | No data on animal experiments listed; humans are the only natural hosts for Epstein-Barr virus |
| B 26            |              | Helicobacter pylori (infection with) | Non-cardia gastric carcinoma, low-grade B-cell MALT gastric lymphoma | Helicobacter pylori | Mouse | Glandular stomach | Adeno-carcinoma | Ohtani et al. (2007), Lee et al. (2008), M, INS-GAS, g. |                                   | |
| B 27            |              | Hepatitis B virus | Hepatocellular carcinoma | Cholangiocarcinoma, non-Hodgkin lymphoma |                                      |         |      |           |                                   | No data on animal experiments listed; hepatitis B virus primarily infects humans |
| B 28            |              | Hepatitis C virus | Hepatocellular carcinoma, non-Hodgkin lymphoma | Cholangiocarcinoma | Cholangiocarcinoma |         |      |           |                                   | No data on animal experiments listed; hepatitis C virus primarily infects humans |
| Volume part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-------------|--------------|-------|------------------------------------------|----------------------------------------|--------------------------------------|---------|------|-----------|----------------------------------|----------|
| B 29        | Human immunodeficiency virus type 1 | Kaposi sarcoma, non-Hodgkin lymphoma, Hodgkin lymphoma, cervix, anus, conjunctiva | Vulva and vagina, penis, hepatocellular carcinoma, non-melanoma skin cancer | | | | | | | No data on animal experiments listed; humans are the natural hosts for human immunodeficiency virus type 1 |
| B 30        | Human papillomavirus type 16 | Cervix, vulva, vagina, penis, anus, oral cavity, oropharynx, tonsil | | | | | | | | |
| B 30        | Human papillomavirus type 18 | Cervix | Vulva, penis, anus, oral cavity, larynx | | | | | | No data on animal experiments listed; humans are the natural hosts for human papillomaviruses |
| B 30        | Human papillomavirus type 31 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 33 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 35 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 39 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 45 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 51 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 52 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 56 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 58 | Cervix | | | | | | | |
| B 30        | Human papillomavirus type 59 | Cervix | | | | | | | |
| B 31        | Human T-cell lymphotropic virus type 1 | Adult T-cell leukaemia/lymphoma | | | | | | | No data on animal experiments listed; humans are the natural hosts for human T-cell lymphotropic virus type 1 |
| B 32        | Kaposi sarcoma herpesvirus | Kaposi sarcoma, primary effusion lymphoma | | | | | | | No data on animal experiments listed; humans are the natural hosts for Kaposi sarcoma herpesvirus |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|-----------------------------------------|---------------------------------------|--------------------------------------|---------|------|-----------|-----------------------------------|----------|
| B              | 33           | Opisthorchis viverrini (infection with) | Cholangiocarcinoma                     |                                        |                                     |         |      |           |                                   |          |
| B              | 34           | Schistosoma haematobium (infection with) | Urinary bladder                        |                                        |                                     |         |      |           |                                   |          |
| C              | 35           | Arsenic and inorganic arsenic compounds | Lung, urinary bladder, skin            | Kidney, liver, prostate                | Dimethylarsinic acid (DMA\(^{+}\)), Monomethylarsonous acid (MMAIII), Sodium arsenite | Mouse   | Lung | Bronchioloalveolar carcinoma | DMA\(^{+}\): Tokar et al. (2012a), M, CD1, d.w.; Sodium arsenite: Waalkes et al. (2003), F, C3HHeNCr, in utero; Waalkes et al. (2006a,b), M, CD1, in utero; Tokar et al. (2011), MF, CD1, in utero + p.o.; Tokar et al. (2012a), M, CD1, in utero; MMAIII: Tokar et al. (2012b), M, CD1, in utero | No data on animal experiments listed because of limited evidence of carcinogenicity |
| C              | 35           | Arsenic and inorganic arsenic compounds | Lung, urinary bladder, skin            | Kidney, liver, prostate                | Sodium arsenite, Monomethylarsonous acid (MMAIII) | Mouse   | Liver | Hepatocellular carcinoma | Sodium arsenite: Waalkes et al. (2003), M, C3HHeNCr, in utero; Waalkes et al. (2004a), M, C3HHeNCr, in utero; Waalkes et al. (2006a,b), M, CD1, in utero; Tokar et al. (2011), MF, CD1, in utero + p.o.; Tokar et al. (2012a), M, CD1, in utero; MMAIII: Tokar et al. (2012b), M, CD1, in utero | No data on animal experiments listed because of limited evidence of carcinogenicity |
| C              | 35           | Arsenic and inorganic arsenic compounds | Lung, urinary bladder, skin            | Kidney, liver, prostate                | Dimethylarsinic acid (DMA\(^{+}\)) | Rat     | Urinary bladder | Transitional cell carcinoma | Wei et al. (1999, 2002), M, F344(DuCrj), p.o.; Arnold et al. (2006), F, F344, p.o. |          |
| C              | 36           | Asbestos (all forms, including actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite) | Mesothelioma, lung, larynx, ovary |                                | Amosite: Anthophyllite; Crocidolite; Chrysotile; Tremolite | Rat     | Lung | Bronchioloalveolar carcinoma | Amosite: Wagner et al. (1974), MF, Wistar, inh.; Davis et al. (1986b), MF, Wistar-Han, inh.; Davis and Jones (1988), NR, Wistar/Han, inh.; Anthophyllite: Wagner et al. (1974), MF, Wistar, inh.; Crocidolite: Wagner et al. (1974), MF, Wistar, inh.; Crocidolite: Wagner et al. (1984), MF, Wistar-Han, inh.; Chrysotile: Wagner et al. (1974), MF, Wistar, inh.; Davis et al. (1978), MF, Wistar-Han, inh.; Wagerer et al. (1984), MF, SPF-F344, inh.; Gross et al. (1967), M, White, inh.; Wagner et al. (1980), MF, Wistar, inh.; Davis et al. (1986a), NR, White, inh.; McConnell et al. (1991), M, F344, inh.; Tremolite: Davis et al. (1985), M, Wistar, inh. |          |
| C              | 36           | Asbestos (all forms, including actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite) | Mesothelioma, lung, larynx, ovary |                                | Amosite: Anthophyllite; Crocidolite; Chrysotile; Tremolite | Rat     | Lung | Squamous cell carcinoma | Amosite: Wagner et al. (1974), MF, Wistar, inh.; Davis et al. (1986b), MF, Wistar-Han, inh.; Davis and Jones (1988), NR, Wistar/Han, inh.; Anthophyllite: Wagner et al. (1974), MF, Wistar, inh.; Crocidolite: Wagner et al. (1974), MF, Wistar, inh.; Crocidolite: Wagner et al. (1984), MF, Wistar-Han, inh.; Chrysotile: Wagner et al. (1974), MF, Wistar, inh.; Davis et al. (1978), MF, Wistar-Han, inh.; Wagerer et al. (1984), MF, SPF-F344, inh.; Gross et al. (1967), M, White, inh.; Wagner et al. (1980), MF, Wistar, inh.; Davis et al. (1986a), NR, White, inh.; McConnell et al. (1991), M, F344, inh.; Tremolite: Davis et al. (1985), M, Wistar, inh. |          |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-------|-------------|-------|-----------------------------------------|---------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| C     | 36          | Asbestos (all forms, including actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite) | Mesothelioma, lung, larynx, ovary | Amosite; Anthophyllite; Crocidolite; Chrysotile; Tremolite | Rat | Mesothelium | Mesothelioma | Amosite chrysotile crocidolite: Wagner & Berry (1969), MF, Wistar, i.pl.; Davis et al. (1988a), NR, White, inh.; Davis et al. (1991a), crocidolite not tested; Wagner et al. (1973), NR, Wistar, i.pl.; Crocidolite amosite tremolite: Stanton et al. (1981), F, Osborne-Mendel, i.pl.; Roller et al. (1996), F, Wistar, i.p.; All 5 fibres: Pott et al. (1987), F, Wistar, i.p. |
| C     | 36          | Asbestos (all forms, including actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite) | Mesothelioma, lung, larynx, ovary | Crocidolite; Amosite | Baboon | Mesothelium | Mesothelioma | Goldstein & Coetzee (1990), MF, Baboon, Papio ursinus, inh.; Webster et al., (1993), M, Papio ursinus, inh. |
| C     | 36          | Asbestos (all forms, including actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite) | Mesothelioma, lung, larynx, ovary | Amosite | Hamster | Mesothelium | Mesothelioma | McConnell et al. (1991), M, Syrian Golden, inh.; Pott et al. (1984), M, Syrian Golden, i.t. |
| C     | 37          | Beryllium and beryllium compounds | Lung | Beryllium and Beryllium compounds | Rat | Lung | Bronchiolo-alveolar carcinoma | Beryllium metal: Groth et al. (1980), F, Wistar, i.t.; Nickell-Brady et al. (1994), MF, F344, inh.; Beryllium sulfate: Reeves et al. (1967), MF, Sprague Dawley, inh.; Schepers et al. (1957), MF, Wistar + Sherman, inh.; Beryllium oxide: Wagner et al. (1969), M, Charles River, inh.; Beryllium hydroxide: Groth et al. (1980), F, Wistar, i.t.; Beryllium oxide: Ishinishi et al. (1980), M, Wistar, i.t.; Litvinov et al. (1983), NR, albino, i.t. |
| C     | 38          | Cadmium and cadmium compounds | Lung | Kidney, liver, prostate | Cadmium and cadmium compounds | Rat | Lung | Bronchiolo-alveolar carcinoma | Cadmium chloride: Takenaka et al. (1983), M, Wistar, inh.; Cadmium chloride, oxide, sulfide, and sulfate: Glaser et al. (1990), MF, Wistar, inh.; Oberdörster & Chenian (1992), Pott et al. (1987), F, Wistar, i.t. |
| C     | 38          | Cadmium and cadmium compounds | Lung | Prostate, kidney | Cadmium and cadmium compounds | Rat | Lung | Squamous cell carcinoma | Cadmium chloride: Takenaka et al. (1983), M, Wistar, inh.; Cadmium chloride, sulfide and sulfate: Glaser et al. (1990), MF, Wistar, inh. |
| C     | 38          | Cadmium and cadmium compounds | Lung | Kidney, liver, prostate | Cadmium chloride | Rat | Soft tissue | Fibrosarcoma | Waalkes et al. (1988, 1989), M, Wistar, s.c.; Waalkes et al. (1997), M, F344, s.c.; Waalkes et al. (1999), M, Noble, NBG/Cl, s.c.; Waalkes et al. (2000), M, F344, Wistar, s.c.; Shirai et al. (1993), M, F344, s.c. |
| C     | 39          | Chromium (VI) compounds | Lung | Nose, nasal sinus | Chromium (VI) compounds | Mouse | Duodenum, jejunum, ileum, small intestine | Adeno-carcinoma | Sodium dichromate dihydrate: NTP (2008), MF, B6C3F1, d.w. |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|--------------------------------------|-------------------------------------|---------|------|-----------|---------------------------------|-----------|
| C              | 39           | Chromium (VI) compounds | Lung | Nose, nasal sinus | Chromium (VI) compounds | Rat | Oral cavity, tongue | Squamous cell carcinoma | Sodium dichromate dihydrate; NTP (2008), MF, F344, d.w. | |
| C              | 39           | Chromium (VI) compounds | Lung | Nose, nasal sinus | Chromium (VI) compounds | Rat | Lung | Squamous cell carcinoma | Calcium chromate; Levy & Venitt (1986), MF, Porton-Wistar, i. pulmo.; Calcium chromate, strontium chromate, zinc chromate; Levy et al. (1986), MF, Porton-Wistar, i. pulmo.; Calcium chromate, sodium dichromate; Steinhoff et al. (1986), MF, SD, i.t. | |
| C              | 39           | Chromium (VI) compounds | Lung | Nose, nasal sinus | Chromium (VI) compounds | Rat | Soft tissue | Fibrosarcoma | (site of injection) Calcium chromate, sintered calcium chromate, sintered chromium trioxide; lead chromate; Hueper & Payne (1959), NR, Bethesda Black, i.m.; Calcium chromate only: Roe & Carter (1969), M, Chester Beatty, i.m.; Lead chromate only: Maltoni (1974, 1976), Maltoni et al. (1982), NR, Sprague-Dawley, s.c. Furst et al. (1976), MF, F344, i.m. | |
| C              | 40           | Erionite | Mesothelioma | Erionite | Rat | Mesothelium | Mesothelioma | Wagner et al. (1985), MF, F344, i.n.; Wagner (1990), MF, F344, i.n.; Pott et al. (1987), F, Wistar; Sprague-Dawley, i.p.; Davis et al. (1991b), NR, Wistar, i.p.; Hill et al. (1990), NR, Porton, i.p.; Kleymenova et al. (1999), M, Wistar, i.p.; Coffin et al. (1992), NR, F344, i.pl. | |
| C              | 41           | Leather dust | Nasal sinus | | | | | | No animal data available | |
| C              | 42           | Nickel compounds | Lung, nose, nasal sinus | Nickel subsulfide; Metal dust (with nickel sulfide, sulfite, and oxide) | Mouse | Soft tissue | Fibrosarcoma | (site of injection) Rodriguez et al. (1996), M, C57BL6, B6C3F1, C3H, i.m.; Waalkes et al. (2004b), M, C57BL6, i.m.; Waalkes et al. (2005), M, Wild type, i.m. | Metal dust: Gilman (1962), F, Swiss, i.m. | |
| C              | 42           | Nickel compounds | Lung, nose, nasal sinus | Nickelocene; Nickel subsulfide | Hamster | Soft tissue | Sarcoma; fibrosarcoma | Nickelocene: Furst & Schlauder (1971), MF, Syrian Golden, i.m. Nickel subsulfide: Sunderman (1983), M, Syrian Golden, i.m. | |
| C              | 42           | Nickel compounds | Lung, nose, nasal sinus | Nickel subsulfide; Nickel oxide | Rat | Lung | Bronchiolo-alveolar carcinoma | Nickel subsulfide: Ottolenghi et al. (1975), MF, F344, i.n.; Dunnick et al. (1995), MF, F344, i.n.; NTP (1996a), MF, F344, i.n.; Pott et al. (1987), F, Wistar, i.t.; Nickel oxide: NTP (1996c), MF, F344, i.n. | |
| C              | 42           | Nickel compounds | Lung, nose, nasal sinus | Nickel and nickel compounds | Rat | Lung | Squamous cell carcinoma | Nickel oxide, nickel subsulfide and metallic nickel: Pott et al. (1987), F, Wistar, i.t. | |

Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs.
| Volume | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|--------|--------------|-------|----------------------------------------|-------------------------------------|-----------------------------------|---------|------|-----------|----------------------------------|----------|
| C 42   | Nickel compounds | Lung, nose, nasal sinus | Nickel oxide; Nickel hydroxide; Nickel subsulfide; Metallic nickel; Nickel sulfate; Nickel chloride | Rat | Soft tissue | Fibrosarcoma | Nickel oxide; Pott et al. (1987), F, Wistar, i.p.; Gilman (1962), NR, Wistar, i.m.; Sunderman & McCully (1983), M, F344, i.m.; Skau et al. (1985), M, Wistar, i.pl.; Sunderman et al. (1990), M, F344, i.m. Nickel hydroxide; Gilman (1986), M, F344, i.m.; Nickel subsulfide; Varita & Nettelstein (1978), F, F344,i.t.; Kasprzak et al. (1994), M, F344, intrarenal; i.m.; Metallic nickel; Mitchell et al. (1960), MF, Wistar, s.c.; Nickel sulfate; Pott et al. (1989), F, Wistar, i.p. Nickel chloride; Pott et al. (1989), F, Wistar, i.p.; |
| C 42   | Nickel compounds | Lung, nose, nasal sinus | Metallic Nickel; Nickel subsulfide; Nickel hydroxide | Rat | Soft tissue | Rhabdomyosarcoma | Metallic nickel; Judde et al. (1987), M, WAG, i.m.; Heath and Daniel (1964), F, i.m.; Nickel subsulfide; Kasprzak & Ward (1991), M, F344, i.m.; Mason (1972), MF, F344, i.m. Nickel hydroxide; Kasprzak et al. (1983), M, Wistar, i.m. |
| C 42   | Nickel compounds | Lung, nose, nasal sinus | Nickel subsulfide | Rat | Soft tissue | Fibrosarcoma | Sunderman & McCully (1983), MF, F344; Wistar-Lewis; Hooded, intrarenal; Jasmin & Riopelle (1976), F, Sprague-Dawley, intrarenal; Furst & Schlauder (1971), MF, F344, i.m. |
| C 42   | Nickel compounds | Lung, nose, nasal sinus | Nickel subsulfide; Nickel oxide; Metallic nickel | Rat | Adrenal medulla | Malignant pheochromocytoma | Nickel subsulfide; NTP (1996b), MF, F344, inh.; Ottolenghi et al. (1975), MF, F344, inh. Nickel oxide; NTP (1996c), M, F344, inh.; Metallic nickel; Diller et al. (2008), M, Wistar, inh. |
| C 43   | silica dust, crystalline, in the form of quartz or cristobalite | Lung | Quartz | Rat | Lung | Bronchiolo-alveolar carcinoma | Holland et al. (1983), NR, F344, inh.; Holland et al. (1986), F, F344, inh.; Muhle et al. (1989), MF, F344, inh.; Muhle et al. (1991,1995), MF, F344, inh.; Saffiotti et al. (1990, 1992); Saffiotti et al. (1996), MF, F344,NCr, i.t.; Pott et al. (1994), F, Wistar, i.t.; Groth et al. (1986), MF, F344, i.t.; Johnson et al. (1987), F, F344, inh.; Spiethoff et al. (1992), F, Wistar, inh. |
| C 43   | silica dust, crystalline, in the form of quartz or cristobalite | Lung | Quartz | Rat | Lung | Squamous cell carcinoma | Spiethoff et al. (1992), F, Wistar; inh.; Holland et al. (1983), NR, F344, inh.; Li,T.; Holland et al. (1986), F, F344, inh.; Pott et al. (1994), F, Wistar, i.t.; Dagle et al. (1986), F, F344, inh. |
| C 43   | silica dust, crystalline, in the form of quartz or cristobalite | Lung | Quartz | Rat | Lymphoid system | Lymphoma | Wagner (1976), MF, Wistar, i.pl; Wagner (1970), Wagner & Wagner (1972), MF, Wistar, i.pl. |
| C 44   | Wood dust | Nasal sinus, nasopharynx | | | | | No data on animal experiments listed because of inadequate evidence of carcinogenicity |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|--------------------------------------|--------------------------------------|-------------------------------------|---------|------|----------|---------------------------------|----------|
| D 45           | Fission products including Sr-90 | Solid cancers, leukaemia | Sr-90 | Mouse | Bone | Osteosarcoma | Nilsson (1970, 1971), M, CBA, i.p.; Nilsson et al. (1980), F, CBA, i.p. |
| D 45           | Fission products including Sr-90 | Solid cancers, leukaemia | Sr-90 | Dog | Bone | Osteosarcoma | Gillett et al. (1992), MF, beagle, i.v.; White et al. (1993), MF, beagle, p.o.; Gillett et al. (1987), MF, beagle, inh; |
| D 46           | Haematite mining with exposure to radon (underground) | Lung | Rn-222 | Rat | Lung | Bronchiolo-alveolar carcinoma | Perraud et al. (1972), M, SD, inh.; Monchaux & Morlier (2002), M, SD, inh.; Collier et al. (2005), M, SD, inh. |
| D 46           | Haematite mining with exposure to radon (underground) | Lung | Rn-222 | Rat | Lung | Squamous cell carcinoma | Perraud et al. (1972), M, SD, inh.; Monchaux & Morlier (2002), M, SD, inh.; Collier et al. (2005), M, SD, inh. |
| D 47           | Ionizing radiation (all types) | Not specified | Not specified | | | | | Generic evaluation, pertaining to all types of ionizing radiation |
| D 48           | Neutron radiation | Not specified* | Neutron radiation | Rat | Mammary gland | Adeno-carcinoma | Vogel & Zaldívar (1972), F, SD, direct; Shellabarger (1976), F, SD, direct; Montour et al. (1977), F, SD, direct; Broese et al. (1986, 1987), F, WAG/Rij, direct; Vogel & Turner (1982), F, SD/Harlan, direct | For neutron radiation no human data are listed because of inadequate evidence of carcinogenicity |
| D 48           | Neutron radiation | Neutron radiation | Rat | Lung | Bronchiolo-alveolar carcinoma | Chmelevsky et al. (1984), MF, SD, direct; Lafuma et al. (1989), M, SD, direct |
| D 48           | Neutron radiation | Neutron radiation | Monkey (Rhesus) | Kidney | Cortical cell carcinoma | Broese et al. (2000), Hollander et al. (2003), M, Rhesus, direct |
| D 48           | Neutron radiation | Neutron radiation | Mouse | Lymphoid tissue | Lymphoma | Seyama et al. (1991), F, B6C3F1, direct; Grahn et al. (1992), MF, B6CF1, direct; Ito et al. (1992), M, C57BL/6N & C3H/HeN, direct; Storer & Fry (1995), MF, B6CF1, direct |
| D 48           | Neutron radiation | Neutron radiation | Mouse | Thymus | Lymphoma | Upton et al. (1970), MF, RF/Un, direct; Ullrich et al. (1976), F, RFM/Un, direct |
| D 48           | Neutron radiation | Neutron radiation | Mouse | Haematopoietic tissue | Myeloid leukaemia | Upton et al. (1970), MF, RF/Un, direct; Ullrich & Preston (1987), M, RKM/Un, direct; Covelli et al. (1989), M, BC3F1, direct; Di Maggio et al. (1994), M, BC3F1, direct | For neutron radiation no human data are listed because of inadequate evidence of carcinogenicity |

Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs
### Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs

| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-----------------|--------------|-------|------------------------------------------|-------------------------------------|---------|------|-----------|----------------------------------|----------|
| **D 48**        | Neutron radiation | | Neutron radiation Mouse Lung | | | Bronchiolo-alveolar carcinoma | Ulrich et al. (1976), F, RFM/Un, direct; Ulrich et al. (1977), F, BALB/c/AnNbd, direct; Ulrich & Storer (1979a, b), F, RFM/Un, direct; Ulrich (1983), F, BALB/c/AnNbd, direct; Coggle (1988), MF, SAS/4, direct; Grahn et al. (1992), MF, B6CF1, direct; Di Majo et al. (1994), M, B6CF1, direct; Storer & Fry (1995), M, B6CF1, direct; Watanabe et al. (2007), MF, Cj-B6CF1, direct |
| **D 48**        | Neutron radiation | | Neutron radiation Mouse Mammary gland | | | Adeno-carcinoma | Ulrich et al. (1976), F, RFM/Un, direct; Ulrich et al. (1977), F, BALB/c/AnNbd, direct; Ulrich (1983), F, BALB/c/AnNbd, direct; Seyama et al. (1991), F, B6CF1, direct |
| **D 48**        | Neutron radiation | | Neutron radiation Mouse Ovary | | | Malignant granulosa cell tumour | Ulrich et al. (1976), F, RFM/Un, direct; Ulrich et al. (1977), F, BALB/c/AnNbd, direct; Ulrich (1983), F, BALB/c/AnNbd, direct; Seyama et al. (1991), F, B6CF1, direct; Ito et al. (1992), F, C57BL/6N & C3H/HeN, direct; Takahashi et al. (1992), F, B6CF1, direct; Grahn et al. (1992), F, B6CF1, direct; Watanabe et al. (2007), F, Cj-B6CF1, direct |
| **D 48**        | Neutron radiation | | Neutron radiation Mouse Pituitary gland | | | Pars distalis carcinoma | Ulrich et al. (1976), F, RFM/Un, direct; Seyama et al. (1991), F, B6CF1, direct |
| **D 48**        | Neutron radiation | | Neutron radiation Mouse Harderian gland | | | Adeno-carcinoma | Ulrich et al. (1976), F, RFM/Un, direct; Seyama et al. (1991), F, B6CF1, direct; Grahn et al. (1992), MF, B6CF1, direct; Watanabe et al. (2007), F, Cj-B6CF1, direct |
| **D 48**        | Neutron radiation | | Neutron radiation Mouse Adrenal gland | | | Carcinoma | Ito et al. (1992), MF & MF & F, C57BL/6N & C3H/HeN & C3B6F1, direct; Takahashi et al. (1992), MF, B6CF1, direct; Grahn et al. (1992), MF, B6CF1, direct; Di Majo et al. (1994), M, B6CF1, direct; Watanabe et al. (2007), MF, Cj-B6CF1, direct |
| **D 48**        | Neutron radiation | | Neutron radiation Mouse Liver | | | Hepatocellular carcinoma | Seyama et al. (1991), F, B6CF1, direct; Ito et al. (1992), M & F & MF, C57BL/6N & C3H/HeN & C3B6F1, direct; Takahashi et al. (1992), F, B6CF1, direct |
| **D 49**        | P-32, as phosphate | Leukaemia | | | | | | Sufficient evidence in experimental animals, but no organ sites identified due to the absence of two (or more) studies of adequate design and quality pointing at the same organ site (with a similar histological origin) in the same species. |

*Mechanistic upgrade*
| Volume 100 part | Agent number | Agent   | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site         | Histology                  | Study, sex, strain, exposure route                                                                 | Comments                      |
|----------------|--------------|---------|------------------------------------------|---------------------------------------|-------------------------------------|---------|--------------|-----------------------------|-----------------------------------------------------------------------------------------------|--------------------------------|
| D              | 50           | Pu-239  | Lung, liver, bone                        | Solid tumours aside from lung, liver and bone | Pu-239                              | Rat     | Lung         | Squamous cell carcinoma     | Dudoignon et al. (2003), M, SD, inh.; Oghiso & Yamada (2003a), F, Wistar, inh.; Nolibe et al. (1981), MF, Wistar, inh.; Sanders & Lundgren (1995), F, Wistar, inh.; Herbert et al. (1993), F, F344, inh.; Oghiso et al. (1994a, 1998), F, Wistar, inh.; Herbert et al. (1994), F, F344, inh.; Métivier et al. (1984), M, Wistar, inh.               |                                |
| D              | 50           | Pu-239  | Lung, liver, bone                        | Solid tumours aside from lung, liver and bone | Pu-239                              | Rat     | Skeletal system | Osteosarcoma               | Sikov et al. (1978), MF, Wistar, i.v.; Sikov et al. (1978), MF, Wistar, in utero.; Sikov (1982, 1983, 1989), MF, SD, i.p.; Sikov (1985, 1987, 1989), MF, SD, in utero.                     |                                |
| D              | 50           | Pu-239  | Lung, liver, bone                        | Solid tumours aside from lung, liver and bone | Pu-239                              | Mouse   | Skeletal system | Osteosarcoma               | Oghiso & Yamada (2000), F, (C3H, C57BL/6, B6C3F1), i.p.; Oghiso & Yamada (2003b), F, (C3HHeN, C57BL/6J, B6C3F1), i.p.; Ellender et al. (2001), M, CBAH, i.p.; Taylor et al. (1981, 1983), MF, C57BL/Do, i.p.; Svoboda & Bubeníková (1990), F, ICR, i.v.; Oghiso et al. (1994b, 1997), F, C3H, i.p.; Humphreys et al. (1987), F, CBA, i.p. |                                |
| D              | 50           | Pu-239  | Lung, liver, bone                        | Solid tumours aside from lung, liver and bone | Pu-239                              | Dog     | Lung         | Bronchiolo alveolar carcinoma | Muggenburg et al. (2008), MF, beagle, inh.; Hahn et al. (1999), MF, beagle, inh.                                           |                                |
| D              | 50           | Pu-239  | Lung, liver, bone                        | Solid tumours aside from lung, liver and bone | Pu-239                              | Dog     | Skeletal system | Osteosarcoma               | Lloyd et al. (1993, 1994a,b, 1997a), MF, beagle, i.v.; Lloyd et al. (2000b, 2001), MF, beagle, i.v.                                      |                                |
| D              | 50           | Pu-239  | Lung, liver, bone                        | Solid tumours aside from lung, liver and bone | Pu-239                              | Dog     | Liver        | Cholangiocarcinoma          | Dagle et al. (1996), MF, beagle, inh.; Taylor et al. (1991), Lloyd et al. (1995), MF, beagle, i.v.                                           |                                |
| D              | 51           | I-131   | Thyroid                                  | Digestive tract, salivary gland, bone, soft tissue, leukaemia | I-131                              | Rat     | Thyroid      | Follicular cell carcinoma   | Lindsay et al. (1957), MF, Long-Evans, inj(exact route NR); Lee et al. (1982), F, Long-Evans, i.p.                                              |                                |
| D              | 51           | I-131   | Thyroid                                  | Digestive tract, salivary gland, bone, soft tissue, leukaemia | I-131                              | Mouse   | Thyroid      | Follicular cell carcinoma   | Walinder (1972), M, CBA, i.v.; Walinder & Sljödén (1972), MF, CBA, in utero                                           |                                |
| D              | 52           | Th-228  | Dog                                      | Skeletal system                        | Th-228 (alpha particle emitter)     | Dog     | Skeletal system | Osteosarcoma               | Mays et al. (1987), Lloyd et al. (1997b), Lloyd et al. (2000a), MF, beagle, i.v.                                           |                                |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|--------------------------------------|--------------------------------------|---------|------|-----------|-----------------------------------|----------|
| D 52           |              | Internalized radionuclides that emit alpha particles | See comments | Pu-238 (alpha particle emitter) | Dog | Skeletal system | Osteosarcoma | Park et al. (1976, 1997), MF, beagle, inh.; Gillett et al. (1988), Muggenburg et al. (1996b), MF, beagle, inh. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | See comments | Pu-238 (alpha particle emitter) | Dog | Lung | Bronchio-alveolar carcinoma | Park et al. (1976, 1997), MF, beagle, inh.; Gillett et al. (1988), Muggenburg et al. (1996b), MF, beagle, inh. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | | Po-210 (alpha particle emitter) | Hamster | Lung | Bronchio-alveolar carcinoma | Little et al. (1978), F, Syrian golden, i.t.; Little et al. (1985), Shami et al. (1982), M, Syrian golden, i.t. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | | Np-237 (alpha particle emitter) | Rat | Lung | Bronchio-alveolar carcinoma | Dudoignon et al. (1999), M, SD, inh.; Dudoignon et al. (2003), M, SD, inh. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | | Am-241 (alpha particle emitter) | Mouse | Skeletal system | Osteosarcoma | Nilsson & Broomé-Karlsson (1976), M, CBA, i.p.; Taylor et al. (1983), F, C57BL/Do, i.p.; Van den Heuvel et al. (1995), F, BALB/c, i.v.; Ellender et al. (2001), M, CBA/H, i.p. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | | Cm-244 (alpha particle emitter) | Rat | Skeletal system | Osteosarcoma | Sanders & Mahaffey (1978), F, Wistar, inh.; Sanders & Mahaffey (1981), F, Wistar, inh. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | See comments | Cm-244 (alpha particle emitter) | Rat | Lung | Bronchio-alveolar carcinoma | Sanders & Mahaffey (1978), F, Wistar, inh.; Sanders & Mahaffey (1981), F, Wistar, inh.; Lundgren et al. (1995), MF, F344/CR1, inh. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | | Cm-244 (alpha particle emitter) | Rat | Lung | Squamous cell carcinoma | Sanders & Mahaffey (1981), F, Wistar, inh.; Lundgren et al. (1995), MF, F344/CR1, inh. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | | Cf-249 (alpha particle emitter) | Mouse | Skeletal system | Osteosarcoma | Taylor et al. (1983), MF, C57BL/Do, i.p. | |
| D 52           |              | Internalized radionuclides that emit alpha particles | | Cf-252 (alpha particle emitter) | Mouse | Skeletal system | Osteosarcoma | Taylor et al. (1983), MF, C57BL/Do, i.p. | |
| D 53           |              | Internalized radionuclides that emit beta particles | | Sr-90 (beta particle emitter) | Mouse | Skeletal system | Osteosarcoma | Nilsson (1970, 1971), M, CBA, i.p.; Nilsson et al. (1980), F, CBA, i.p. | |
| D 53           |              | Internalized radionuclides that emit beta particles | | Sr-90 (beta particle emitter) | Dog | Skeletal system | Osteosarcoma | Gillett et al. (1992), MF, beagle, i.v.; White et al. (1993), MF, beagle, p.o.; Gillett et al. (1987), MF, beagle, inh; | |
| D 53           |              | Internalized radionuclides that emit beta particles | | H-3 (beta particle emitter) | Mouse | Thymus | Lymphoma | Yamamoto et al. (1990, 1995, 1998), F, C57BL/6NxC3H/He, d.w. | |
| D 53           |              | Internalized radionuclides that emit beta particles | | H-3 (beta particle emitter) | Rat | Mammary gland | Adeno-carcinoma | Graafmans et al. (1984), F, SD, i.p.; Cahill et al. (1979a,b), F, SD, i.p. | |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-----------------|--------------|-------|------------------------------------------|--------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| D               | 53           | Internalized radionuclides that emit beta particles | Pm-147 (beta particle emitter) | Rat | Lung | Squamous cell carcinoma | Herbert et al. (1987, 1988), MF, F344/Crl, inh. | |
| D               | 53           | Internalized radionuclides that emit beta particles | Pm-147 (beta particle emitter) | Rat | Soft tissue | Haemangio-sarcoma | Herbert et al. (1987, 1988), MF, F344/Crl, inh. | |
| D               | 53           | Internalized radionuclides that emit beta particles | Lu-177 (beta particle emitter) | Mouse | Skeletal system | Osteosarcoma | Müller et al. (1980), F, NMRI, i.p. | |
| D               | 53           | Internalized radionuclides that emit beta particles | Cs-137 (beta particle emitter) | Dog | Soft tissue | Sarcoma, NOS | Nikula et al. (1995), MF, beagle, i.v.; Nikula et al. (1996), MF, beagle, i.v. | Generic evaluation, pertaining to all types of internalized radionuclides that emit beta-particles |
| D               | 53           | Internalized radionuclides that emit beta particles | Ce-144 (beta particle emitter) | Rat | Lung | Squamous cell carcinoma | Lundgren et al. (1992a,b), Hahn & Lundgren (1992), MF, F344/Crl, inh.; Lundgren et al. (1996), MF, F344/N, inh. | |
| D               | 53           | Internalized radionuclides that emit beta particles | Ce-144 (beta particle emitter) | Rat | Lung | Bronchio-alveolar carcinoma | Lundgren et al. (1992a,b), Hahn & Lundgren (1992), MF, F344/Crl, inh.; Lundgren et al. (1996), MF, F344/N, inh. | |
| D               | 53           | Internalized radionuclides that emit beta particles | Ce-144 (beta particle emitter) | Rat | Skeletal system | Osteosarcoma | Mahlum & Sikov (1969), MF, SD, i.v.; Lundgren et al. (1992a,b), Hahn & Lundgren (1992), MF, F344/Crl, inh. | |
| D               | 53           | Internalized radionuclides that emit beta particles | Ce-144 (beta particle emitter) | Mouse | Lung | Bronchio-alveolar carcinoma | Lundgren et al. (1980a), F, C57BL/6J, inh.; Hahn et al. (1980), Lundgren et al. (1980b), F, C57BL/6J, inh. | |
| D               | 53           | Internalized radionuclides that emit beta particles | Ce-144 (beta particle emitter) | Dog | Soft tissue | Haemangio-sarcoma | Hahn et al. (1995, 1997), MF, beagle, inh.; Hahn et al. (1999), MF, beagle, inh. | |
| D               | 54           | Ra-224 and its decay products | Bone | Ra-224 and its decay products | Mouse | Skeletal system | Osteosarcoma | Svoboda et al. (1977), F, ICR, i.p.; Müller et al. (1983), F, NMRI, i.p.; Luz et al. (1979), F, NMRI, i.p.; Müller et al. (1990), F, NMRI, i.p.; Humphreys et al. (1993), M, CBA/H, i.p. | |
| D               | 54           | Ra-224 and its decay products | Bone | Ra-224 and its decay products | Dog | Skeletal system | Osteosarcoma | Mugenburg et al. (1995, 1996a), MF, beagle, i.v. | |
| D               | 55           | Ra-226 and its decay products | Bone, paranasal sinuses, mastoid process | Ra-226 and its decay products | Mouse | Skeletal system | Osteosarcoma | Raabe et al. (1983), F, C57BL/6J, i.p.; Svoboda et al. (1977), F, ICR, i.p.; Taylor et al. (1983), MF, C57BL/Do, i.p. | |
| D               | 55           | Ra-226 and its decay products | Bone, paranasal sinuses, mastoid process | Ra-226 and its decay products | Dog | Skeletal system | Osteosarcoma | Lloyd et al. (2000a), MF, beagle, i.v.; Taylor et al. (2000), MF, beagle, i.v.; White et al. (1994), MF, beagle, i.v. | |
| Volume 100 part | Agent number | Agent                          | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-----------------|--------------|--------------------------------|------------------------------------------|---------------------------------------|--------------------------------------|---------|------|-----------|----------------------------------|----------|
| D 56            | 56           | Ra-228 and its decay products | Bone                                     | Ra-228 and its decay products         | Dog                                  | Skeletal system | Osteosarcoma | Lloyd et al. (2000a), MF, beagle, i.v. |          |
| D 57            | 57           | Rn-222 and its decay products | Lung                                     | Leukaemia                             | Rat                                  | Lung    | Bronchio-alveolar carcinoma | Pernaud et al. (1972), M, SD, inh.; Monchaux & Morlier (2002), M, SD, inh.; Collier et al. (2005), M, SD, inh. |          |
| D 57            | 57           | Rn-222 and its decay products | Lung                                     | Leukaemia                             | Rat                                  | Lung    | Squamous cell carcinoma    | Pernaud et al. (1972), M, SD, inh.; Monchaux & Morlier (2002), M, SD, inh.; Collier et al. (2005), M, SD, inh. |          |
| D 58            | 58           | Solar radiation               | Skin (basal cell carcinoma, squamous cell carcinoma, melanoma) | Lip, eye (squamous cell carcinoma, melanoma) | Solar radiation | Mouse    | Skin                                      | Squamous cell carcinoma | Roffo (1939), NR, NR, direct; Forbes et al. (1982), NR, Skh-hr-1, direct (simulated solar radiation) |          |
| D 58            | 58           | Solar radiation               | Skin (basal cell carcinoma, squamous cell carcinoma, melanoma) | Lip, eye (squamous cell carcinoma, melanoma) | Solar radiation | Rat      | Skin                                      | Squamous cell carcinoma | Roffo (1934), NR, NR, direct; Roffo (1939), NR, white, direct |          |
| D 59            | 59           | Th-232 (as Thorotrast)        | Liver, leukaemia (excluding chronic lymphocytic leukaemia), extrahepatic bile ducts, gallbladder | Pancreas, prostate | Th-232 (as Thorotrast) | Hamster | Liver                                      | Hepatocellular carcinoma | Guilmette et al. (1989), MF, Chinese, i.v. |          |
| D 59            | 59           | Th-232 (as Thorotrast)        | Liver, leukaemia (excluding chronic lymphocytic leukaemia), extrahepatic bile ducts, gallbladder | Pancreas, prostate | Th-232 (as Thorotrast) | Rat      | Liver                                      | Hepatocellular carcinoma | Wegener et al. (1983), Wesch et al. (1983), F, Wistar, i.v. |          |
| D 60            | 60           | UV radiation (bandwidth 100-400 nm, encompassing UVC, UVB and UVA) | See comments | Broad-spectrum UVR | Mouse    | Skin                                      | Squamous cell carcinoma | Grady et al. (1943), NR, strain A, direct; Blum (1959), NR, strain A, direct |          |
| D 60            | 60           | UV radiation (bandwidth 100-400 nm, encompassing UVC, UVB and UVA) | See comments | Broad-spectrum UVR | Rat      | Skin                                      | Squamous cell carcinoma | Putschar & Holtz (1930), NR, NR, direct; Hueper (1942), NR, NR, direct |          |
| D 61            | 61           | UV-emitting tanning devices   | Skin (melanoma), eye (melanoma)          | Skin (squamous cell carcinoma)         | UVA                                  | Mouse    | Skin                                      | Squamous cell carcinoma | Van Weelden et al. (1986, 1988a,b), MF, Skh-hr-1, direct; Stenberg & Van der Leun (1990), MF, Skh-hr-1, direct; Kligman et al. (1990), F, Skh-hr-1, direct |          |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|--------------------------------------|-------------------------------------|---------|------|-----------|---------------------------------|----------|
| D              | 61           | UV-emitting tanning devices | Skin (melanoma), eye (melanoma) | Skin (squamous cell carcinoma) | UVB | Mouse | Skin | Squamous cell carcinoma | Freeman (1975), NR, haired albino, direct; Forbes et al. (1981), MF, Skh-hr-1, direct; de Gruijl et al. (1983), MF, Skh-hr-1, direct |
| D              | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excl. chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Rat | Mammary gland | Adeno-carcinoma | Dicello et al. (2004), F, SD, direct; Imaoka et al. (2007), F, SD, direct; Shellabarger et al. (1966), F, SD, direct; Shellabarger et al. (1980), F, SD, direct; Broerse et al. (1996), F, SD & BN/Bi & WAG/Rij; |
| D              | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excl. chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Rat | Thyroid | Follicular cell carcinoma | Lee et al. (1982), F, Long-Evans, direct |
| D              | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excl. chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Monkey (Rhesus) | Kidney | Cortical cell carcinoma | Broerse et al. (2000), Hollander et al. (2003), M, Rhesus, direct |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|-----------------------------------------|----------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| D              | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excl. chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Haematopoietic tissue | Myeloid leukaemia | Upton et al. (1970), MF, RFM/Un, direct; Ullrich & Storer (1979a, b, c), MF, RFM/Un, direct; Mole et al. (1983), M, CBA/H, direct; Di Majo et al. (1996), M, CBA/Cne, direct; Tanaka et al. (2007), M, B6C3F1, direct | |
| D              | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excl. chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Lymphoid tissue | Lymphoma | Grahn et al. (1992), M, B6CF1, direct; Maisin et al. (1983a,b), M, BALB/c, direct; Di Majo et al. (1996), M, CBA/Cne, direct; Lumniczky et al. (1998), MF, C57BL/6, in utero; Nomura (1986, 1989), M, N5 & LT, parental; Van der Houven van Oordt et al. (1998), MF, C57BL/6, direct | |
| D              | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excl. chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Thymus | Lymphoma | Upton et al. (1970), MF, RFM/Un, direct; Ullrich & Storer (1979a, b, c), MF, RFM/Un, direct; Maisin et al. (1983a,b), M, BALB/c, direct; Sasaki & Kasuga (1981), MF, B6WF1, direct | |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-----------------|--------------|-------|-------------------------------------------|----------------------------------------|-------------------------------------|---------|------|-----------|--------------------------------|----------|
| D               | 62           | X- and Gamma radiation | Salivary gland, esophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukemia (excl. chronic lymphocytic leukemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Ovary | Malignant granulosa cell tumour | Upton et al. (1970), F, RFM/Un, direct; Ullrich & Storer (1979a, b, c), F, BALB/c & RFM/Un, direct; Grahn et al. (1992), F, B6CF1, direct; Sasaki et al. (1978a), F, C57BL/6xWHT/Ht, in utero; Di Majo et al. (2003), F, B6C3F1, direct; Tanaka et al. (2007), F, B6C3F1, direct; Sasaki & Fukuda (2008), F, B6C3F1, in utero; Sasaki & Kasuga (1981), F, B6WF1, direct |
| D               | 62           | X- and Gamma radiation | Salivary gland, esophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukemia (excl. chronic lymphocytic leukemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Lung | Bronchiolo-alveolar carcinoma | Ullrich & Storer (1979a, b, c), F, BALB/C, direct; Ullrich (1983), Ullrich & Preston (1987), F, BALB/C, direct; Grahn et al. (1992), M, B6CF1, direct; Maisin et al. (1983a,b), M, BALB/c, direct; Ullrich et al. (1979), F, RFM, direct; Ullrich (1980), F, RFM, direct; Coggle (1988), F, SAS/4, direct; Sasaki et al. (1978a), MF, C57BL/6xWHT/Ht, in utero; Lumnizcky et al. (1998), MF, C57BL/6, in utero; Nomura (1982), MF, ICR, parental; Dasenbrock et al. (2005), F, C57BL/6N, direct; Dasenbrock et al. (2005), M, B6C3F1, pre-mating |
| D               | 62           | X- and Gamma radiation | Salivary gland, esophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukemia (excl. chronic lymphocytic leukemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Harderian gland | Adeno-carcinoma | Ullrich & Storer (1979a, b, c), MF, RFM, direct; Grahn et al. (1992), M, B6CF1, direct; Di Majo et al. (1996), MF, CBA/Cne, direct |
### Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs

| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-----------------|--------------|-------|------------------------------------------|----------------------------------------|--------------------------------------|---------|------|-----------|-----------------------------------|----------|
| D               | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excluding chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Mammary gland | Adeno-carcinoma | Ullrich & Storer (1979a, b, c), F, BALB/c, direct; Ullrich (1983), Ullrich & Preston (1987), F, BALB/c, direct |          |
| D               | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excluding chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Liver | Hepatocellular carcinoma | Grahn et al. (1992), M, B6CF1, direct; Sasaki et al. (1978b), MF, C57BL/6xWHT/Ht, in utero; Sasaki & Kasuga (1981), MF, B6WF1, direct; Dasenbrock et al. (2005), F, C57BL/6N, direct; Dasenbrock et al. (2005), M, B6C3F1, pre-mating |          |
| D               | 62           | X- and Gamma radiation | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excluding chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation | Mouse | Pituitary gland | Pars distalis carcinoma | Ullrich & Storer (1979a, b, c), F, RFM/Un; Grahn et al. (1992), F, B6CF1, direct; Sasaki et al. (1979a), F, C57BL/6xWHT/Ht, in utero; Sasaki & Kasuga (1981), F, B6WF1, direct |          |
| Volume 100 part | Agent number | Agent                              | Sites with sufficient evidence in humans                                                                 | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site              | Histology          | Study, sex, strain, exposure route | Comments                                                                 |
|-----------------|--------------|------------------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------------------------|---------|------------------|-------------------|-----------------------|----------------------------------------------------------------------|
| D               | 62           | X- and Gamma radiation              | Salivary gland, oesophagus, stomach, colon, lung, bone, basal cell of the skin, female breast, urinary bladder, brain and CNS, thyroid, kidney, leukaemia (excl. chronic lymphocytic leukaemia). In-utero exposure causes cancer (above-mentioned cancers and childhood cancers) | Rectum, liver, pancreas, ovary, prostate, non-Hodgkin lymphoma, multiple myeloma | X- and Gamma radiation               | Mouse   | Soft tissue       | Haemangio-sarcoma | Tanaka et al. (2007), MF, B6C3F1, direct; Sasaki & Kasuga (1981), F, B6WF1, direct | Sufficient evidence in experimental animals but no organ sites identified due to the absence of two (or more) studies of adequate design and quality pointing at the same organ site (with a similar histological origin) in the same species. |
| E               | 63           | Acetaldehyde associated with consumption of alcoholic beverages | Oesophagus and upper aerodigestive tract combined |                                                                      |                                      | See comments |  | Oral cavity | Squamous cell carcinoma | See comments | The experts consider concordance when an agent in humans such as Alcoholic beverages is tested in animals by one of its main components such as ethanol. |
| E               | 64           | Alcoholic beverages                | Oral cavity, pharynx, larynx, oesophagus, colorectum, hepatocellular carcinoma, breast |                                                                      |                                      | See comments | Rat | Oral cavity | Squamous cell carcinoma |                                                                              |  |
| E               | 65           | Areca nut                          | Areca nut |                                                                      | Areca nut                           | Mouse      | Soft tissue       | Fibrosarcoma | areca nut: Ranadive et al. (1976), MF, Swiss, s.c.; polyphenol fraction of areca nut: Shivapurkar et al. (1980), M, Swiss, s.c. | No epidemiological data available for areca nut alone; no human target site indicated |
| E               | 65           | Areca nut                          | Areca nut |                                                                      | Areca nut                           | Hamster    | Oral cavity       | Squamous cell carcinoma | Suri et al. (1971), M, Syrian golden, b.pouch; Ranadive et al. (1979), MF, Syrian golden, b.pouch implant |  |
| E               | 66           | Betel quid with tobacco             | Oral cavity, pharynx, oesophagus |                                                                      |                                      | See comments |  |  |  |  | Sufficient evidence in experimental animals but no organ sites identified due to the absence of two (or more) studies of adequate design and quality pointing at the same organ site (with a similar histological origin) in the same species. |
| E               | 67           | Betel quid without tobacco          | Oral cavity, oesophagus |                                                                      | Liver                  | betel quid | Hamster | Forestomach | Squamous cell carcinoma | Ranadive et al., (1979), MF, Syrian golden, b.pouch; Ranadive et al., (1979) experiment 2, MF, Syrian golden, b.pouch implant |  |
| E               | 68           | Coal, indoor emissions from household combustion of | Lung |                                                                      | coal smoke             | Mouse      | Lung    | Bronchiolo-alveolar carcinoma | Liang et al. (1988), MF, Kunming, in.; Lin et al. (1995), MF, Kunming, in. |  |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|----------------------------------------|---------------------------------------|--------------------------------------|---------|------|-----------|----------------------------------|----------|
| E 68           |              | Coal, indoor emissions from household combustion of | Lung | coal soot extract | Mouse | Lung | Bronchiolo-alveolar carcinoma | Yin et al. (1984), NR, Kunming, i.t.; Liang et al. (1983), M, Kunming, s.c.; Liang et al. (1984), M, Kunming, s.c. |
| E 68           |              | Coal, indoor emissions from household combustion of | Lung | soot | Mouse | Skin | Squamous cell carcinoma | Mumford et al. (1990), F, SENCAR, sk.; Campbell (1939), MF, NR, sk. |
| E 69           |              | Ethanol in alcoholic beverages | See comments | ethanol | rat | Oral cavity | Squamous cell carcinoma | Soffritti et al. (2002), F, SD, p.o.; Soffritti et al. (2002), MF, SD, in utero; The experts consider concordance when an agent in humans such as Alcoholic beverages is tested in animals by one of its main components such as ethanol |
| E 70           |              | N'-Nitrosonornicotine (NNN) and 4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanon (NNK) | NNN | Rat | Lung | Bronchiolo-alveolar carcinoma | Prokopczyk et al. (1991), M, F344, oral swab; Rivenson et al. (1988), M, F344, p.o.; Hecht et al. (1986a,b), M, F344, s.c.; Hoffmann et al. (1984), MF, F344, s.c.; Belinsky et al. (1990), M, F344, s.c. |
| E 70           |              | N'-Nitrosonornicotine (NNN) and 4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanon (NNK) | NNN | Rat | Lung | Squamous cell carcinoma | Prokopczyk et al. (1991), M, F344, oral swab; Rivenson et al. (1988), M, F344, p.o.; Belinsky et al. (1990), M, F344, s.c. |
| E 70           |              | N'-Nitrosonornicotine (NNN) and 4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanon (NNK) | NNN | Rat | Oesophagus | Squamous cell carcinoma | Hoffmann et al. (1975), M, F344, p.o.; Hecht et al. (1983), MF, F344, p.o. |
| E 70           |              | N'-Nitrosonornicotine (NNN) and 4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanon (NNK) | Mechanistic upgrade* | NNN | Rat | Liver | Hepatocellular carcinoma | Hoffmann et al. (1984), MF, F344, s.c.; Hecht et al. (1986a,b), M, F344, s.c. |
| E 70           |              | N'-Nitrosonornicotine (NNN) and 4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanon (NNK) | NNN | Hamster | Lung | Bronchiolo-alveolar carcinoma | Hoffmann et al. (1981), MF, Syrian golden, s.c.; Schüller et al. (1990), M, Syrian golden, s.c. |
| E 70           |              | N'-Nitrosonornicotine (NNN) and 4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanon (NNK) | NNN | Hamster | Nasal cavity | Adeno-carcinoma | Correa et al. (1990), MF, Syrian golden, in utero, s.c.; Schüller et al. (1994), M, Syrian golden (progeny), s.c. |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|-----------------------------------------|----------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| E 71           | Salted fish, chinese style | Nasopharynx | Stomach | Steamed cantonese -style salted fish | Rat | Nasal cavity, paranasal sinus, nasopharynx | Sarcoma (spindle cell, soft tissue, fibrosarcoma, rhabdomyosarcoma), carcinoma (undifferentiated), squamous cell carcinoma | Yu et al. (1989), MF, inbred Wistar-Kyoto, p.o.; Zheng et al. (1994), MF, Sprague-Dawley, p.o., in utero |
| E 72           | Second-hand tobacco smoke | Lung | Larynx, pharynx | Second hand tobacco smoke | Mouse | Bronchiolo-alveolar carcinoma | Witschi et al. (1997a), M, AJ, inh.; Witschi et al. (1997b), F, AJ, inh.; Witschi et al. (2006), MF, AJ, inh. |
| E 73           | Tobacco smoking | Lung, liver, kidney, pancreas, ureter, urinary bladder, uterine cervix, ovary, myeloid leukaemia, oral cavity, nasal cavity, paranasal sinuses; naso-, oro-, hypopharynx; larynx, esophagus, stomach, colorectum, hepatoblastoma in children (parental smoking) | Breast, childhood leukemia (acute lymphocytic leukaemia) (parental smoking) | Tobacco smoke | Mouse | Bronchiolo-alveolar carcinoma | Harris & Negroni (1967), MF, C57BL, inh.; Leuchtenberger & Leuchtenberger (1970), MF, Snell's, inh.; Hutt et al. (2005), F, B6C3F1, inh.; Balansky et al. (2007), MF, Swiss, inh. |
| E 73           | Tobacco smoking | Lung, liver, kidney, pancreas, ureter, urinary bladder, uterine cervix, ovary, myeloid leukaemia, oral cavity, nasal cavity, paranasal sinuses; naso-, oro-, hypopharynx; larynx, esophagus, stomach, colorectum, hepatoblastoma in children (parental smoking) | Breast, childhood leukemia (acute lymphocytic leukaemia) (parental smoking) | Tobacco smoke | Mouse | Squamous cell carcinoma | Balansky et al. (2007), MF, Swiss; Hutt et al. (2005), F, B6C3F1, inh. |
Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs

| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|---------------------------------------|---------------------------------------|---------|------|-----------|-----------------------------------|----------|
| E              | 73           | Tobacco smoking | Lung, liver, kidney, pancreas, ureter, urinary bladder, uterine cervix, ovary, myeloid leukaemia, oral cavity, nasal cavity, paranasal sinuses; naso-, oro-, hypopharynx; larynx, esophagus, stomach, colorectum, hepatoblastoma in children (parental smoking) | Breast, childhood leukaemia (acute lymphocytic leukaemia) (parental smoking) | Tobacco smoke | Mouse | Skin | Squamous cell carcinoma | Gargus et al. (1976), F, ICR Swiss, sk.; Gori (1976, 1977, 1980), F, ICR Swiss, sk.; Wynder et al. (1953), MF, CAF1, sk.; Hayes et al. (2007), F, SENCAR, sk. |
| E              | 73           | Tobacco smoking | Lung, liver, kidney, pancreas, ureter, urinary bladder, uterine cervix, ovary, myeloid leukaemia, oral cavity, nasal cavity, paranasal sinuses; naso-, oro-, hypopharynx; larynx, esophagus, stomach, colorectum, hepatoblastoma in children (parental smoking) | Breast, childhood leukaemia (acute lymphocytic leukaemia) (parental smoking) | Tobacco smoke | Hamster | Larynx | Carcinoma | Dontenwill et al. (1973), MF, Syrian golden, inh.; Dontenwill et al. (1977), MF, Syrian golden, inh.; Bernfeld et al. (1979), M, Syrian golden BIO 15.16 strain, inh.; Bernfeld et al. (1974), M, Syrian golden BIO 15.16 strain, inh. |
| E              | 73           | Tobacco smoking | Lung, liver, kidney, pancreas, ureter, urinary bladder, uterine cervix, ovary, myeloid leukaemia, oral cavity, nasal cavity, paranasal sinuses; naso-, oro-, hypopharynx; larynx, esophagus, stomach, colorectum, hepatoblastoma in children (parental smoking) | Breast, childhood leukaemia (acute lymphocytic leukaemia) (parental smoking) | Tobacco smoke | Rat | Lung | Bronchiolo-alveolar carcinoma | Finch et al. (1995), MF, F344, inh.; Mauderly et al. (2004), MF, F344, inh. |
| Volume 100 part | Agent number | Agent                        | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site          | Histology                        | Study, sex, strain, exposure route                                                                 |
|----------------|--------------|------------------------------|------------------------------------------|--------------------------------------|-------------------------------------|---------|---------------|----------------------------------|-------------------------------------------------------------------------------------------------|
| E 73           |              | Tobacco smoking              | Lung, liver, kidney, pancreas, ureter, urinary bladder, uterine cervix, ovary, myeloid leukaemia, oral cavity, nasal cavity, paranasal sinuses; naso-, oro-, hypopharynx; larynx, oesophagus, stomach, colorectum, hepatoblastoma in children (parental smoking) | Breast, childhood leukemia (acute lymphocytic leukaemia) (parental smoking) | Tobacco smoke                       | Rat      | Lung          | Squamous cell carcinoma          | Stanton et al. (1972), F. Osborne-Mendel, i.pulmo.; Dagle et al. (1978), F, OM/NCR and Sprague-Dawley, i.pulmo. |
| E 74           |              | Tobacco, smokeless           | Oral cavity, oesophagus, pancreas         | Snuff                                | Rat                                 | Lip      | Sarcoma       |                                  | Johansson et al. (1989), M, Sprague-Dawley, s.c.; Johansson et al. (1991), M, Sprague-Dawley, s.c.; |
| E 74           |              | Tobacco, smokeless           | Oral cavity, oesophagus, pancreas         | Snuff                                | Rat                                 | Oral cavity | Squamous cell carcinoma          | Johansson et al. (1989), M, Sprague-Dawley, s.c.; Johansson et al. (1991), M, Sprague-Dawley, s.c.; |
| F 75           |              | Acid mists, strong inorganic | Larynx                                  |                                    |                                    | Lung     | No animal data available.       |        |                                                                           |
| F 76           |              | Aflatoxins                   | Hepatocellular carcinoma                  | Aflatoxin G1                         | Rat                                 | Liver     | Hepatocellular carcinoma      | Wogan et al. (1971), M, F344, g.; Butler et al. (1969), MF, MRC, d.w.                              |
| F 76           |              | Aflatoxins                   | Hepatocellular carcinoma                  | Aflatoxin B1                         | Rat                                 | Liver     | Hepatocellular carcinoma      | Hao et al. (2009), NR, Wistar, i.p.; Wogan & Newberne (1967), MF, F344, p.o.; Wogan et al. (1971), M, F344, g.; Wogan et al. (1974), M, F344, p.o.; Epstein et al. (1969), M, Wistar, p.o. |
| F 77           |              | Aluminium production         | Urinary bladder, lung                     |                                    |                                    |          |                            | Sufficient evidence in experimental animals for airborne particulate polynuclear organic matter from aluminium-production plants, but no organ sites identified due to the absence of two (or more) studies of adequate design and quality pointing at the same organ site (with a similar histological origin) in the same species. |
| F 78           |              | 4-Aminobiphenyl              | Urinary bladder                          | 4-Aminobiphenyl                      | Mouse                               | Liver     | Hepatocellular carcinoma      | Clayson et al. (1967), F, C57sdF-F1, g.; Schieferstein et al. (1985), F, BALB/cSlCrlC3Hf/Nctr, d.w.; Dooley et al. (1992), M, B6C3F1/Nctr, i.p. |
| F 78           |              | 4-Aminobiphenyl              | Urinary bladder                          | 4-Aminobiphenyl                      | Mouse                               | Soft tissue | Haemangio-sarcoma            | Schieferstein et al. (1985), MF, BALB/cSlCrlC3Hf/Nctr, d.w.                                    |
| Volume | Agent number | Agent                          | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site                          | Histology                      | Study, sex, strain, exposure route | Comments                                      |
|--------|--------------|--------------------------------|------------------------------------------|---------------------------------------|--------------------------------------|---------|------------------------------|---------------------------------|-------------------------------------|----------------------------------|
| F      | 78           | 4-Aminobiphenyl                | Urinary bladder                          |                                       | 4-Aminobiphenyl                      | Dog     | Urinary bladder              | Transitional cell carcinoma      | Deichmann et al. (1958), F, Monogrel, p.o.; Deichmann et al. (1965), F, Beagle, p.o.; Block et al. (1978), F, Beagle, p.o. |                                           |
| F      | 79           | Auramine production            | Urinary bladder                          |                                       |                                      |         |                              |                                 | Sufficient evidence of carcinogenicity in animals of auramine per se; no animal data available for auramine production. |                                           |
| F      | 80           | Benzene                        | Acute myeloid leukaemia/acute non-lymphocytic leukaemia |                                       | Benzene                             | Rat     | Zymbal gland                  | Carcinoma                       | Maltoni et al. (1982a,b, 1983, 1985, 1989), F, Sprague-Dawley, in utero; NTP (1986), Maronpot (1987), Huff et al. (1989), MF, F344, g.; Maltoni et al. (1983, 1988a, 1989), Mehlman (2002), MF, Wistar, g.; Maltoni et al. (1983, 1989), Maltoni & Scarnato (1979), Mehlman (2002), F, Sprague-Dawley, g.; Maltoni et al. (1983, 1989), Maltoni & Scarnato (1979), Mehlman (2002), MF, Sprague-Dawley, g. |                                           |
| F      | 80           | Benzene                        | Acute myeloid leukaemia/acute non-lymphocytic leukaemia |                                       | Benzene                             | Rat     | Oral cavity                  | Carcinoma                       | Maltoni et al. (1982a,b, 1983, 1985, 1989), F, Sprague-Dawley, in utero; NTP (1986), Maronpot (1987), Huff et al. (1989), MF, F344, g.; Maltoni et al. (1983, 1989), Maltoni & Scarnato (1979), Mehlman (2002), MF, Sprague-Dawley, g. |                                           |
| F      | 80           | Benzene                        | Acute myeloid leukaemia/acute non-lymphocytic leukaemia |                                       | Benzene                             | Rat     | Forestomach                  | Squamous cell carcinoma         | Maltoni et al. (1982a,b, 1983, 1985, 1989), F, Sprague-Dawley, in utero; Maltoni et al. (1983, 1989), Maltoni & Scarnato (1979), Mehlman (2002), F, Sprague-Dawley, g. |                                           |
| F      | 80           | Benzene                        | Acute myeloid leukaemia/acute non-lymphocytic leukaemia |                                       | Benzene                             | Rat     | Skin                         | Squamous cell carcinoma         | NTP (1986), Maronpot (1987), Huff et al. (1989), 3, F344, g.; Maltoni et al. (1983, 1989), Maltoni & Scarnato (1979), Mehlman (2002), 3, Sprague-Dawley, g. |                                           |

Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs.
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|-----------------|--------------|-------|------------------------------------------|---------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| F 80            | Benzene      | Acute myeloid leukaemia/acute non-lymphocytic leukaemia | Acute lymphocytic leukaemia, chronic lymphocytic leukaemia, multiple myeloma, non-Hodgkin lymphoma | Benzene | Mouse | Lung | Bronchiole-alveolar carcinoma | NTP (1986), Maronpot (1987), Huff et al. (1989), MF, B6C3F1, g.; Maltoni et al. (1988a), MF, Swiss, g.; Maltoni et al. (1989), Mehlman (2002), MF, RFJ, g.; Snyder et al. (1988), M, CD-1, inh.; Snyder et al. (1988), M, CD-1, inh.; Farris et al. (1993), M, CBA/Ca, inh. |
| F 80            | Benzene      | Acute myeloid leukaemia/acute non-lymphocytic leukaemia | Acute lymphocytic leukaemia, chronic lymphocytic leukaemia, multiple myeloma, non-Hodgkin lymphoma | Benzene | Mouse | Zymbal gland | Carcinoma | Snyder et al. (1988), M, C57Bl, inh.; Snyder et al. (1988), M, CD-1, inh.; NTP (1986), Maronpot (1987), Huff et al. (1989), MF, B6C3F1, g. |
| F 80            | Benzene      | Acute myeloid leukaemia/acute non-lymphocytic leukaemia | Acute lymphocytic leukaemia, chronic lymphocytic leukaemia, multiple myeloma, non-Hodgkin lymphoma | Benzene | Mouse | Mammary gland | Adeno-carcinoma | NTP (1986), Maronpot (1987), Huff et al. (1989), F, B6C3F1, g.; Maltoni et al. (1988a), F, Swiss, g.; Maltoni et al. (1989), Mehlman (2002), F, RFJ, g. |
| F 80            | Benzene      | Acute myeloid leukaemia/acute non-lymphocytic leukaemia | Acute lymphocytic leukaemia, chronic lymphocytic leukaemia, multiple myeloma, non-Hodgkin lymphoma | Benzene | Mouse | Preputial gland | Squamous cell carcinoma | Farris et al. (1993), M, CBA/Ca, inh.; NTP (1986), Maronpot (1987), Huff et al. (1989), M, B6C3F1, g. |
| F 80            | Benzene      | Acute myeloid leukaemia/acute non-lymphocytic leukaemia | Acute lymphocytic leukaemia, chronic lymphocytic leukaemia, multiple myeloma, non-Hodgkin lymphoma | Benzene | Mouse | Thymus | Lymphoma | Snyder et al. (1980), M, C57Bl/6J, inh.; Cronkite et al. (1984), F, C57Bl/6 BNL, inh. |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|----------------------------------------|----------------------------------------|---------|------|-----------|-----------------------------------|----------|
| F 80           | F 80         | Benzene | Acute myeloid leukaemia/acute non-lymphocytic leukaemia | Acute lymphocytic leukaemia, chronic lymphocytic leukaemia, multiple myeloma, non-Hodgkin lymphoma | Benzene Mouse Lymphoid tissue Lymphoma | Farris et al. (1993), M, CBA/Ca, inh.; NTP (1986), Maronpot (1987), Huff et al. (1989), MF, B6C3F1, g.; NTP (2007), M, haploinsufficient p16Ink4a/p19Arf, g. |
| F 80           | F 80         | Benzene | Acute myeloid leukaemia/acute non-lymphocytic leukaemia | Acute lymphocytic leukaemia, chronic lymphocytic leukaemia, multiple myeloma, non-Hodgkin lymphoma | Benzene Mouse Haematopoietic tissue Granulocytic leukaemia | Cronkite et al. (1989), MF, CBA/Ca BNL, inh.; French & Saulnier (2000), F, homozygous, FVB/N-Tg.AC (v-Ha-ras), sk. |
| F 81           | F 81         | Benzidine | Urinary bladder | Benzidine Mouse Liver Hepatocellular carcinoma | Vesselinovitch et al. (1975), M, B6C3F1, p.o.; Vesselinovitch (1983), MF, B6C3F1, p.o.; Littlefield et al. (1983, 1984), MF, C57BL/6J C3Hf/Nctr females × BALB/cCrjC3Hf/Nctr males, d.w.; Littlefield et al. (1983, 1984), MF, Mono-hybrid (F1 females and F1 males) with F1 = C57BL/6J C3Hf/Nctr females × BALB/cCrjC3Hf/Nctr males, d.w.; |
| F 81           | F 81         | Benzidine | Urinary bladder | Benzidine Rat Mammary gland Adeno-carcinoma | Griswold et al. (1966), F, Sprague-Dawley, g.; Morton et al. (1981), F, CD, i.p. |
| F 82           | F 82         | Benzidine, dyes metabolized to | Direct Black 38 Mouse Liver Hepatocellular carcinoma | Asada et al. (1981), NR, ICR, d.w. |
| F 82           | F 82         | Benzidine, dyes metabolized to | Direct Blue 6 Rat Liver Hepatocellular carcinoma | NCI (1978), Robens et al. (1980), MF, F344, p.o. |
| F 82           | F 82         | Benzidine, dyes metabolized to | Direct Brown 95 Rat Liver Hepatocellular carcinoma | NCI (1978), Robens et al. (1980), F, F344, p.o. |
| F 83           | F 83         | Benzo[a]pyrene | Benzene Mouse Skin Squamous cell carcinoma | Van Duuren et al. (1973), F, Swiss, sk.; Cavalieri et al. (1977), F, Swiss, sk.; Levin et al. (1977), F, C57BL/6J, sk.; Halb et al. (1984), F, NMRI, sk.; Warshawsky & Barkley (1987), M, C3H/HeJ, sk.; Cavalieri et al. (1988a), F, Swiss, sk.; Toth (1980), MF, Swiss, i.col. |
| F 83           | F 83         | Benzo[a]pyrene | Benzene Mouse Skin Fibrosarcoma | Kouri et al. (1980), M, C3Hf/Cum, s.c.; Rippe & Pott (1989), F, NR, s.c. |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|---------------------------------------|-------------------------------------|---------|------|-----------|----------------------------------|----------|
| F 83           | Benzo[a]pyrene | Mechanistic upgrade* | Benzo[a]pyrene | Mouse | Lung | Bronchiolo-alveolar carcinoma | Balarsky et al. (2007), F, MF, Swiss (newborn), s.c.; Weyand et al. (1995), F, AJ, p.o.; Vesselinovitch et al. (1975a, b), MF, B6C3F1, i.p.; Vesselinovitch et al. (1975a, b), MF, C3A/JF1, i.p.; Wisloki et al. (1986), MF, CD-1, i.p.; Lavoie et al. (1987), MF, CD-1, i.p.; Busby et al. (1989), MF, Swiss, i.p.; Weyand et al. (1995), MF, AJ, i.p.; Rossi et al. (1983), NR, Swiss, i.f. | For benzo[a]pyrene no human data are listed, because no epidemiological data are available on the agent alone |
| F 83           | Benzo[a]pyrene | | Benzo[a]pyrene | Mouse | Forestomach | Squamous cell carcinoma | Weyand et al. (1995), F, AJ, p.o.; Culp et al. (1998), B6C3F1, i.p.; Vesselinovitch et al. (1975a, b), MF, C3A/JF1, i.p.; Weyand et al. (1995), F, A/J, i.p.; Toth (1980), MF, Swiss, i.col.; Anderson et al. (1983), F, C57Bl/6, i.col. | |
| F 83           | Benzo[a]pyrene | | Benzo[a]pyrene | Mouse | Liver | Hepatocellular carcinoma | Vesselinovitch et al. (1975a, b), MF, B6C3F1, i.p.; Vesselinovitch et al. (1975a, b), M, C3A/JF1, i.p.; Lavoie et al. (1987), M, CD-1, i.p.; Rodriguez et al. (1997), M, B6C3F1 (infant), i.p. | |
| F 83           | Benzo[a]pyrene | | Benzo[a]pyrene | Mouse | Lymphoid tissue | Lymphoma | Vesselinovitch et al. (1975a, b), MF, B6C3F1, i.p.; Vesselinovitch et al. (1975a, b), MF, C3A/JF1, i.p.; Toth (1980), MF, Swiss, i.col.; Anderson et al. (1983), F, C57Bl/6, i.col. | |
| F 83           | Benzo[a]pyrene | | Benzo[a]pyrene | Rat | Skin | Fibrosarcoma | Pott et al. (1973a,b), F, Wistar, s.c.; Rippe & Pott (1989), F, NR, s.c.; Rippe & Pott (1989), F, NR, s.c. | |
| F 83           | Benzo[a]pyrene | | Benzo[a]pyrene | Rat | Mammary gland | Fibrosarcoma | Cavaliere et al. (1991), F, Sprague-Dawley, i.mam.; Cavaliere et al. (1988b), F, Sprague-Dawley, i.mam.; Cavaliere et al. (1988a), F, Sprague-Dawley, i.mam. | |
| F 83           | Benzo[a]pyrene | | Benzo[a]pyrene | Rat | Lung | Squamous cell carcinoma | Deutsch-Wenzel et al. (1983), F, OM, i.pulmo.; Iwagawa et al. (1989), M, F344/NiSc, i.pulmo.; Wenzel-Hartung et al. (1990), F, Osborne-Mendel, i.pulmo.; Pott et al. (1987), F, Wistar-WU/Kisslegg, i.t.; Steinhoff et al. (1991), MF, Sprague-Dawley, i.t. | |
| F 83           | Benzo[a]pyrene | Mechanistic upgrade* | Benzo[a]pyrene | Rat | Mammary gland | Adeno-carcinoma | el-Bayoumy et al. (1995), F, CrI/CD(SD)BR, g.; Cavaliere et al. (1988b), F, Sprague-Dawley, i.mam.; Cavaliere et al. (1988a), F, Sprague-Dawley, i.mam. | For benzo[a]pyrene no human data are listed, because no epidemiological data are available on the agent alone |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|----------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| F 83           | Benzo[a]pyrene | Benzo[a]pyrene | Hamster | Skin | Fibrosarcoma | Homburger et al. (1972), MF, Syrian golden, i.t.; Feron et al. (1977), MF, Syrian golden, i.t.; Bartsch et al. (1980), MF, Syrian golden, i.t.; Kobayashi et al. (1975), M, Syrian golden, i.t.; Ketkar et al. (1978), F, Syrian golden, i.t.; Stenbäck & Rowland (1978), NR, Syrian golden, i.t.; Ketkar et al. (1979), M, Syrian golden, i.t. |
| F 83           | Benzo[a]pyrene | Benzo[a]pyrene | Hamster | Lower respiratory tract (larynx, trachea, lung) | Squamous cell carcinoma | Thyssen et al. (1981), M, Syrian golden, i.t.; Feron (1972), MF, Syrian golden, i.t.; Feron et al. (1973), M, Syrian golden, i.t.; Kobayashi et al. (1975), M, Syrian golden, i.t.; Ketkar et al. (1978), F, Syrian golden, i.t.; Stenbäck & Rowland (1978), NR, Syrian golden, i.t.; Ketkar et al. (1979), M, Syrian golden, i.t. |
| F 83           | Benzo[a]pyrene | Benzo[a]pyrene | Hamster | Lung | Adeno-carcinoma | Feron et al. (1973), M, Syrian golden, i.t.; Henry et al. (1973), NR, Syrian golden, i.t.; Kobayashi (1975), MF, Syrian golden, i.t.; Ketkar et al. (1979), M, Syrian golden, i.t. |
| F 83           | Benzo[a]pyrene | Benzo[a]pyrene | Hamster | Forestomach | Squamous cell carcinoma | Sellakumar et al. (1976), M, Syrian golden, i.t.; Saffiotti et al. (1972), MF, Syrian golden, i.t.; Sellakumar et al. (1973), M, Syrian golden, i.t.; Stenbäck & Rowland (1979), NR, Syrian golden, i.t.; Solt et al. (1987), M, Syrian golden, i.t. |
| F 84           | Bis(chloromethyl)ether; chloromethyl methyl ether (technical-grade) | Bis(chloromethyl)ether | Rat | Nasal cavity | Olfactory neuroblastoma | Kuschner et al. (1975), M, Sprague-Dawley, i.n.; Leong et al. (1981), M, Sprague-Dawley, i.n. |
| F 84           | Bis(chloromethyl)ether; chloromethyl methyl ether (technical-grade) | Bis(chloromethyl)ether | Mouse | Soft tissue | Sarcoma | Van Duuren et al. (1975), F, Swiss, i.p. |
| F 84           | Bis(chloromethyl)ether; chloromethyl methyl ether (technical-grade) | Bis(chloromethyl)ether | Mouse | Skin | Fibrosarcoma | Van Duuren et al. (1975), F, Swiss, s.c.; Zajdel et al. (1980), M, XVLinc/Z, s.c. |
| F 85           | 1,3-Butadiene | Haematolymphatic organs | Butadiene | Lymphoid tissue | Lymphoma | NTP (1984), Huff et al. (1985), Miller et al. (1988), Melnick et al. (1993), Melnick & Huff (1993), Hong et al. (2000), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, i.n.; Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, i.n.; Melnick et al. (1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, i.n. |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|--------------------------------------|--------------------------------------|---------|------|-----------|----------------------------------|----------|
| 85             | 1,3-Butadiene| Haematolymphatic organs               | Butadiene                              | Mouse                                | Soft tissue                          | Haemangiosarcoma | NTP (1984), Huff et al. (1985), Miller et al. (1989), Melnick et al. (1993), Melnick & Huff (1993), Hong et al. (2000), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, inh.; Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, inh.; Melnick et al. (1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), M, B6C3F1, inh. |
| 85             | 1,3-Butadiene| Haematolymphatic organs               | Butadiene                              | Mouse                                | Liver                                | Hepatocellular carcinoma | Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, inh.; NTP (1984), Huff et al. (1985), Miller et al. (1989), Melnick et al. (1993), Melnick & Huff (1993), Hong et al. (2000), Melnick & Sills (2001), Kim et al. (2005), F, B6C3F1, inh.; Melnick et al. (1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), M, B6C3F1, inh. |
| 85             | 1,3-Butadiene| Haematolymphatic organs               | Butadiene                              | Mouse                                | Mammary gland                        | Adeno-carcinoma | NTP (1984), Huff et al. (1985), Miller et al. (1989), Melnick et al. (1993), Melnick & Huff (1993), Hong et al. (2000), Melnick & Sills (2001), Kim et al. (2005), F, B6C3F1, inh.; Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), F, B6C3F1, inh. |
| 85             | 1,3-Butadiene| Haematolymphatic organs               | 1,3-Butadiene                          | Mouse                                | Mammary gland                        | Adeno-acanthoma | Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), F, B6C3F1, inh.; NTP (1984), Huff et al. (1985), Miller et al. (1989), Melnick et al. (1993), Melnick & Huff (1993), Hong et al. (2000), Melnick & Sills (2001), Kim et al. (2005), F, B6C3F1, inh. |
| 85             | 1,3-Butadiene| Haematolymphatic organs               | 1,3-Butadiene                          | Mouse                                | Lung                                 | Bronchiolo-alveolar carcinoma | NTP (1984), Huff et al. (1985), Miller et al. (1989), Melnick et al. (1993), Melnick & Huff (1993), Hong et al. (2000), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, inh.; Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, inh.; Melnick et al. (1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), M, B6C3F1, inh. |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|------------|-------|-----------------------------------------|--------------------------------------|--------------------------------------|---------|------|----------|----------------------------------|----------|
| F 85           | 1,3-Butadiene | Haematolymphatic organs                  | 1,3-Butadiene                         | Mouse                                | Fore stomach                        | Squamous cell carcinoma          | Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), MF, B6C3F1, inh.; NTP (1993), Huff et al. (1995), Miller et al. (1989), Melnick et al. (1993), Melnick & Huff (1993), Hong et al. (2000), MF, B6C3F1, inh.; Melnick et al. (1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), M, B6C3F1, inh. |
| F 85           | 1,3-Butadiene | Haematolymphatic organs                  | 1,3-Butadiene                         | Mouse                                | Harderian gland                     | Carcinoma                        | Melnick et al. (1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), M, B6C3F1, inh.; Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), M, B6C3F1, inh. |
| F 85           | 1,3-Butadiene | Haematolymphatic organs                  | 1,3-Butadiene                         | Mouse                                | Preputial gland                     | Squamous cell carcinoma          | Miller et al. (1989), Melnick et al. (1990a, b, 1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), M, B6C3F1, inh.; Miller et al. (1989), Melnick et al. (1993), Melnick & Huff (1993), NTP (1993), Melnick & Sills (2001), Kim et al. (2005), M, B6C3F1, inh. |
| F 86           | Coal gasification | Lung | Coal-tars from gas-works               | Mouse                                | Skin                                | Squamous cell carcinoma          | Hieger (1929), NR, NR, sk.; Woglom & Herly (1929), NR, NR, sk.; Grigor’ev (1960), M, A/J, sk. |
| F 87           | Coal-tar distillation | Skin | Coal tars [class 1]                   | Mouse                                | Skin                                | Squamous cell carcinoma          | Tsutsui (1918), NR, random-bred, sk.; Berenblum (1930), NR, NR, sk.; Bonser (1932), NR, NR, sk.; Hueper & Payne (1960), NR, C57BL, sk.; Shustova & Samoilovich (1971), NR, (C57BLxCBA)/F1, sk. |
| F 88           | Coal-tar pitch   | Lung | Bladder                               | Coal-tar pitch                       | Mouse                                | Skin                                | Kireeva (1968), NR, CC57 white, sk.; Wallcave et al. (1971), NR, Swiss, sk.; Emmett et al. (1981), M, C3H/HeJ, sk.; Nesnow et al. (1983), MF, SENCAR, sk. |
| F 89           | Coke production  | Lung | Tar from coke ovens                  | Mouse                                | Lung                                | Bronchiolo-alveolar carcinoma     | Tye & Stemmer (1967), M, C3H/HeJ, inh.; MacEwen et al. (1976), F, ICR-CF1, inh.; MacEwen et al. (1976), F, CAFT-JAX, inh. |
| F 89           | Coke production  | Lung | Tar from coke ovens                  | Rat                                  | Lung                                | Squamous cell carcinoma          | MacEwen et al. (1976), MF, CFE Sprague-Dawley, inh. |
| F 89           | Coke production  | Lung | Tar from coke ovens                  | Mouse                                | Skin                                | Squamous cell carcinoma          | Nesnow et al. (1983), MF, SENCAR, sk.; Nesnow et al. (1982,1983), MF, SENCAR, sk. |
| Volume 100 part | Agent number | Agent       | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site            | Histology | Study, sex, strain, exposure route | Comments                      |
|-----------------|--------------|-------------|------------------------------------------|---------------------------------------|--------------------------------------|---------|-----------------|-----------|--------------------------------|--------------------------------|
| F               | 90           | Ethylene oxide | Lymphatic and haemato-poietic cancers (specifically lymphoid tumours, ie, non-Hodgkin lymphoma, multiple myeloma and chronic lymphocytic leukaemia), and breast cancer | Ethylene oxide | Ethylene oxide | Rat      | Brain           | Glioma    | Lynch et al. (1984), M, F344, inh.; Snellings et al. (1984), Garman et al. (1985, 1986), MF, F344, inh. |                                   |
| F               | 90           | Ethylene oxide | Lymphatic and haemato-poietic cancers (specifically lymphoid tumours, ie, non-Hodgkin lymphoma, multiple myeloma and chronic lymphocytic leukaemia), and breast cancer | Ethylene oxide | Ethylene oxide | Rat      | Lymphoid tissue | Lymphoma | Snellings et al. (1984), Garman et al. (1985, 1986), MF, F344, inh.; Lynch et al. (1984), M, F344, inh. |                                   |
| F               | 90           | Ethylene oxide | Lymphatic and haemato-poietic cancers (specifically lymphoid tumours, ie, non-Hodgkin lymphoma, multiple myeloma and chronic lymphocytic leukaemia), and breast cancer | Ethylene oxide | Ethylene oxide | Rat      | Peritoneum      | Mesothelioma | Lynch et al. (1984), M, F344, inh.; Snellings et al. (1984), Garman et al. (1985, 1986), M, F344, inh. |                                   |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|--------------------------------------|--------------------------------------|---------|------|-----------|----------------------------------|----------|
| F 90           | Ethylene oxide | Mechanistic upgrade* | Lymphatic and haematopoietic cancers (specifically lymphoid tumours, ie, non-Hodgkin lymphoma, multiple myeloma and chronic lymphocytic leukaemia), and breast cancer | Ethylene oxide | Mouse | Lung | Bronchiolo-alveolar carcinoma | Adkins et al. (1986); F, AU, inh.; NTP (1987); Picut et al. (2003); MF, B6C3F1, inh. | |
| F 91           | Formaldehyde | Nasopharynx, leukaemia | Paranasal sinuses | Formaldehyde | Rat | Nasal cavity | Squamous cell carcinoma | Swenberg et al. (1980), Kerns et al. (1983a,b), Gibson (1984), CIIT (1981), MF, F344, inh.; Woutersen et al. (1989), M, Wistar, inh.; Monticello et al. (1996), M, F344, inh.; Kamata et al. (1997), M, F344, inh. | Sufficient evidence of carcinogenicity in animals of CI Basic Red 9 (Magenta 0) per se; no animal data available for magenta production. |
| F 92           | Iron and steel founding (occupational exposure during) | Lung | | | | | | | No animal data available |
| F 93           | Isopropyl alcohol manufacture using strong acids | Nasal cavity | | | | | | | No animal data available |
| F 94           | Magenta production | Urinary bladder | | | | | | | |
| F 95           | 4,4’-Methylenebis(2-chloroaniline) (MOCA) | MOCA | Rat | Lung | Bronchiolo-alveolar carcinoma | Grundmann & Steinhoff (1970), MF, Wistar, p.o.; Stula et al. (1975), MF, CD, p.o.; Stula et al. (1975), MF, CD, p.o.; Kommineni et al. (1979), M, CD, p.o. | | For MOCA no human data are listed because of inadequate evidence of carcinogenicity |
| F 95           | 4,4’-Methylenebis(2-chloroaniline) (MOCA) | MOCA | Rat | Liver | Hepatocellular carcinoma | Grundmann & Steinhoff (1970), MF, Wistar, p.o.; Stula et al. (1975), M, CD, p.o.; Kommineni et al. (1979), M, CD, p.o. | | |
| F 95           | 4,4’-Methylenebis(2-chloroaniline) (MOCA) | MOCA | Rat | Mammary gland | Adeno-carcinoma | Stula et al. (1975), F, CD, p.o.; Kommineni et al. (1979), M, CD, p.o. | | |
| F 96           | Mineral oils, untreated or mildly treated | Skin | | | | | | | |

**Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs**
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|---------------------------------------|-------------------------------------|---------|------|-----------|----------------------------------|----------|
| F 97           | 2-Naphthylamine | Urinary bladder | 2-Naphthylamine | Mouse | Liver | Hepatocellular carcinoma | Bonser et al. (1952), MF, CBA, g.; Bonser et al. (1952), MF, CBA, p.o.; Yoshida et al. (1979), F, BALB/c, p.o.; Bonser et al. (1956), NR, Swiss, s.c. |
| F 97           | 2-Naphthylamine | Urinary bladder | 2-Naphthylamine | Rat | Urinary bladder | Transitional cell carcinoma | Hicks & Chowaniec (1977), F, Wistar, g.; Hicks et al. (1982), F, Wistar, g. |
| F 97           | 2-Naphthylamine | Urinary bladder | 2-Naphthylamine | Dog | Urinary bladder | Transitional cell carcinoma | Harrison et al. (1969), F, Mongrel, p.o.; Conzelman & Moulton (1972), MF, Beagle, p.o.; Romanenko & Martynenko (1972), F, NR, g.; Rigotti et al. (1977), F, NR, p.o.; Purchase et al. (1981), NR, Beagle, p.o. |
| F 97           | 2-Naphthylamine | Urinary bladder | 2-Naphthylamine | Monkey | Urinary bladder | Transitional cell carcinoma | Conzelman et al. (1969), NR, Rhesus Macaca mulatta, g. |
| F 97           | 2-Naphthylamine | Urinary bladder | 2-Naphthylamine | Hamster | Urinary bladder | Transitional cell carcinoma | Saffiotti et al. (1967), MF, Syrian golden, p.o. |
| F 98           | Ortho-Toluidine | Urinary bladder | ortho-Toluidine | Mouse | Soft tissue | Haemangiosarcoma | Weisburger et al. (1978), MF, Swiss CD-1, p.o.; NTP (1979), M, B6C3F1, p.o. |
| F 98           | Ortho-Toluidine | Urinary bladder | ortho-Toluidine | Rat | Skin | Fibrosarcoma | Weisburger et al. (1978), M, Sprague-Dawley CD, p.o.; NTP (1979), M, F344, p.o.; Hecht et al. (1982), M, F344, p.o. |
| F 98           | Ortho-Toluidine | Urinary bladder | ortho-Toluidine | Rat | Urinary bladder | Transitional cell carcinoma | Weisburger et al. (1978), M, Sprague-Dawley CD, p.o.; NTP (1979), F, F344, p.o. |
| F 99           | Painter, occupational exposure | Mesothelioma, urinary bladder, lung | | | | | No animal data available |
| F 100          | 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) | | Mechanistic upgrade* | | | | | Sufficient evidence in experimental animals but no organ sites identified due to the absence of two (or more) studies of adequate design and quality pointing at the same organ site (with a similar histological origin) in the same species. |
| F 101          | Rubber manufacturing industry | Leukaemia, lymphoma, urinary bladder, lung, stomach | | | | | | No animal data available |
| F 102          | Shale oils | Skin | Shale oils | Mouse | Skin | Squamous cell carcinoma | Rowland et al. (1980), F, Swiss, sk.; Vinkmann (1972), IARC (1985), M, CC57Br, sk.; Sun et al. (1961), IARC (1985), NR, random-bred, sk.; Wilson & Holland (1988), MF, C3H/He, sk.; Bogovski (1958), Bogovski & Vinkmann (1979), IARC (1985), NR, random-bred white, sk. |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|---------------|-------|-----------------------------------------|--------------------------------------|--------------------------------------|---------|------|-----------|-----------------------------------|----------|
| F              | 103           | Soot (as found in occupational exposure of chimney sweeps) | Skin, lung | Bladder | Soot (as found in chimney sweeps) | Mouse | Skin | Squamous cell carcinoma | IARC (1985), Passey (1922), Passey & Carter-Braine (1925), NR, "white", sk.; IARC (1985), Campbell (1939), NR, NR, sk. | |
| F              | 104           | Sulfur mustard | Lung | Larynx | | | | | No data on animal experiments listed because of limited evidence of carcinogenicity | |
| F              | 105           | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | All cancers combined | Soft-tissue sarcoma, non-Hodgkin lymphoma, lung | 2,3,7,8-TCDD | Mouse | Skin | Fibrosarcoma | NTP (1982b), F, Swiss, sk.; NTP (1982a), F, B6C3F1, g. | |
| F              | 105           | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | All cancers combined | Soft-tissue sarcoma, non-Hodgkin lymphoma, lung | 2,3,7,8-TCDD | Mouse | Liver | Hepatocellular carcinoma | NTP (1982a), MF, B6C3F1, g.; Tóth et al. (1979), M, Swiss, g.; Della Porta et al. (1987), MF, C57BL/6J x C3Hf, p.o.; Della Porta et al. (1987), M, C57BL/6J x C3Hf, i.p. | |
| F              | 105           | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | All cancers combined | Soft-tissue sarcoma, non-Hodgkin lymphoma, lung | 2,3,7,8-TCDD | Mouse | Thymus | Lymphoma | Della Porta et al. (1987), F, C57BL/6J x C3Hf, i.p.; Della Porta et al. (1987), MF, C57BL/6J x BALB/c, i.p. | |
| F              | 105           | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | All cancers combined | Soft-tissue sarcoma, non-Hodgkin lymphoma, lung | 2,3,7,8-TCDD | Mouse | Lymphoid tissue | Lymphoma | Della Porta et al. (1987), F, C57BL/6J x C3Hf, i.p.; Della Porta et al. (1987), MF, C57BL/6J x BALB/c, i.p.; NTP (1982a), F, B6C3F1, g. | |
| F              | 105           | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | All cancers combined | Soft-tissue sarcoma, non-Hodgkin lymphoma, lung | 2,3,7,8-TCDD | Rat | Liver | Hepatocellular adenocarcinoma | NTP (1982a), MF, Osborne-Mendel, g.; NTP (2006b), Yoshizawa et al. (2005), F, Harlan Sprague-Dawley, g.; Kociba et al. (1978), Hays et al. (1997), Goodman & Sauer (1992), F, Sprague-Dawley (Spartan substrain), p.o. | |
| F              | 105           | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | All cancers combined | Soft-tissue sarcoma, non-Hodgkin lymphoma, lung | 2,3,7,8-TCDD | Rat | Liver | Cholangiocarcinoma | NTP (2006b), Yoshizawa et al. (2005), F, Harlan Sprague-Dawley, g. | |
| F              | 105           | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | All cancers combined | Soft-tissue sarcoma, non-Hodgkin lymphoma, lung | 2,3,7,8-TCDD | Rat | Lung | Keratinizing squamous cell carcinoma | NTP (2006b), Yoshizawa et al. (2005), F, Harlan Sprague-Dawley, g.; Kociba et al. (1978), Hays et al. (1997), Goodman & Sauer (1992), MF, Sprague-Dawley (Spartan substrain), p.o. | |
| F              | 105           | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | All cancers combined | Soft-tissue sarcoma, non-Hodgkin lymphoma, lung | 2,3,7,8-TCDD | Rat | Oral cavity | Squamous cell carcinoma | Kociba et al. (1978), Hays et al. (1997), Goodman & Sauer (1992), MF, Sprague-Dawley (Spartan substrain), p.o.; NTP (2006b), Yoshizawa et al. (2005), F, Harlan Sprague-Dawley, g. | |
| Volume 100 part | Agent number | Agent | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site | Histology | Study, sex, strain, exposure route | Comments |
|----------------|--------------|-------|------------------------------------------|----------------------------------------|--------------------------------------|---------|------|-----------|---------------------------------|----------|
| F 106          | Vinyl chloride | Angiosarcoma of the liver, hepatocellular carcinoma | Vinyl chloride | Mouse | Soft tissue | Haemangiosarcoma | Holmberg et al. (1976), MF, NMRI, inh.; Lee et al. (1978), MF, CD-1, inh.; Hong et al. (1981), MF, CD-1, inh.; Maltoni et al. (1981), NR, Swiss, inh.; Drew et al. (1983), F, CD-1, inh.; Drew et al. (1983), F, CD-1, inh.; Drew et al. (1983), F, B6C3F1, inh.; Drew et al. (1983), F, B6C3F1, inh. |
| F 106          | Vinyl chloride | Angiosarcoma of the liver, hepatocellular carcinoma | Vinyl chloride | Mouse | Lung | Bronchiolo-alveolar carcinoma | Holmberg et al. (1976), MF, NMRI, inh.; Lee et al. (1978), MF, CD-1, inh.; Hong et al. (1981), NR, Swiss, inh.; Drew et al. (1983), F, CD-1, inh.; Drew et al. (1983), F, CD-1, inh.; Suzuki (1983), M, CD-1, inh. |
| F 106          | Vinyl chloride | Angiosarcoma of the liver, hepatocellular carcinoma | Vinyl chloride | Mouse | Mammary gland | Adeno-carcinoma and adeno-acanthoma | Lee et al. (1978), F, CD-1, inh.; Hong et al. (1981), F, CD-1, inh.; Maltoni et al. (1981), F, Swiss, inh.; Drew et al. (1983), F, CD-1, inh.; Drew et al. (1983), F, CD-1, inh.; Drew et al. (1983), F, B6C3F1, inh.; Drew et al. (1983), F, B6C3F1, inh.; |
| F 106          | Vinyl chloride | Angiosarcoma of the liver, hepatocellular carcinoma | Vinyl chloride | Rat | Soft tissue | Haemangiosarcoma | Lee et al. (1978), F, CD, inh.; Feron & Kroes (1979), Feron et al. (1979), F, Wistar, inh.; Groth et al. (1981), F, Sprague-Dawley, inh.; Maltoni et al. (1981), NR, Sprague-Dawley, inh.; Maltoni et al. (1981), M, Wistar, inh.; Drew et al. (1983), F, F344, inh.; Drew et al. (1983), F, F344, inh.; Feron et al. (1981), MF, Wistar, p.o.; Maltoni & Cotti (1988), MF, Sprague-Dawley, per & inh. |
| F 106          | Vinyl chloride | Angiosarcoma of the liver, hepatocellular carcinoma | Vinyl chloride | Rat | Zymbal gland | Carcinoma | Maltoni et al. (1981), NR, Sprague-Dawley, inh.; Maltoni et al. (1981), NR, Sprague-Dawley, inh.; Maltoni et al. (1981), NR, Sprague-Dawley, inh.; |
| F 106          | Vinyl chloride | Angiosarcoma of the liver, hepatocellular carcinoma | Vinyl chloride | Rat | Mammary gland | Adeno-carcinoma | Drew et al. (1983), F, F344, inh.; Drew et al. (1983), F, F344, inh. |
| F 106          | Vinyl chloride | Angiosarcoma of the liver, hepatocellular carcinoma | Vinyl chloride | Rat | Liver | Hepatocellular carcinoma | Drew et al. (1983), F, F344, inh.; Drew et al. (1983), F, F344, inh.; Feron et al. (1981), MF, Wistar, p.o.; Til et al. (1991), M, Wistar, p.o.; Maltoni & Cotti (1988), MF, Sprague-Dawley, per & inh. |
| 105            | Engine Exhaust, diesel | Lung | Urinary bladder | Whole diesel-engine exhaust | Rat | Lung | Bronchiolo-alveolar carcinoma | Ishinishi et al. (1986), MF, F344, inh.; Mauderly et al. (1986, 1987), MF, F344, inh.; Iwai et al. (1986), F, F344, inh.; Heinrich et al. (1995), F, Wistar, inh.; Nikula et al. (1995), F, F344, inh.; Iwai et al. (2000), F, F344, inh. |
## Supplementary Table 1. Data set on tumours and tumour sites in humans and in experimental animals for Group 1 agents identified up to and including Volume 109 of the IARC Monographs

| Volume 100 part | Agent number | Agent                  | Sites with sufficient evidence in humans | Sites with limited evidence in humans | Agent tested in experimental animals | Species | Site               | Histology               | Study, sex, strain, exposure route | Comments |
|-----------------|--------------|------------------------|------------------------------------------|--------------------------------------|--------------------------------------|---------|--------------------|--------------------------|-----------------------------------|----------|
| 106             | 108          | Trichloroethylene      | Kidney                                   | Non-Hodgkin lymphoma, liver          | Trichloroethylene                     | Mouse   | Liver              | Hepatocellular adenocarcinoma | NTP (1990), MF, B6C3F1, g.; NCI (1976), MF, B6C3F1, g.; Anna et al. (1994), M, B6C3F1, g.; Bull et al. (2002), M, B6C3F1, g. |          |
| 106             | 108          | Trichloroethylene      | Kidney                                   | Non-Hodgkin lymphoma, liver          | Trichloroethylene                     | Mouse   | Lung               | Adeno-carcinoma            | Fukuda et al. (1983), F, C67-CD-1 (ICR), inh.; Maltoni et al. (1986, 1988b), F, Swiss, inh.; NCI (1976), MF, B6C3F1, g. |          |
| 106             | 108          | Trichloroethylene      | Kidney                                   | Non-Hodgkin lymphoma, liver          | Trichloroethylene                     | Rat     | Kidney             | Renal-cell carcinoma       | NTP (1990), M, F344/N, g.; NTP (1988), M, Osborne-Mendel, g.; NTP (1988), F, ACI, g. |          |
| 107             | 109          | Polychlorinated biphenyls | Skin (melanoma)                         | Non-Hodgkin lymphoma, breast         | PCB 118                               | Rat     | Liver              | Cholangiocarcinoma         | NTP (2010), F, Harlan Sprague-Dawley, g.; NTP (2006d), F, Harlan Sprague-Dawley, g. |          |
| 107             | 109          | Polychlorinated biphenyls | Skin (melanoma)                         | Non-Hodgkin lymphoma, breast         | PCB 126                               | Rat     | Liver              | Cholangiocarcinoma         | NTP (2006a), F, Harlan Sprague-Dawley, g.; NTP (2006c), F, Harlan Sprague-Dawley, g.; NTP (2006d), F, Harlan Sprague-Dawley, g. |          |
| 107             | 109          | Polychlorinated biphenyls | Skin (melanoma)                         | Non-Hodgkin lymphoma, breast         | PCB 126                               | Rat     | Oral cavity        | Squamous cell carcinoma    | NTP (2006a), F, Harlan Sprague-Dawley, g.; NTP (2006c), F, Harlan Sprague-Dawley, g. |          |
| 107             | 109          | Polychlorinated biphenyls | Skin (melanoma)                         | Non-Hodgkin lymphoma, breast         | Aroclor 1254                          | Rat     | Liver              | Hepatocellular carcinoma   | NTP (1978), M, F344, p.o.; Mayes et al. (1998), F, Sprague-Dawley, p.o. |          |
| 107             | 109          | Polychlorinated biphenyls | Skin (melanoma)                         | Non-Hodgkin lymphoma, breast         | Aroclor 1260                          | Rat     | Liver              | Hepatocellular carcinoma   | Mayes et al. (1998), F, Sprague-Dawley, p.o.; Norback & Weltman (1985), F, Sprague-Dawley, p.o.; Kimbrough et al. (1975), F, Sherman, p.o. |          |
| 109             | 110          | Outdoor air pollution  | Lung                                     | Urinary bladder                      |                                      |         |                    |                          | Sufficient evidence in experimental animals but no organ sites identified due to the absence of two (or more) studies of adequate design and quality pointing at the same organ site (with a similar histological origin) in the same species |          |
| 109             | 111          | Particulate matter in outdoor air pollution | Lung                                    |                                      |                                      |         |                    |                          | Sufficient evidence in experimental animals but no organ sites identified due to the absence of two (or more) studies of adequate design and quality pointing at the same organ site (with a similar histological origin) in the same species |          |

b.pouch, buccal pouch; d.w., drinking-water; F, positive female; g, gavage; i.col., intracolonic; i.f., intrafetal; i.m., intramuscular; i.mam., intramammary; inh., inhalation; i.p., intraperitoneal; i.pulmo., intrapulmonary; i.t., intratracheal; i.v., intravenous; M, positive male; MF, positive male and female; NK, natural killer; NOS, not otherwise specified; NR, not reported; per., perinatal; p.o., feeding; s.c., subcutaneous; skin, skin application; UV, ultraviolet

*Mechanistic upgrade with no human tumour site specified.
REFERENCES FOR SUPPLEMENTARY TABLE 1 BY VOLUME

Volume 100A

Ahotupa M, Hirsimäki P, Pärssinen R, Mäntylä E (1994). Alterations of drug metabolizing and antioxidant enzyme activities during tamoxifen-induced hepatocarcinogenesis in the rat. *Carcinogenesis*. 15:863–868. [PMID:8200088]

Allen E, Gardner WU (1941). Cancer of the cervix of the uterus in hybrid mice following long-continued administration of estrogen. *Cancer Res*. 1:359–366.

Bischoff F, Long ML, Rupp JJ, Clarke GJ (1942a). Carcinogenic effect of estradiol and of theelin in Marsh-Buffalo mice. *Cancer Res*. 2:52–55.

Bischoff F, Long ML, Rupp JJ, Clarke GJ (1942b). Influence of toxic amounts of estrin upon intact and castrated male Marsh-Buffalo mice. *Cancer Res*. 2:198–199.

Blank EW, Wong PY, Lakshmanaswamy R, Guzman R, Nandi S (2008). Both ovarian hormones estrogen and progesterone are necessary for hormonal mammary carcinogenesis in ovariectomized ACI rats. *Proc Natl Acad Sci USA*. 105:3527–3532. [PMID:18299580]

Brambilla G, Caraceni CE, Cavanna M, Parodi S (1971). Evaluation, in newborn Swiss mice, of the carcinogenic activity of some antineoplastic and immunosuppressive compounds [in Italian]. *Boll Soc Ital Biol Sper*. 47:418–422. [PMID:5134218]

Carthew P, Martin EA, White IN, De Matteis F, Edwards RE, Dorman BM, et al. (1995b). Tamoxifen induces short-term cumulative DNA damage and liver tumors in rats: promotion by phenobarbital. *Cancer Res*. 55:544–547. [PMID:7834623]

Carthew P, Rich KJ, Martin EA, De Matteis F, Lim CK, Manson MM, et al. (1995a). DNA damage as assessed by 32P-postlabelling in three rat strains exposed to dietary tamoxifen: the relationship between cell proliferation and liver tumour formation. *Carcinogenesis*. 16:1299–1304. [PMID:7788846]

Casey TP (1968b). Azathioprine (Imuran) administration and the development of malignant lymphomas in NZB mice. *Clin Exp Immunol*. 3:305–312. [PMID:4297669]

Casey TP (1968a). The development of lymphomas in mice with autoimmune disorders treated with azathioprine. *Blood*. 31:396–399. [PMID:5640634]

Caivaliere A, Pietropaoli N, Alberti PF, Vitali R (1990). Chlorambucil carcinogenesis in BALB/c mice. *Cancer Lett*. 55:115–120. [PMID:2265409]

Committee on Safety of Medicines (1972). Carcinogenicity tests of oral contraceptives. London: Her Majesty's Stationery Office.

Couse JF, Davis VL, Hanson RB, Jefferson WN, McLachlan JA, Bullock BC, et al. (1997). Accelerated onset of uterine tumors in transgenic mice with aberrant expression of the estrogen receptor after neonatal exposure to diethylstilbestrol. *Mol Carcinog.* 19:236–242. [PMID:9290700]

Dragan VP, Vaughan J, Jordan VC, Pitot HC (1995). Comparison of the effects of tamoxifen and toremifene on liver and kidney tumor promotion in female rats. *Carcinogenesis*. 16:2733–2741. [PMID:7586193]

Dubertret L, Averbeck D, Zajdela F, Bisagni E, Moustacchi E, Touraine R, et al. (1979). Photochemotherapy (PUVA) of psoriasis using 3-carbethoxypsoralen, a non-carcinogenic compound in mice. *Br J Dermatol.* 101:379–389. [PMID:389271]

Dunnick JK, Forbes PD, Eustis SL, Hardisty JF, Goodman DG (1991). Tumors of the skin in the HRA/Skh mouse after treatment with 8-methoxypsoralen and UVA radiation. *Fundam Appl Toxicol.* 16:92–102. [PMID:2019354]

Gardner WU, Dougherty TF (1944). The leukemogenic action of estrogens in hybrid mice. *Yale J Biol Med.* 17:75–90. [PMID:21434208]
Goldfarb S, Pugh TD (1990). Morphology and anatomic localization of renal microneoplasms and proximal tubule dysplasias induced by four different estrogens in the hamster. *Cancer Res.* 50:113–119. PMID:2152770

Gray K, Bullock B, Dickson R, Raszmann K, Walmer D, McLachlan J, et al. (1996). Potentiation of diethylstilbestrol-induced alterations in the female mouse reproductive tract by transforming growth factor-alpha transgene expression. *Mol Carcinog.* 17:163–173. http://dx.doi.org/10.1002/(SICI)1098-2744(199611)17:3<163::AID-MC9>3.0.CO;2-G PMID:8940477

Greaves P, Goonetilleke R, Nunn G, Topham J, Orton T (1993). Two-year carcinogenicity study of tamoxifen in Alderley Park Wistar-derived rats. *Cancer Res.* 53:3919–3924. PMID:8358718

Greenman DL, Highman B, Chen JJ, Schieferstein GJ, Norvell MJ (1986). Influence of age on induction of mammary tumors by diethylstilbestrol in C3H/HeN mice with low murine mammary tumor virus titer. *J Nail Cancer Inst.* 77:891–898. PMID:3020299

Griffin AC, Hakim RE, Knox J (1958). The wave length effect upon erythematous and carcinogenic response in psoralesen treated mice. *J Invest Dermatol.* 31:289–295. http://dx.doi.org/10.1038/jid.1958.122 PMID:13598936

Grube DD, Ley RD, Fry RJ (1977). Photosensitizing effects of 8-methoxypsoralen on the skin of hairless mice – II. Strain and spectral differences for tumorigenesis. *Photochem Photobiol.* 25:269–276. http://dx.doi.org/10.1111/j.1751-1097.1977.tb06910.x PMID:905350

Habs MR, Schmähl D (1983). Prevention of urinary bladder tumors in cyclophosphamide-treated rats by additional medication with the uroprotectors sodium 2-mercaptopoethane sulfonate (mesna) and disodium 2,2′-dithio-bis-ethane sulfonate (dimesna). *Cancer.* 51:606–609. http://dx.doi.org/10.1002/1097-0142(19830215)51:4<606::AID-CNCR2820510409>3.0.CO;2-S PMID:6401591

Hard GC, Iatropoulos MJ, Jordan K, Radi L, Kaltenberg OP, Imondi AR, et al. (1993). Major difference in the hepatocarcinogenicity and DNA adduct forming ability between toremifene and tamoxifen in female Crl:CD(BR) rats. *Cancer Res.* 53:4534–4541. PMID:8402624

Hasmann M, Rattel B, Löser R (1994). Preclinical data for Droloxifene. *Cancer Lett.* 84:101–116. http://dx.doi.org/10.1016/0304-3835(94)90364-6 PMID:8076367

Highman B, Greenman DL, Norvell MJ, Farmer J, Shellenberger TE (1980). Neoplastic and preneoplastic lesions induced in female C3H mice by diets containing diethylstilbestrol or 17 beta-estradiol. *J Environ Pathol Toxicol.* 4:81–95. PMID:7217862

Hirsimäki P, Hirsimäki Y, Nieminen L, Payne BJ (1993). Tamoxifen induces hepatocellular carcinoma in rat liver: a 1-year study with two antiestrogens. *Arch Toxicol.* 67:49–54. http://dx.doi.org/10.1007/BF02072035 PMID:8452480

Hwang MS, Park MS, Moon JY, Lee JS, Yun YN, Yoon E, et al. (2006). Subchronic toxicity studies of the aqueous extract of *Aristolochiae fructus* in Sprague-Dawley rats. *J Toxicol Environ Health A.* 69:2157–2165. http://dx.doi.org/10.1080/15287390600747965 PMID:17062506

Imamura N, Nakano M, Kawase A, Kawamura Y, Yokoro K (1973). Synergistic action of *N*-nitrosobuty lurea and azathioprine in induction of leukemia in C57BL mice. *Gan.* 64:493–498. PMID:4588868

Isaka H, Yoshii H, Otsuji A, Koike M, Nagai Y, Koura M, et al. (1979). Tumors of Sprague-Dawley rats induced by long-term feeding of phenacetin. *Gan.* 70:29–36. PMID:446975

Ito A, Mori M, Naito M (1989). Induction of uterine hemangioendothelioma and lymphoma in (C57BL/6N x C3H/2N)F1 mice by oral administration of azathioprine. *Jpn J Cancer Res.* 80:419–423. http://dx.doi.org/10.1080/15287390600747965 PMID:2502517

Johansson SL (1981). Carcinogenicity of analgesics: long-term treatment of Sprague-Dawley rats with phenacetin, phenazone, caffeine and paracetamol (acetamidphen). *Int J Cancer.* 27:521–529. http://dx.doi.org/10.1002/ijic.2910270416 PMID:7275356

Kärki A, Mäntylä E, Hirsimäki Y, Karlsson S, Toikkkanen S, Hirsimäki P (2000). Comparison of the effects of tamoxifen and toremifene on rat hepatocarcinogenesis. *Arch Toxicol.* 74:249–256. http://dx.doi.org/10.1007/s002040000116 PMID:10959800
Kirkman H (1959). Estrogen-induced tumors of the kidney. III. Growth characteristics in the Syrian hamster. *Natl Cancer Inst Monogr.* 1:1–57. PMID:14409355

Kirschbaum A, Shapiro JR, Mixer HW (1953). Synergistic action of leukemogenic agents. *Cancer Res.* 13:262–368. PMID:13042816

Liehr JG, Wheeler WJ (1983). Inhibition of estrogen-induced renal carcinoma in Syrian hamsters by vitamin C. *Cancer Res.* 43:4638–4642. PMID:6883321

MacKenzie I (1955). The production of mammary cancer in rats using oestrogens. *Br J Cancer.* 9:284–299. http://dx.doi.org/10.1038/bjc.1955.25 PMID:11695548

McClain RM, Keller D, Casciano D, Fu P, MacDonald J, Popp J, et al. (2001). Neonatal mouse model: review of methods and results. *Toxicol Pathol.* 29:128–137. http://dx.doi.org/10.1080/01003390109544277 PMID:11695548

Mengs U (1983). On the histopathogenesis of rat forestomach carcinoma caused by aristolochic acid. *Arch Toxicol.* 52:209–220. http://dx.doi.org/10.1007/BF00302751 PMID:7059279

Mengs U, Lang W, Poch J-A (1982). The carcinogenic action of aristolochic acid in rats. *Arch Toxicol.* 5:107–119. http://dx.doi.org/10.1007/BF00333900 PMID:6860143

Mitrou PS, Fischer M, Mitrou G, Röttger P, Holtz G (1979a). The oncogenic effect of immunosuppressive (cytotoxic) agents in (NZB X NZW) mice. I. Long-term treatment with azathioprine and ifosfamide. *Arzneimittelforschung.* 29:483–488. PMID:314806

Mitrou PS, Fischer M, Mitrou G, Röttger P (1979b). The oncogenic effect of immunosuppressive (cytotoxic) agents in (NZB X NZW) mice. II. Emergence of tumors in young animals treated with azathioprine and ifosfamide, including a histologic assessment of the neoplasms. *Arzneimittelforschung.* 29:662–667. PMID:582763

Nagayo K, Way BH, Tran RM, Song PS (1983). Photocarcinogenicity of 8-methoxypsoralen and aflatoxin B1 with longwave ultraviolet light. *Cancer Lett.* 18:191–198. http://dx.doi.org/10.1016/0304-3835(83)90067-8 PMID:6403222

Nakanishi K, Kurata Y, Oshima M, Fukushima S, Ito N (1982). Carcinogenicity of phenacetin: long-term feeding study in B6C3F1 mice. *Int J Cancer.* 29:439–444. http://dx.doi.org/10.1002/ijc.2910290413 PMID:7085132

NCI (1978). Bioassay of thio-tepa for possible carcinogenicity. Technical Report Series No. 58. DHEW Publication No. (NIH) 78-1308. Washington (DC), USA: Government Printing Office. Available from: http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr058.pdf

Newbold RR, Bullock BC, McLachlan JA (1990). Uterine adenocarcinoma in mice following developmental treatment with estrogens: a model for hormonal carcinogenesis. *Cancer Res.* 50:7677–7681. PMID:2174729

Newbold RR, Hanson RB, Jefferson WN, Bullock BC, Haseman J, McLachlan JA (1998). Increased tumors but uncompromised fertility in the female descendants of mice exposed developmentally to diethylstilbestrol. *Carcinogenesis.* 19:1655–1663. http://dx.doi.org/10.1093/carcin/19.9.1655 PMID:9771938

Pan SC, Gardner WU (1948). Carcinomas of the uterine cervix and vagina in estrogen- and androgen-treated hybrid mice. *Cancer Res.* 8:337–3345. PMID:18105861

Rudali G, Coezy E, Frederic F, Apiou F (1971). Susceptibility of mice of different strains to the mammary carcinogenic action of natural and synthetic oestrogens. *Rev Eur Etud Clin Biol.* 16:425–429. PMID:5113304

Schmähl D, Habs M (1979). Carcinogenic action of low-dose cyclophosphamide given orally to Sprague-Dawley rats in a lifetime experiment. *Int J Cancer.* 23:706–712. http://dx.doi.org/10.1002/ijc.2910230518 PMID:572348

Schmähl D, Habs MR (1983). Prevention of cyclophosphamide-induced carcinogenesis in the urinary bladder of rats by administration of mesna. *Cancer Treat Rev.* 10:57–61. PMID:6414697

Schmähl D, Osswald H (1970). Experimental studies on the carcinogenic effects of anticancer chemotherapeutics and immunosuppressive agents [in German]. *Arzneimittelforschung.* 20:1461–1467. PMID:5536412
Schmeiser HH, Janssen JW, Lyons J, Scherf HR, Pfau W, Buchmann A, et al. (1990). Aristolochic acid activates ras genes in rat tumors at deoxyadenosine residues. Cancer Res. 50:5464–5469. PMID:2201437

Shimkin MB, Weisburger JH, Weisburger EK, Gubareff N, Suntzeff V (1966). Bioassay of 29 alkylating chemicals by the pulmonary-tumor response in strain A mice. J Natl Cancer Inst. 36:915–935.

Shull JD, Spady TJ, Snyder MC, Johansson SL, Pennington KL (1997). Ovary-intact, but not ovariectomized female ACI rats treated with 17beta-estradiol rapidly develop mammary carcinoma. Carcinogenesis. 18:1595–1601. http://dx.doi.org/10.1093/carcin/18.8.1595 PMID:9276635

Turusov VS, Trukhanova LS, Parfenov YuD, Tomatis L (1992). Occurrence of tumours in the descendants of CBA male mice prenatally treated with diethylstilbestrol. Int J Cancer. 50:131–135. http://dx.doi.org/10.1002/ijc.2910500126 PMID:1728603

Walker BE, Haven MI (1997). Intensity of multigenerational carcinogenesis from diethylstilbestrol in mice. Carcinogenesis. 18:791–793. http://dx.doi.org/10.1093/carcin/18.4.791 PMID:9111216

Walker SE, Anver MR (1979). Accelerated appearance of neoplasms in female NZB/NZW mice treated with high-dose cyclophosphamide. Arthritis Rheum. 22:1338–1343. http://dx.doi.org/10.1002/art.1780221204 PMID:391238

Walker SE, Bole GG Jr (1973). Augmented incidence of neoplasia in NZB-NZW mice treated with long-term cyclophosphamide. J Lab Clin Med. 82:619–633. PMID:4755436

Walker SE, Bole GG (1971). Augmented incidence of neoplasia in female New Zealand black-New Zealand white (NZB-NZW) mice treated with long-term cyclophosphamide. J Lab Clin Med. 78:978–979. PMID:4943505

Weisburger JH, Griswold DP, Prejean JD, Casey AE, Wood HB, Weisburger EK (1975). The carcinogenic properties of some of the principal drugs used in clinical cancer chemotherapy. Recent Results Cancer Res. 52:1–17. http://dx.doi.org/10.1007/978-3-642-80940-8_1 PMID:138176

Williams GM, Iatropoulos MJ, Karlsson S (1997). Initiating activity of the anti-estrogen tamoxifen, but not toremifene in rat liver. Carcinogenesis. 18:2247–2253. http://dx.doi.org/10.1093/carcin/18.11.2247 PMID:9395228

Volume 100B

Lee CW, Rickman B, Rogers AB, Ge Z, Wang TC, Fox JG (2008). Helicobacter pylori eradication prevents progression of gastric cancer in hypergastrinemic INS-GAS mice. Cancer Res. 68:3540–3548. http://dx.doi.org/10.1158/0008-5472.CAN-07-6786 PMID:18441088

Ohtani M, García A, Rogers AB, Ge Z, Taylor NS, Xu S, et al. (2007). Protective role of 17 beta-estradiol against the development of Helicobacter pylori-induced gastric cancer in INS-GAS mice. Carcinogenesis. 28:2597–2604. http://dx.doi.org/10.1093/carcin/bgm150 PMID:17724378

Volume 100C

Arnold LL, Eldan M, Nyska A, van Gemert M, Cohen SM (2006). Dimethylarsinic acid: results of chronic toxicity/oncogenicity studies in F344 rats and in B6C3F1 mice. Toxicology. 223:82–100. http://dx.doi.org/10.1016/j.tox.2006.03.013 PMID:16677751

Coffin DL, Cook PM, Creason JP (1992). Relative mesothelioma induction in rats by mineral fibers: comparison with residual pulmonary mineral fiber number and epidemiology. Inhal Toxicol. 4:273–300. http://dx.doi.org/10.3109/08958379209145671

Dagle GE, Wehner AP, Clark ML, Buschbom RL (1986). Chronic inhalation exposure of rats to quartz. In: Goldsmith DF, Winn DM, Shy CM, editors. Silica, silicosis, and cancer: controversy in occupational medicine. New York, USA: Praeger; pp. 255–66.

Davis JM, Addison J, Bolton RE, Donaldson K, Jones AD, Miller BG (1985). Inhalation studies on the effects of tremolite and brucite dust in rats. Carcinogenesis. 6:667–674. http://dx.doi.org/10.1093/carcin/6.5.667 PMID:2988806

4
Davis JM, Addison J, Bolton RE, Donaldson K, Jones AD, Smith T (1986b). The pathogenicity of long versus short fibre samples of amosite asbestos administered to rats by inhalation and intraperitoneal injection. *Br J Exp Pathol.* 67:415–430. PMID:2872911

Davis JM, Addison J, Bolton RE, Donaldson K, Jones AD (1986a). Inhalation and injection studies in rats using dust samples from chrysotile asbestos prepared by a wet dispersion process. *Br J Exp Pathol.* 67:113–129. PMID:3004552

Davis JM, Beckett ST, Bolton RE, Collings P, Middleton AP (1978). Mass and number of fibres in the pathogenesis of asbestos-related lung disease in rats. *Br J Cancer.* 37:673–688. http://dx.doi.org/10.1038/bjc.1978.105 PMID:656299

Davis JM, Jones AD, Miller BG (1991a). Experimental studies in rats on the effects of asbestos inhalation coupled with the inhalation of titanium dioxide or quartz. *Int J Exp Pathol.* 72:501–525. PMID:1742204

Davis JM, Bolton RE, Miller BG, Niven K (1991b). Mesothelioma dose response following intraperitoneal injection of mineral fibres. *Int J Exp Pathol.* 72:263–274. PMID:1843255

Davis JM, Jones AD (1988). Comparisons of the pathogenicity of long and short fibres of chrysotile asbestos in rats. *Br J Exp Pathol.* 69:717–737. PMID:2848570

Dunnick JK, Elwell MR, Radovsky AE, Benson JM, Hahn FF, Nikula KJ, et al. (1995). Comparative carcinogenic effects of nickel subsulfide, nickel oxide, or nickel sulfate hexahydrate chronic exposures in the lung. *Cancer Res.* 55:5251–5256. PMID:7585584

Furst A, Schlauder M, Sasmore DP (1976). Tumorigenic activity of lead chromate. *Cancer Res.* 36:1779–1783. PMID:1268834

Furst A, Schlauder MC (1971). The hamster as a model for metal carcinogenesis. *Proc West Pharmacol Soc.* 14:68–71.

Gilman JP (1962). Metal carcinogenesis. II. A study on the carcinogenic activity of cobalt, copper, iron, and nickel compounds. *Cancer Res.* 22:158–162. PMID:13898693

Gilman JP (1966). Muscle tumourigenesis. *Proc Can Cancer Conf.* 6:209–223. PMID:5972980

Glaser U, Hochrainer D, Otto FJ, Oldiges H (1990). Carcinogenicity and toxicity of four cadmium compounds inhaled by rats. *Toxicol Environ Chem.* 27:153–162. http://dx.doi.org/10.1080/02772249009357568

Goldstein B, Coetzee FSJ (1990). Experimental malignant mesothelioma in baboons. *S Afr J Sci.* 86:89–93.

Gross P, DeTreville RT, Tolker EB, Kaschak M, Babyak MA (1967). Experimental asbestosis. The development of lung cancer in rats with pulmonary deposits of chrysotile asbestos dust. *Arch Environ Health.* 15:343–355. http://dx.doi.org/10.1080/00039896.1967.10664930 PMID:6035084

Groth DH, Kommineni C, Mackay GR (1980). Carcinogenicity of beryllium hydroxide and alloys. *Environ Res.* 21:63–84. http://dx.doi.org/10.1016/0013-9351(80)90009-2 PMID:7389706

Groth DH, Stettler LE, Platek SF, Lal JB, Burg JR (1986). Lung tumors in rats treated with quartz by instillation. In: Goldsmith DF, Winn J, Shy CM, editors. Silica, silicosis, and cancer: controversy in occupational medicine. New York, USA: Praeger; pp. 243–253.

Heath JC, Daniel MR (1964). The production of malignant tumors by nickel in the rat. *Br J Cancer.* 18:261–264. http://dx.doi.org/10.1038/bjc.1964.30 PMID:14189681

Hill RJ, Edwards RE, Carthew P (1990). Early changes in the pleural mesothelium following intrapleural inoculation of the mineral fibre erionite and the subsequent development of mesotheliomas. *J Exp Pathol (Oxford).* 71:105–118. PMID:2155636

Holland L, Gonzales M, Wilson J (1983). Pulmonary effects of shale dusts in experimental animals. In: Wagner W, Rom W, Merchand J, editors. Health issues related to metal and nonmetallic mining. Boston (MA), USA: Butterworths; pp. 485–496.

Holland LM, Wilson JS, Tillery ML, Smith DM (1986). Lung cancer in rats exposed to fibrogenic dusts. In: Goldsmith DF, Winn DM, Shy CM, editors. Silica, silicosis, and cancer: controversy in occupational medicine. New York, USA: Praeger; pp. 267–279.
Hueper WC, Payne WW (1959). Experimental cancers in rats produced by chromium compounds and their significance to industry and public health. Am Ind Hyg Assoc J. 20:274–280. http://dx.doi.org/10.1080/00028895909343716 PMID:13670103

Ishinishi N, Mizuno M, Inamasu T, Hisanaga A (1980). Experimental study on carcinogenicity of beryllium oxide and arsenic trioxide to the lung of rats by an intratracheal instillation [in Japanese]. Fukuoka Igaku Zasshi. 71:19–26. PMID:7372264

Jasmin G, Riopelle JL (1976). Renal carcinomas and erythrocytosis in rats following intrarenal injection of nickel subsulfide. Lab Invest. 35:71–78. PMID:940323

Johnson NF, Smith DM, Sebring R, Holland LM (1987). Silica-induced alveolar cell tumors in rats. Am J Ind Med. 11:93–107. http://dx.doi.org/10.1002/ajim.4700110110 PMID:3028139

Judde JG, Breilout F, Clemenceau C, Poupon MF, Jasmin C (1987). Inhibition of rat natural killer cell function by carcinogenic nickel compounds: preventive action of manganese. J Natl Cancer Inst. 78:1185–1190. PMID:2438444

Kasprzak KS, Diwan BA, Rice JM (1994). Iron accelerates while magnesium inhibits nickel-induced carcinogenesis in the rat kidney. Toxicology. 90:129–140. http://dx.doi.org/10.1016/0300-483X(94)90211-9 PMID:8023338

Kasprzak KS, Gabryel P, Jarcezewska K (1983). Carcinogenicity of nickel(II)hydroxides and nickel(II)sulfate in Wistar rats and its relation to the in vitro dissolution rates. Carcinogenesis. 4:275–279. http://dx.doi.org/10.1093/carcin/4.3.275 PMID:6831634

Kasprzak KS, Ward JM (1991). Prevention of nickel subsulfide carcinogenesis by local administration of Mycobacterium bovis antigen in male F344/NCr rats. Toxicology. 67:97–105. http://dx.doi.org/10.1016/0300-483X(91)90167-Y PMID:2017766

Kleymenova EV, Horesovsky G, Pylev LN, Everitt J (1999). Mesotheliomas induced in rats by the fibrous mineral erionite are independent from p53 alterations. Cancer Lett. 147:55–61. http://dx.doi.org/10.1016/S0304-3835(99)00275-X PMID:10660089

Levy LS, Martin PA, Bidstrup PL (1986). Investigation of the potential carcinogenicity of a range of chromium containing materials on rat lung. Br J Ind Med. 43:243–256. PMID:3964573

Levy LS, Venitt S (1986). Carcinogenicity and mutagenicity of chromium compounds: the association between bronchial metaplasia and neoplasia. Carcinogenesis. 7:831–835. http://dx.doi.org/10.1093/carcin/7.5.831 PMID:3698209

Litvinov NN, Kazenashev VF, Bugryshev PF (1983). Blastomogenic activities of various beryllium compounds [in Russian]. Eksp Onkol. 5:23–26.

Maltoni C (1974). Occupational carcinogenesis. Excerpta Med Int Congr Ser. 322:19–26.

Maltoni C (1976). Occupational carcinogenesis. Predictive value of carcinogenesis bioassays. Ann N Y Acad Sci. 271:431–443. http://dx.doi.org/10.1111/j.1749-6632.1976.tb23144.x PMID:1069535

Maltoni C, Morisi L, Chieco P (1982). Experimental approach to the assessment of the carcinogenic risk of industrial inorganic pigments. Adv Mod Environ Toxicol. 2:77–92.

Mason MM (1972). Nickel subsulfide carcinogenesis. Environ Physiol Biochem. 2:137–41.

McConnell EE, Hall L, Adkins B Jr (1991). Studies on the chronic toxicity (inhalation) of wollastonite in Fischer 344 rats. Inhal Toxicol. 3:323–237. http://dx.doi.org/10.3109/08958379109145292

McConnell EE, Kamstrup O, Musselman R, Hesterberg TW, Chevalier J, Miiller WC, et al. (1994). Chronic inhalation study of size-separated rock and slag wool insulation fibers in Fischer 344/N rats. Inhal Toxicol. 6:571–614. http://dx.doi.org/10.3109/08958379409003042

Mitchell DF, Shankwalker GB, Shazer S (1960). Determining the tumorigenicity of dental materials. J Dent Res. 39:1023–1028. http://dx.doi.org/10.1177/00220345600390050401 PMID:13771327

Muhle H, Bellmann B, Creutzenberg O, Dasenbrock C, Ernst H, Kilpper R, et al. (1991). Pulmonary response to toner upon chronic inhalation exposure in rats. Fundam Appl Toxicol. 17:280–299. http://dx.doi.org/10.1016/0168-8749(91)90219-T PMID:1662648

Muhle H, Kittel B, Ernst H, Mohr U, Mermelstein R (1995). Neoplastic lung lesions in rat after chronic exposure to crystalline silica. Scand J Work Environ Health. 21:27–29. PMID:8929684

Muhle H, Takenaka S, Mohr U, Dasenbrock C, Mermelstein R (1989). Lung tumor induction upon long-term low-level inhalation of crystalline silica. Am J Ind Med. 15:343–346. http://dx.doi.org/10.1002/ajim.4700150309 PMID:2539015
Nickell-Brady C, Hahn FF, Finch GL, Belinsky SA (1994). Analysis of K-ras, p53 and c-raf-1 mutations in beryllium-induced rat lung tumors. Carcinogenesis. 15:257–262. http://dx.doi.org/10.1093/carcin/15.2.257 PMID:7545909

NTP (1996b). NTP Toxicology and carcinogenesis studies of nickel subsulfide (CAS No. 12035-72-2) in F344 rats and B6C3F1 mice (inhalation studies). Natl Toxicol Program Tech Rep Ser. 453:1–365. PMID:12594522

NTP (1996c). NTP Toxicology and carcinogenesis studies of nickel oxide (CAS No. 1313-99-1) in F344 rats and B6C3F1 mice (inhalation studies). Natl Toxicol Program Tech Rep Ser. 451:1–381. PMID:12594524

NTP (2008). Toxicology and carcinogenesis studies of sodium dichromate dihydrate (CAS No. 7789-12-0) in F344/N rats and B6C3F1 mice (drinking water studies). Natl Toxicol Program Tech Rep Ser. 546:1–192. PMID:18716633

Oberdörster G, Cherian MG (1992). Cadmium and the lung: current perspectives of carcinogenicity. London and Reston (VA), USA: Cadmium Association/Cadmium Council; pp. 130–134.

Oller AR, Kirkpatrick DT, Radovsky A, Bates HK (2008). Inhalation carcinogenicity study with nickel metal powder in Wistar rats. Toxicol Appl Pharmacol. 233:262–275. http://dx.doi.org/10.1016/j.taap.2008.08.017 PMID:18822311

Ottolenghi AD, Haseman JK, Payne WW, Falk HL, MacFarland HN (1975). Inhalation studies of nickel sulfide in pulmonary carcinogenesis of rats. J Natl Cancer Inst. 54:1165–1172. http://dx.doi.org/10.1093/jnci/54.5.1165 PMID:165308

Pott F, Dungworth DL, Heinrich U, Muhle H, Kamino K, Germann P-G, et al. (1994). Lung tumours in rats after intratracheal instillation of dusts. Ann Occup Hyg. 38:357–363.

Pott F, Rippe RM, Roller M, Csicsaky M, Rosenbruch M, Huth F (1989). Tumours in the abdominal cavity of rats after intraperitoneal injection of nickel compounds. In: Vernet JP, editor. Proceedings of the International Conference on Heavy Metals in the Environment: 12–15 September. Geneva, Switzerland: World Health Organization; pp. 127–129.

Pott F, Ziem D, Mohr D (1984). Lung carcinomas and mesotheliomas following intratracheal instillation of glass and asbestos. In: Proceedings of the 8th International Pneumocinosis Conference, 20–23 September 1983. Bochum, Germany: International Labour Office; pp. 746–756.

Pott F, Ziem U, Reiffer FJ, Huth F, Ernst H, Mohr U (1987). Carcinogenicity studies on fibres, metal compounds, and some other dusts in rats. Exp Pathol. 32:129–152. http://dx.doi.org/10.1016/S0232-1513(87)80044-0 PMID:3436395

Reeves AL, Deitch D, Vorwald AJ (1967). Beryllium carcinogenesis. I. Inhalation exposure of rats to beryllium sulfate aerosol. Cancer Res. 27:439–445. PMID:6021502

Rodriguez RE, Misra M, Diwan BA, Riggs CW, Kasprzak KS (1996). Relative susceptibilities of C57BL/6, (C57BL/6 x C3H/He)F1, and C3H/He mice to acute toxicity and carcinogenicity of nickel subsulfide. Toxicology. 107:131–140. http://dx.doi.org/10.1016/0300-483X(95)03251-A PMID:8599172

Roe FJ, Carter RL (1969). Chromium carcinogenesis: calcium chromate as a potent carcinogen for the subcutaneous tissues of the rat. Br J Cancer. 23:172–176. http://dx.doi.org/10.1038/bjc.1969.25 PMID:5768433

Roller M, Pott F, Kamino K, Althoff GH, Bellmann B (1996). Results of current intraperitoneal carcinogenicity studies with mineral and vitreous fibres. Exp Toxicol Pathol. 48:3–12. http://dx.doi.org/10.1016/S0940-2993(96)80084-4 PMID:8919265

Saffiotti U (1990). Lung cancer induction by silica in rats, but not in mice and hamsters: species differences in epithelial and granulomatous reactions. In: Seemayer NH, Hadnagy W, editors. Environmental hygiene II. New York, USA: Springer Verlag; pp. 235–238.

Saffiotti U (1992). Lung cancer induction by crystalline silica. In: D’Amato R, Slaga TJ, Farland WH, Henry C, editors. Relevance of animal studies to the evaluation of human cancer risk. New York, USA: Wiley-Liss; pp. 51–69.

Saffiotti U, Williams AG, Daniel LN, Kaighn ME, Mao Y, Shi X (1996). Carcinogenesis by crystalline silica: animal, cellular, and molecular studies. In: Castranova V, Vallyathan V, Wallace WE, editors. Silica and silica-induced lung diseases. Boca Raton (FL), USA: CRC Press; pp. 345–381.
Schepers GW, Durkan TM, Delahant AB, Creedon FT (1957). The biological action of inhaled beryllium sulfate; a preliminary chronic toxicity study on rats. *AMA Arch Ind Health.* 15:32–58. PMID:13393810

Shirai T, Iwasaki S, Masui T, Mori T, Kato T, Ito N (1993). Enhancing effect of cadmium on rat ventral prostate carcinogenesis induced by 3,2′-dimethyl-4-aminobiphenyl. *Jpn J Cancer Res.* 84:1023–1030. http://dx.doi.org/10.1111/j.1349-7006.1993.tb02796.x PMID:7693634

Skaug V, Gylseth B, Reiss ALP, Norseth T (1985). Tumor induction in rats after intrapleural injection of nickel subsulfide and nickel oxide. In: Brown SS, Sunderman FW Jr, editors. Progress in nickel toxicology. Oxford, United Kingdom: Blackwell Scientific Publications; pp. 37–41.

Spielhoff A, Wesch H, Wegener K, Klimisch HJ (1992). The effects of Thorotrast and quartz on the induction of lung tumors in rats. *Health Phys.* 63:101–110.http://dx.doi.org/10.1097/00004032-199207000-00011 PMID:1325960

Stanton MF, Layard M, Tegeris A, Miller E, May M, Morgan E, et al. (1981). Relation of particle dimension to carcinogenicity in amphibole asbestoses and other fibrous minerals. *J Natl Cancer Inst.* 67:965–975. PMID:6946253

Steinhoff D, Gad SC, Hattfield G, Mohr U (1986). Carcinogenicity study with sodium dichromate in rats. *Exp Pathol.* 30:129–141. http://dx.doi.org/10.1016/S0232-1513(86)80085-8 PMID:3792485

Sunderman FW Jr, Hopfer SM, Plowman MC, Knight JA (1990). Carcinogenesis bioassays of nickel oxides and nickel-copper oxides by intramuscular administration to Fischer-344 rats. *Res Commun Chem Pathol Pharmacol.* 70:103–113. PMID:2263758

Sunderman FW Jr, McCully KS (1983). Carcinogenesis tests of nickel arsenides, nickel antimonide, and nickel telluride in rats. *Cancer Invest.* 1:469–474. http://dx.doi.org/10.3109/07357908309020271 PMID:6667417

Sunderman FW Jr (1983). Organ and species specificity in nickel subsulfide carcinogenesis. *Basic Life Sci.* 24:107–127. PMID:6860261

Takenaka S, Oldiges H, König H, Hochrainer D, Oberdörster G (1983). Carcinogenicity of cadmium chloride aerosols in W rats. *J Natl Cancer Inst.* 70:367–373. PMID:6571943

Tokar EJ, Diwan BA, Thomas DJ, Waalkes MP (2012b). Tumors and proliferative lesions in adult offspring after maternal exposure to methylarsenonic acid during gestation in CD1 mice. *Arch Toxicol.* 86:975–982. http://dx.doi.org/10.1007/s00204-012-0820-8 PMID:22398986

Tokar EJ, Diwan BA, Waalkes MP (2012a). Renal, hepatic, pulmonary and adrenal tumors induced by prenatal inorganic arsenic followed by dimethylarsinic acid in adulthood in CD1 mice. *Toxicol Lett.* 209:179–185. http://dx.doi.org/10.1016/j.toxlet.2011.12.016 PMID:22230260

Tokar EJ, Diwan BA, Ward JM, Delker DA, Waalkes MP (2011). Carcinogenic effects of “whole-life” exposure to inorganic arsenic in CD1 mice. *Toxicol Sci.* 119:73–83. http://dx.doi.org/10.1093/toxsci/kfq315 PMID:20937726

Waalkes MP, Anver M, Diwan BA (1999). Carcinogenic effects of cadmium in the noble (NBL/Cr) rat: induction of pituitary, testicular, and injection site tumors and intraepithelial proliferative lesions of the dorsolateral prostate. *Toxicol Sci.* 52:154–161. http://dx.doi.org/10.1093/toxsci/52.2.154 PMID:10630567

Waalkes MP, Liu J, Kasprzak KS, Diwan BA (2004b). Minimal influence of metallothionein over-expression on nickel carcinogenesis in mice. *Toxicol Lett.* 153:357–364. http://dx.doi.org/10.1016/j.toxlet.2004.06.003 PMID:15454311

Waalkes MP, Liu J, Kasprzak KS, Diwan BA (2005). Metallothionein-I/II double knockout mice are no more sensitive to the carcinogenic effects of nickel subsulfide than wild-type mice. *Int J Toxicol.* 24:215–220. http://dx.doi.org/10.1080/10915810591000668 PMID:16126615

Waalkes MP, Liu J, Ward JM, Diwan BA (2006b). Enhanced urinary bladder and liver carcinogenesis in male CD1 mice exposed to transplacental inorganic arsenic and postnatal diethylstilbestrol or tamoxifen. *Toxicol Appl Pharmacol.* 215:295–305. http://dx.doi.org/10.1016/j.taap.2006.03.010 PMID:16712894

Waalkes MP, Liu J, Ward JM, Powell DA, Diwan BA (2006a). Urogenital carcinogenesis in female CD1 mice induced by in utero arsenic exposure is exacerbated by postnatal diethylstilbestrol treatment. *Cancer Res.* 66:1337–1345. http://dx.doi.org/10.1158/0008-5472.CAN-05-3530 PMID:16452187
Waalkes MP, Rehm S, Cherian MG (2000). Repeated cadmium exposures enhance the malignant progression of ensuing tumors in rats. Toxicol Sci. 54:110–120. http://dx.doi.org/10.1093/toxsci/54.1.110 PMID:10746938

Waalkes MP, Rehm S, Devor DE (1997). The effects of continuous testosterone exposure on spontaneous and cadmium-induced tumors in the male Fischer (F344/NCr) rat: loss of testicular response. Toxicol Appl Pharmacol. 142:40–46. http://dx.doi.org/10.1006/taap.1996.8005 PMID:9007032

Waalkes MP, Rehm S, Riggs CW, Bare RM, Devor DE, Poirier LA, et al. (1988). Cadmium carcinogenesis in male Wistar [Crl:(WI)BR] rats: dose-response analysis of tumor induction in the prostate and testes and at the injection site. Cancer Res. 48:4656–4663. PMID:3396014

Waalkes MP, Rehm S, Devor DE, Poirier LA, et al. (1989). Cadmium carcinogenesis in male Wistar [Crl:(WI)BR] rats: dose-response analysis of effects of zinc on tumor induction in the prostate, in the testes, and at the injection site. Cancer Res. 49:4282–428. PMID:2743314

Waalkes MP, Ward JM, Diwan BA (2004a). Induction of tumors of the liver, lung, ovary and adrenal in adult mice after brief maternal gestational exposure to inorganic arsenic: promotional effects of postnatal phorbol ester exposure on hepatic and pulmonary, but not dermal cancers. Carcinogenesis. 25:133–141. http://dx.doi.org/10.1093/carcin/bgg181 PMID:14514661

Waalkes MP, Ward JM, Liu J, Diwan BA (2003). Transplacental carcinogenicity of inorganic arsenic in the drinking water: induction of hepatic, ovarian, pulmonary, and adrenal tumors in mice. Toxicol Appl Pharmacol. 186:7–17. http://dx.doi.org/10.1016/S0041-008X(02)00022-4 PMID:12583988

Wagner JC (1970). The pathogenesis of tumors following the intrapleural injection of asbestos and silica. In: Nettlesheim P, Hanna MJ, Deatherage JJ, editors. Morphology of experimental respiratory carcinogenesis (AEC Symposium Series 21). Oak Ridge (TN), USA: Atomic Energy Commission; pp. 347–358.

Wagner JC (1990). Biological effects of short fibers. Proceedings of the VIIth International Pneumoconioses Conference, Pittsburgh, August 23–26, 1988. DHHS NIOSH Publication 90-108, Part II; pp. 835–839.

Wagner JC, Berry G (1969). Mesotheliomas in rats following inoculation with asbestos. Br J Cancer. 23:567–581. http://dx.doi.org/10.1038/bjc.1969.70 PMID:5360333

Wagner JC, Berry G, Skidmore JW, Pooley FD (1980). The comparative effects of three chrysotiles by injection and inhalation in rats. IARC Sci Publ. 30:363–372. PMID:7239658

Wagner JC, Berry G, Skidmore JW, Timbrell V (1974). The effects of the inhalation of asbestos in rats. Br J Cancer. 29:252–269. http://dx.doi.org/10.1038/bjc.1974.65 PMID:4364384

Wagner JC, Berry G, Timbrell V (1973). Mesotheliomata in rats after inoculation with asbestos and other materials. Br J Cancer. 28:173–185. http://dx.doi.org/10.1038/bjc.1973.134 PMID:4354178

Wagner JC, Skidmore JW, Hill RJ, Griffiths DM (1985). Erionite exposure and mesotheliomas in rats. Br J Cancer. 51:727–730. http://dx.doi.org/10.1038/bjc.1985.108 PMID:2986668

Wagner MF, Wagner JC (1972). Lymphomas in the Wistar rat after intrapleural inoculation of silica. J Natl Cancer Inst. 49:81–91. PMID:4338782

Wagner MM (1976). Pathogenesis of malignant histiocytic lymphoma induced by silica in a colony of specific-pathogen-free Wistar rats. J Natl Cancer Inst. 57:509–518. http://dx.doi.org/10.1093/jnci/57.3.509 PMID:185399

Wagner WD, Groth DH, Holtz JL, Madden GE, Stokinger HE (1969). Comparative chronic inhalation toxicity of beryllium ores, bertrandite and beryl, with production of pulmonary tumors by beryl. Toxicol Appl Pharmacol. 15:10–29. http://dx.doi.org/10.1016/0041-008X(69)90127-6 PMID:4307951

Wagner JC, Berry G, Hill R, Munday D, Skidmore J (1984). Animal experiments with MMM(V)F – Effects of inhalation and intrapleural inoculation in rats. In: Biological effects of man-made mineral fibres – Proceedings of a WHO/IARC Conference in association with JEMRB and TIMA. Copenhagen, April 20–22, 1982. Copenhagen Regional Office for Europe, World Health Organization; pp. 209–223.

Webster I, Goldstein B, Coetzee FS, van Sittert GC (1993). Malignant mesothelioma induced in baboons by inhalation of amosite asbestos. Am J Ind Med. 24:659–666. http://dx.doi.org/10.1002/ajim.4700240602 PMID:8311096

Wei M, Wanibuchi H, Morimura K, Iwai S, Yoshida K, Endo G, et al. (2002). Carcinogenicity of dimethylarsinic acid in male F344 rats and genetic alterations in induced urinary bladder tumors. Carcinogenesis. 23:1387–1397. http://dx.doi.org/10.1093/carcin/23.8.1387 PMID:12151359
Wei M, Waniibuchi H, Yamamoto S, Li W, Fukushima S (1999). Urinary bladder carcinogenicity of dimethylarsinic acid in male F344 rats. *Carcinogenesis*. 20:1873–1876. [http://dx.doi.org/10.1093/carcin/20.9.1873 PMID:10469637](http://dx.doi.org/10.1093/carcin/20.9.1873 PMID:10469637)

Yarita T, Nettesheim P (1978). Carcinogenicity of nickel subsulfide for respiratory tract mucosa. *Cancer Res.* 38:3140–3145. [PMID:688205](http://dx.doi.org/10.1093/jnci/55.5.1165 PMID:13801686)

**Volume 100D**

Blum HF (1959). On the mechanism of cancer induction by ultraviolet radiation. IV. The size of the replicated unit. *J Natl Cancer Inst.* 23:343–350. [PMID:13801686](http://dx.doi.org/10.1093/jnci/55.5.1165 PMID:13801686)

Broerse JJ, Bartstra RW, van Bekkum DW, van der Hage MH, Zurcher C, van Zwieten MJ, et al. (2000). The carcinogenic risk of high dose total body irradiation in non-human primates. *Radiother Oncol.* 54:247–253. [http://dx.doi.org/10.1016/S0167-8140(00)00147-X PMID:10738083](http://dx.doi.org/10.1016/S0167-8140(00)00147-X PMID:10738083)

Broerse JJ, Hennen LA, Klapwijk WM, Solleveld HA (1987). Mammary carcinogenesis in different rat strains after irradiation and hormone administration. *Int J Radiat Biol Relat Stud Phys Chem Med.* 51:1091–1100. [http://dx.doi.org/10.1080/09553008714551381 PMID:3496299](http://dx.doi.org/10.1080/09553008714551381 PMID:3496299)

Cahill DF, Wright JF, Godbold JH, Ward JM, Laskey JW, Tompkins EA (1975b). Neoplastic and life-span effects of chronic exposure to tritium. II. Rats exposed in utero. *J Natl Cancer Inst.* 55:1165–1169. [http://dx.doi.org/10.1093/jnci/55.5.1165 PMID:1206742](http://dx.doi.org/10.1093/jnci/55.5.1165 PMID:1206742)

Coggle JE (1988). Lung tumour induction in mice after X-rays and neutrons. *Int J Radiat Biol Relat Stud Phys Chem Med.* 53:585–597. [http://dx.doi.org/10.1080/09553008814550911 PMID:3258294](http://dx.doi.org/10.1080/09553008814550911 PMID:3258294)

Collier CG, Strong JC, Humphreys JA, Timpson N, Baker ST, Eldred T, et al. (2005). Carcinogenicity of radon/ radon decay product inhalation in rats–effect of dose, dose rate and unattached fraction. *Int J Radiat Biol.* 81:631–647. [http://dx.doi.org/10.1080/0955300050368404 PMID:16368462](http://dx.doi.org/10.1080/0955300050368404 PMID:16368462)

Covelli V, Di Majo V, Coppola M, Rebessi S (1989). The dose-response relationships for myeloid leukemia and malignant lymphoma in BC3F1 mice. *Radiat Res.* 119:553–561. [http://dx.doi.org/10.1038/3577526 PMID:2772145](http://dx.doi.org/10.1038/3577526 PMID:2772145)

Cogle JE (1988). Lung tumour induction in mice after X-rays and neutrons. *Int J Radiat Biol Relat Stud Phys Chem Med.* 53:585–597. [http://dx.doi.org/10.1080/09553008814550911 PMID:3258294](http://dx.doi.org/10.1080/09553008814550911 PMID:3258294)

Covelli V, Di Majo V, Coppola M, Rebessi S (1989). The dose-response relationships for myeloid leukemia and malignant lymphoma in BC3F1 mice. *Radiat Res.* 119:553–561. [http://dx.doi.org/10.1038/3577526 PMID:2772145](http://dx.doi.org/10.1038/3577526 PMID:2772145)

Dagle GE, Weller RE, Filipy RE, Watson CR, Buschbom RL (1996). The distribution and effects of inhaled $^{239}$Pu(NO$_3$)$_4$ deposited in the liver of dogs. *Health Phys.* 71:198–205. [http://dx.doi.org/10.1097/00004032-199608000-00011 PMID:8690603](http://dx.doi.org/10.1097/00004032-199608000-00011 PMID:8690603)

Dasenbrock C, Tillmann T, Ernst H, Behnke W, Kellner R, Hagemann G, et al. (2005). Maternal effects and cancer risk in the progeny of mice exposed to X-rays before conception. *Exp Toxicol Pathol.* 56:351–360. [http://dx.doi.org/10.1016/j.etp.2004.12.001 PMID:15945274](http://dx.doi.org/10.1016/j.etp.2004.12.001 PMID:15945274)

De Grujil FR, Van Der Meer JB, Van Der Leun JC (1983). Dose-time dependency of tumor formation by chronic UV exposure. *Photochem Photobiol.* 37:53–62. [http://dx.doi.org/10.1111/j.1751-1097.1983.tb04433.x PMID:6836030](http://dx.doi.org/10.1111/j.1751-1097.1983.tb04433.x PMID:6836030)

Di Majo V, Coppola M, Rebessi S, Saran A, Pazzaglia S, Pariset L, et al. (1994). Neutron-induced tumors in BC3F1 mice: effects of dose fractionation. *Radiat Res.* 138:252–259. [http://dx.doi.org/10.1038/3578595 PMID:8183995](http://dx.doi.org/10.1038/3578595 PMID:8183995)

Di Majo V, Coppola M, Rebessi S, Saran A, Pazzaglia S, Pariset L, et al. (1996). The influence of sex on life shortening and tumor induction in CBA/Cne mice exposed to X rays or fission neutrons. *Radiat Res.* 146:81–87. [http://dx.doi.org/10.1038/3579399 PMID:8677302](http://dx.doi.org/10.1038/3579399 PMID:8677302)
Di Majo V, Rebessi S, Pazzaglia S, Saran A, Covelli V (2003). Carcinogenesis in laboratory mice after low doses of ionizing radiation. Radiat Res. 159:102–108. http://dx.doi.org/10.1667/0033-7587(2003)159[0102:CLEMAL]2.0.CO;2 PMID:12492373

Dicello JF, Christian A, Cucinotta FA, Gridley DS, Kathirithamby R, Mann J, et al. (2004). In vivo mammary tumourigenesis in the Sprague-Dawley rat and microdosimetric correlates. Phys Med Biol. 49:3817–3830. http://dx.doi.org/10.1088/0031-9155/49/16/024 PMID:15446807

Dudoignon N, Guézingar-Liébard F, Guillet K, L’Hullier I, Rateau G, Monchaux G, et al. (1999). Lung carcinogenesis in rats after inhalation exposure to $^{237}$NpO$_2$. Radiat Res. 152:S31–3. http://dx.doi.org/10.2307/3580109 PMID:10564932

Dudoignon N, Guillet K, Fritsch P (2003). Evaluation of risk factors for lung tumour induction in rats exposed to either NpO(2) or PuO(2) aerosols. Int J Radiat Biol. 79:169–174. http://dx.doi.org/10.1080/0955300031000086299 PMID:12745881

Ellender M, Harrison JD, Pottinger H, Thomas JM (2001). Induction of osteosarcoma and acute myeloid leukaemia in CBA/H mice by the alpha-emitting nuclides, uranium-233, plutonium-239 and americium-241. Int J Radiat Biol. 77:41–52. http://dx.doi.org/10.1080/09553001453104 PMID:11213349

Forbes PD, Blum HF, Davies RE (1981).Photocarcinogenesis in hairless mice: dose-response and the influence of dose-delivery. Photochem Photobiol. 34:361–365. http://dx.doi.org/10.1111/j.1751-1097.1981.tb0371.x PMID:7280052

Forbes PD, Davies RE, Urbach F, Berger D, Cole C (1982). Simulated stratospheric ozone depletion and increased ultraviolet radiation: effects on photocarcinogenesis in hairless mice. Cancer Res. 42:2796–2803. PMID:7083169

Grady HG, Blum HF, Kirby-Smith JS (1943). Types of tumor induced by ultraviolet radiation and factors influencing their relative incidence. J Natl Cancer Inst. 3:371–378.

Gratmansk NJ, Myers DK, Johnson JR, Jones AR, Johnson LD (1984). Occurrence of mammary tumors in rats after exposure to tritium beta rays and 200-kVp X rays. Radiat Res. 99:636–650. http://dx.doi.org/10.2307/2576337 PMID:6236474

Grahn D, Lombard LS, Carnes BA (1992). The comparative tumorigenic effects of fission neutrons and cobalt-60 gamma rays in the B6CF1 mouse. Radiat Res. 129:19–34. http://dx.doi.org/10.2307/2577899 PMID:1728054

Guilmette RA, Gillett NA, Eidson AF, Griffith WC, Brooks AL (1989). The influence of non-uniform α-irradiation of Chinese hamster liver on chromosome damage and the induction of cancer. In: Taylor DM, Mays CW, Gerber GB, Thomas RG, editors. Risks from radium and thorotrast (BRI Report 21). London, United Kingdom: British Institute of Radiology; pp. 142–148.

Hahn FF, Lundgren DL, McClellan RO (1980). Repeated inhalation exposure of mice to $^{144}$CeO$_2$. II. Biologic effects. Radiat Res. 82:123–137. http://dx.doi.org/10.2307/2575242 PMID:7367585

Hahn FF, Lundgren DL (1992). Pulmonary neoplasms in rats that inhaled cerium-144 dioxide. Toxicol Pathol. 20:169–178. http://dx.doi.org/10.1177/019262339202000204 PMID:1475578

Hahn FF, Muggenburg BA, Boecker BB (1995). Hepatic lesions induced by chronic beta irradiation from Ce in dogs. In: Van Kaick G, Karaoglou A, Kellerer AM, editors. Health effects of internally deposited radionuclides: emphasis on radium and thorium. Singapore: World Scientific Publishing; pp. 337–340.
Hahn FF, Boecker BB, Griffith WC, Muggenburg BA (1997). Biological effects of inhaled 144CeCl3 in beagle dogs. Radiat Res. 147:92–108. http://dx.doi.org/10.2307/3579448 PMID:8989375

Hahn FF, Muggenburg BA, Ménache MG, Guilmette RA, Boecker BB (1999). Comparative stochastic effects of inhaled alpha- and beta-particle-emitting radionuclides in beagle dogs. Radiat Res. 152:S19–22. http://dx.doi.org/10.2307/3580106 PMID:10564929

Herbert RA, Gillett NA, Rebar AH, Lundgren DL, Hoover MD, Chang IY, et al. (1993). Sequential analysis of the pathogenesis of plutonium-induced pulmonary neoplasms in the rat: morphology, morphometry, and cytokinetics. Radiat Res. 134:29–42. http://dx.doi.org/10.2307/3578499 PMID:8475252

Herbert RA, Scott BR, Hahn FF, Newton GJ, Snipes MB, Damon EG, et al. (1987). The prevalence and morphology of primary pulmonary neoplasms in rats 18 months after inhalation of 147Pm in fused aluminosilicate particles. In: Sun JD, Mewhinney JA, editors. Inhalation Toxicology Research Institute Annual Report 1986–1987 (Report LMF-120). Albuquerque (NM), USA: Inhalation Toxicology Research Institute; pp. 331–335.

Herbert RA, Scott BR, Hahn FF, Newton GJ, Snipes MB, Damon EG, et al. (1988). The occurrence of primary pulmonary neoplasms in rats after inhalation of Pm-147 in fused aluminosilicate particles. In: Mewhinney JA, Bechtold WE, Sun JD, Coons TA, editors. Annual Report of the Inhalation Toxicology Research Institute, 1987–1988 (Report LMF-121). Albuquerque (NM), USA: Inhalation Toxicology Research Institute; pp. 234–240.

Herbert RA, Stegelmeier BS, Gillett NA, Rebar AH, Carlton WW, Singh G, et al. (1994). Plutonium-induced proliferative lesions and pulmonary neoplasms in the rat: immunohistochemical and ultrastructural evidence for their origin from type II pneumocytes. Vet Pathol. 31:366–374. http://dx.doi.org/10.1177/030098589403100310 PMID:8053132

Hollander CF, Zurcher C, Broerse JJ (2003). Tumorigenesis in high-dose total body irradiated rhesus monkeys—a life span study. Toxicol Pathol. 31:209–213. PMID:12696581

Hueper WC (1942). Morphological aspects of experimental actinic and arsenic carcinomas in the skin of rats. Cancer Res. 2:551–559.

Humphreys ER, Isaacs KR, Raine TA, Saunders J, Stones VA, Wood DL (1993). Myeloid leukaemia and osteosarcoma in CBA/H mice given 224Ra. Int J Radiat Biol. 64:231–235. http://dx.doi.org/10.1080/09553009314551341 PMID:8103548

Humphreys ER, Loutit JF, Stones VA (1987). The induction by 239Pu of myeloid leukaemia and osteosarcoma in female CBA mice. Int J Radiat Biol Relat Stud Phys Chem Med. 51:331–339. http://dx.doi.org/10.1080/09553008714550801 PMID:3493993

Imaoka T, Nishimura M, Kakinuma S, Hatano Y, Ohmachi Y, Yoshinaga S, et al. (2007). High relative biologic effectiveness of carbon ion radiation on induction of rat mammary carcinoma and its lack of H-ras and Tp53 mutations. Int J Radiat Oncol Biol Phys. 69: 194–203. http://dx.doi.org/10.1016/j.ijrobp.2007.05.026 PMID:17707273

Ito A, Takahashi H, Watanabe H, Ogundigie PO, Okamoto T (1992). Significance of strain and sex differences in the development of 252Cf neutron-induced liver tumors in mice. Jpn J Cancer Res. 83:1052–1056. http://dx.doi.org/10.1111/j.1349-7006.1992.tb07271.x PMID:1452457

Kligman LH, Crosby MJ, Miller SA, Hitchins VM, Beer JZ (1990). Skin cancer induction in hairless mice by long-wavelength UVA radiation: a progress report [Abstract]. Photochem Photobiol. 51:18–19S.

Lafuma J, Chmelevsky D, Chameaud J, Morin M, Masse R, Kellerer AM (1989). Lung carcinomas in Sprague-Dawley rats after exposure to low doses of radon daughters, fission neutrons, or gamma rays. Radiat Res. 118:230–245. http://dx.doi.org/10.2307/3577439 PMID:2543027

Lee W, Chiaccierini RP, Shleien B, Telles NC (1982). Thyroid tumors following 131I or localized X irradiation to the thyroid and pituitary glands in rats. Radiat Res. 92:307–319. http://dx.doi.org/10.2307/3576007 PMID:7163481

Lindsay S, Potter GD, Chaikoff IL (1957). Thyroid neoplasms in the rat: a comparison of naturally occurring and 113I-induced tumors. Cancer Res. 17:183–189. PMID:13413859
Little JB, Kennedy AR, McGandy RB (1978). Effect of dose distribution on the induction of experimental lung cancer by alpha radiation. *Health Phys.* 35:595–606. http://dx.doi.org/10.1097/00004032-197811000-00001 PMID:744724

Little JB, Kennedy AR, McGandy RB (1985). Effect of dose rate on the induction of experimental lung cancer in hamsters by alpha radiation. *Radiat Res.* 103:293–299. http://dx.doi.org/10.2307/3576584 PMID:4023181

Lloyd RD, Angus W, Taylor GN, Bruenger FW, Miller SC (1993). Bone cancer occurrence among beagles given $^{239}$Pu as young adults. *Health Phys.* 64:45–51. http://dx.doi.org/10.1007/10.97004032-199301000-00005 PMID:8416214

Lloyd RD, Taylor GN, Miller SC (2000a). Does body size contribute to sensitivity of bone tumor induction by radionuclide exposure? *Health Phys.* 79:199–202. http://dx.doi.org/10.1097/00004032-200008000-00015 PMID:10910392

Lumniczky K, Antal S, Unger E, Wunderlich L, Hidvégi EJ, Sáfrány G (1998). Carcinogenic alterations in murine liver, lung, and uterine tumors induced by in utero exposure to ionizing radiation. *Mol Carcinog.* 21:100–110. http://dx.doi.org/10.1002/(SICI)1098-2744(199802)21:2<100::AID-MC4>3.0.CO;2-R PMID:9496910

Lundgren DL, Hahn FF, McClellan RO (1980a). Influence of age at the time of inhalation exposure to aerosols of $^{144}$CeO$_2$ on $^{144}$Ce retention, dosimetry and toxicity in mice. *Health Phys.* 38:643–655. http://dx.doi.org/10.1002/(SICI)1098-2744(198004)38:4<643::AID-HED59>3.0.CO;2-M PMID:7410082

Lundgren DL, McClellan RO, Hahn FF, Newton GJ, Diel JH (1980b). Repeated inhalation exposure of mice to $^{144}$CeO$_2$. I. Retention and dosimetry. *Radiat Res.* 82:106–122. http://dx.doi.org/10.2307/3575241 PMID:6768099

Lundgren DL, Hahn FF, Diel JH (1992b). Repeated inhalation exposure of rats to aerosols of $^{144}$CeO$_2$. II. Effects on survival of lungs, liver, and skeletal neoplasms. *Radiat Res.* 132:325–333. http://dx.doi.org/10.2307/3578240 PMID:1475355

Lundgren DL, Hahn FF, Diel JH, Snipes MB (1992a). Repeated inhalation exposure of rats to aerosols of $^{144}$CeO$_2$. I. Lung, liver, and skeletal dosimetry. *Radiat Res.* 132:312–324. http://dx.doi.org/10.2307/3578239 PMID:1475354

Lundgren DL, Haley PJ, Hahn FF, Diel JH, Griffith WC, Scott BR (1995). Pulmonary carcinogenicity of repeated inhalation exposure of rats to aerosols of $^{239}$PuO$_2$. *Radiat Res.* 142:39–53. http://dx.doi.org/10.2307/3578965 PMID:7899558
Lundgren DL, Hahn FF, Griffith WC, Hubbs AF, Nikola KJ, Newton GJ, et al. (1996). Pulmonary carcinogenicity of relatively low doses of beta-particle radiation from inhaled $^{144}$CeO$_2$ in rats. *Radiat Res.* 146:525–535. http://dx.doi.org/10.2307/3579553 PMID:8896579

Luz A, Müller WA, Gössner W, Hug O (1979). Osteosarcoma induced by short-lived bone-seeking alpha emitters in mice: the role of age. *Environ Res.* 18:115–119. http://dx.doi.org/10.1016/0013-9351(79)90144-0 PMID:291507

Mahlum DD, Sikov MR (1969). Skeletal changes produced by the administration of plutonium-239 and cerium-144 to weanling rats. In: Sikov MR, Mahlum DD, editors. Radiation biology of the fetal and juvenile mammal (CONF-690501). Springfield (VA), USA: National Technical Information Service; pp. 567–576.

Maisin JR, Wambersie A, Gerber GB, Mattelin G, Lambet-Collier M, Gueulette J (1983a). The effects of a fractionated gamma irradiation on life shortening and disease incidence in BALB/c mice. *Radiat Res.* 94:359–373. http://dx.doi.org/10.2307/3575970 PMID:6344131

Maisin JR, Wambersie A, Gerber GB, Mauderly JL, Griffith WC, et al. (1996). Toxicity of inhaled plutonium dioxide in beagle dogs. *Radiat Res.* 145:361–381. http://dx.doi.org/10.2307/3578993 PMID:8927705

Muggenburg BA, Guilmette RA, Hahn FF, Diel JH, Mauderly JL, Seilkop SK, et al. (2008). Radiotoxicity of inhaled (239)PuO(2) in dogs. *Radiat Res.* 170:736–757. http://dx.doi.org/10.1667/RR1409.1 PMID:19138039

Müller WA, Luz A, Murray AB, Linzner U (1990). Induction of lymphoma and osteosarcoma in mice by single and protracted low alpha doses. *Health Phys.* 59:305–310. http://dx.doi.org/10.1097/00004032-199009000-00006 PMID:2394588

Müller WA, Schäffer EH, Gössner W (1983). The role of time-factor and RBE for the induction of osteosarcomas by incorporated short-lived bone-seekers. *Health Phys.* 44:203–212. http://dx.doi.org/10.1097/00004032-198306001-00017 PMID:6574999

Müller WA, Schäffer EH, Linzner U (1980). Studies on incorporated short-lived beta-emitters with regard to the induction of late effects. *Radiat Environ Biophys.* 18:1–11. http://dx.doi.org/10.1007/BF01324368 PMID:6934560
Nikula KJ, Muggenburg BA, Chang IV, Griffith WC, Hahn FF, Boecker BB (1995). Biological effects of 137CsCl injected in beagle dogs. *Radiat Res.* 142:347–361. [http://dx.doi.org/10.2307/3579144 PMID:7761585]

Nikula KJ, Muggenburg BA, Griffith WC, Carlton WW, Fritz TE, Boecker BB (1996). Biological effects of 137CsCl injected in beagle dogs of different ages. *Radiat Res.* 146:536–547. [http://dx.doi.org/10.2307/3579554 PMID:8896580]

Nilsson A (1970). Pathologic effects of different doses of radiostrontium in mice. Dose effect relationship in 90Sr-induced bone tumors. *Acta Radiol Ther Phys Biol.* 9:155–176. [http://dx.doi.org/10.3109/02841867009129097 PMID:5447112]

Nilsson A (1971). Radiostrontium-induced carcinomas of the external ear. *Acta Radiol Ther Phys Biol.* 10:321–328. [http://dx.doi.org/10.3109/02841867109130796 PMID:5095033]

Nilsson A, Bierke P, Walinder G, Broomé-Karlsson A (1980). Age and dose related carcinogenicity of 90Sr. *Acta Radiol Oncol.* 19:223–238. [http://dx.doi.org/10.3109/02841868009130156 PMID:6257041]

Nilsson A, Broomé-Karlsson A (1976). The pathology of americium 241. *Acta Radiol Ther Phys Biol.* 15:49–70. [http://dx.doi.org/10.3109/02841867609132708 PMID:946934]

Nolibe D, Masse R, Lafuma J (1981). The effect of neonatal thymectomy on lung cancers induced in rats by plutonium dioxide. *Radiat Res.* 87:90–99. [http://dx.doi.org/10.2307/3575543 PMID:6973163]

Nomura T (1982). Parental exposure to x-rays and chemicals induces heritable tumours and anomalies in mice. *Nature.* 296:575–577. [http://dx.doi.org/10.1038/296575a0 PMID:7200193]

Nomura T (1986). Further studies on X-ray and chemically induced germ-line alterations causing tumors and malformations in mice. In: Ramel C, Lambert B, Magnnusson J, editors. Genetic toxicology of environmental chemicals, Part B: genetic effects and applied mutagenesis. New York, USA: Alan R. Liss; pp. 13–20.

Nomura T (1989). Role of radiation-induced mutations in multigeneration carcinogenesis. In: Napalkov NP, Rice JM, Tomatis L, Yamasaki H, editors. Perinatal and multigeneration carcinogenesis. IARC Scientific Publications, No. 96. Lyon, France: International Agency for Research on Cancer; pp. 375–387.

Oghiso Y, Yamada Y (2000). Strain differences in carcinogenic and hematopoietic responses of mice after injection of plutonium citrate. *Radiat Res.* 154:447–454. [http://dx.doi.org/10.1667/0033-7587(2000)154[0447:SDICAH]2.0.CO;2 PMID:11023609]

Oghiso Y, Yamada Y (2003a). Comparisons of pulmonary carcinogenesis in rats following inhalation exposure to plutonium dioxide or X-ray irradiation. *J Radiat Res.* 44:261–270. [http://dx.doi.org/10.1269/jrr.44.261 PMID:14646231]

Oghiso Y, Yamada Y (2003b). The specific induction of osteosarcomas in different mouse strains after injections of 239Pu citrate. *J Radiat Res.* 44:125–132. [http://dx.doi.org/10.1269/jrr.44.125 PMID:13678341]

Oghiso Y, Yamada Y, Ishigure N, Fukuda S, Iida H, Yamada Y, et al. (1994a). High incidence of malignant lung carcinomas in rats after inhalation of 239PuO2 aerosol. *J Radiat Res.* 35:222–235. [http://dx.doi.org/10.1269/jrr.35.222 PMID:7752106]

Oghiso Y, Yamada Y, Iida H (1994b). Differential induction of bone and hematopoietic tumors in C3H mice after the injection of 239Pu citrate. *J Radiat Res.* 35:236–247. [http://dx.doi.org/10.1269/jrr.35.236 PMID:7752107]

Oghiso Y, Yamada Y, Iida H (1997). High frequency of leukemic lymphomas with osteosarcomas but no myeloid leukemias in C3H mice after 239Pu citrate injection. *J Radiat Res.* 38:77–86. [http://dx.doi.org/10.1269/jrr.38.77 PMID:9287460]

Oghiso Y, Yamada Y, Iida H, Inaba J (1998). Differential dose responses of pulmonary tumor types in the rat after inhalation of plutonium dioxide aerosols. *J Radiat Res.* 39:61–72. [http://dx.doi.org/10.1269/jrr.39.61 PMID:9610033]

Park JF, Buschbom RL, Dagle GE, James AC, Watson CR, Weller RE (1997). Biological effects of inhaled 238PuO2 in beagles. *Radiat Res.* 148:365–381. [http://dx.doi.org/10.2307/3579522 PMID:9339953]

Park JF, Lund JE, Ragan HA, Hackett PL, Frazier ME (1976). Bone tumors induced by inhalation of 238PuO2 in dogs. *Recent Results Cancer Res.* 54:17–35. [PMID:1070720]
Perraud R, Chameaud J, Lafuma J, Masse R, Chrétien J (1972). Experimental bronchopulmonary cancer induced by radon inhalation in rats. Comparison with the histological aspects of human cancers [in French]. J Fr Med Chir Thorac. 26:25–41. PMID:5039949

Putschar W, Holtz F (1930). Erzeugung von Hautkrebsen bei Ratten durch langedaurende Ultraviolett bestrahlung. Z Krebsforsch. 33(1):219–60. http://dx.doi.org/10.1007/ BF01792278

Roffo AH (1939). Über die physikalische Aetiologie der Krebskrankheit. Strahlentherapie. 66:328–350.

Raabe OG, Book SA, Parks NJ (1983). Lifetime bone cancer dose-response relationships in beagles and people from skeletal burdens of 226Ra and 90Sr. Health Phys. 44:33–48. http://dx.doi.org/10.1097/00004032-198306001-00002 PMID:6862910

Roffo AH (1934). Cancer et soleil. Carcinomes et sarcomes provoqués par l’action du soleil in toto. Bull Assoc Fr Etud Cancer. 23:590–616.

Sanders CL, Lundgren DL (1995). Pulmonary carcinogenesis in the F344 and Wistar rat after inhalation of plutonium dioxide. Radiat Res. 144:206–214. http://dx.doi.org/10.2307/3579260 PMID:7480647

Sanders CL, Mahaffey JA (1978). Inhalation carcinogenesis of high-fired 244CmO2 in rats. Radiat Res. 76:384–401. http://dx.doi.org/10.2307/3574787 PMID:287127

Sanders CL, Mahaffey JA (1981). Inhalation carcinogenesis of repeated exposures to high-fired 239PuO2 in rats. Health Phys. 41:629–644. http://dx.doi.org/10.1097/00004032-198110000-00005 PMID:7198105

Sasaki S, Fukuda N (2008). Dose-response relationship for induction of ovarian tumors in mice irradiated during prenatal, early postnatal and elder periods. J Radiat Res. 49:623–633. http://dx.doi.org/10.1269/jrr.08045 PMID:18957829

Sasaki S, Kasuga T (1981). Life-shortening and carcinogenesis in mice irradiated neonatally with X rays. Radiat Res. 88:313–325. http://dx.doi.org/10.2307/3575663 PMID:7029601

Sasaki S, Kasuga T, Sato F, Kawashima N (1978a). Late effects of fetal mice X-irradiated at middle or late intrauterine stage. Gan. 69:167–177. PMID:680461

Sasaki S, Kasuga T, Sato F, Kawashima N (1978b). Induction of hepatocellular tumor by X-ray irradiation at perinatal stage of mice. Gan. 69:451–452. PMID:208909

Seyama T, Yamamoto O, Kinomura A, Yokoro K (1991). Carcinogenic effects of tritiated water (HTO) in mice: in comparison to those of neutrons and gamma-rays. J Radiat Res. 32:132–142. http://dx.doi.org/10.1269/jrr.32.SUPPLEMENT2_132 PMID:1823350

Shami SG, Thibodeau LA, Kennedy AR, Little JB (1982). Proliferative and morphological changes in the pulmonary epithelium of the Syrian golden hamster during carcinogenesis initiated by 210Po alpha-radiation. Cancer Res. 42:1405–1411. PMID:7060014

Shellabarger CJ (1976). Radiation carcinogenesis: laboratory studies. Cancer. 37:1090–1096. http://dx.doi.org/10.1002/1097-0142(197602)37:2+<1090::AID-CNCR2820370817>3.0.CO;2-W PMID:1253125

Shellabarger CJ, Bond VP, Aponte GE, Cronkite EP (1966). Results of fractionation and protraction of total-body radiation on rat mammary neoplasia. Cancer Res. 26:509–513. PMID:5930698

Shellabarger CJ, Chmelevsky D, Kellarer AM (1980). Induction of mammary neoplasms in the Sprague-Dawley rat by 430keV neutrons and X-rays. J Natl Cancer Inst. 64:821–833. PMID:6928995

Sikov MR (1982). Fetal and juvenile radiotoxicity. Pacific Northwest Laboratory Annual Report for 1981 (PNL-4100 PTI). Springfield (VA), USA: National Technical Information Service; pp. 113–117.

Sikov MR (1983). Fetal and juvenile radiotoxicity. Pacific Northwest Laboratory Annual Report for 1982 (PNL-4699 PTI). Springfield (VA), USA: National Technical Information Service; pp. 89–93.

Sikov MR (1985). Fetal and juvenile radiotoxicity. Pacific Northwest Laboratory Annual Report for 1984 (PNL-5500 PTI). Springfield (VA), USA: National Technical Information Service; pp. 43–7.

Sikov MR (1987). Fetal and juvenile radiotoxicity. Pacific Northwest Laboratory Annual Report for 1986 (BNWL-6100 PTI). Springfield (VA), USA: National Technical Information Service; pp. 47–50.

Sikov MR (1989). Tumour development following internal exposures to radionuclides during the perinatal period following prenatal exposure to radiation. In: Napalkov NP, Rice JM, Tomatis L, Yamasaki H, editors. Perinatal and multigeneration carcinogenesis (IARC Scientific Publication No. 96). Lyon, France: IARC Press; pp. 403–419.
Sikov MR, Zwicker GM, Hess JO, Mahlum DD (1978). Late effects of perinatally administered plutonium. In: Mahlum DD, Sikov MR, Hackett PL, Andrew X, editors. Developmental toxicology of energy-related pollutants (CONF-771107). Springfield (VA), USA: National Technical Information Service; pp. 361–374.

Sterenberg HJ, van der Leun JC (1990). Tumorigenesis by a long wavelength UV-A source. Photochem Photobiol. 51:325–330. http://dx.doi.org/10.1111/j.1751-1097.1990.tb01718.x PMID:2356228

Storer JB, Fry RJ (1995). On the shape of neutron dose-effect curves for radiogenic cancers and life shortening in mice. Radiat Environ Biophys. 34:21–27. http://dx.doi.org/10.1007/BF01210541 PMID:7604155

Svoboda V, Bubeníková D (1990). Hemoblastoses in mice contaminated with low activities of $^{239}$Pu. Neoplasma. 37:639–646. PMID:2274084

Svoboda V, Kofráněk V, Kotasková Z, Bubeníková D, Dvorák V (1977). Planimetric evaluation and comparison of roentgenograms of osteogenic sarcomas induced by $^{226}$Ra and $^{224}$Ra in mice. Neoplasma. 24:311–318. PMID:268495

Takahashi T, Watanabe H, Dohi K, Ito A (1992). $^{252}$Cf relative biological effectiveness and inheritable effect of fission neutrons in mouse liver tumorigenesis. Cancer Res. 52:1948–1953. PMID:1551123

Tanaka IB 3rd, Tanaka S, Ichinohe K, Matsushita S, Matsumoto T, Otsu H, et al. (2007). Cause of death and neoplasia in mice continuously exposed to very low dose rates of gamma rays. Radiat Res. 167:417–437. http://dx.doi.org/10.1667/RR0728.1 PMID:17388697

Taylor GN, Gardner P, Mays CW, Wrenn ME, Charrier K (1981). Incidence of plutonium-induced bone cancer in neutered mice. Cancer Res. 4:1:971–973. PMID:7459884

Taylor GN, Lloyd RD, Mays CW, Angus W, Miller SC, Sabestari L, et al. (1991). Plutonium- or americium-induced liver tumors and lesions in beagles. Health Phys. 61:337–347. http://dx.doi.org/10.1097/00004032-199109000-00003 PMID:1880023

Taylor GN, Lloyd RD, Miller SC, Muggenburg BA (2000). Radium-induced eye melanomas in dogs. Health Phys. 79:196–198. http://dx.doi.org/10.1097/00004032-200008000-00014 PMID:10910391

Taylor GN, Mays CW, Lloyd RD, Gardner PA, Talbot LR, McFarland SS, et al. (1983). Comparative toxicity of $^{226}$Ra, $^{239}$Pu, $^{241}$Am, $^{249}$Cf, and $^{252}$Cf in C57BL/Do black and albino mice. Radiat Res. 95:584–601. http://dx.doi.org/10.2307/3576102 PMID:6611863

Ullrich RL (1980). Effects of split doses of x rays or neutrons on lung tumor formation in RFM mice. Radiat Res. 83:138–145. http://dx.doi.org/10.2307/3575265 PMID:7394540

Ullrich RL (1983). Tumor induction in BALB/c female mice after fission neutron or gamma irradiation. Radiat Res. 93:506–515. http://dx.doi.org/10.2307/3576029 PMID:6344126

Ullrich RL, Jernigan MC, Adams LM (1979). Induction of lung tumors in RFM mice after localized exposures to x rays or neutrons. Radiat Res. 80:464–473. http://dx.doi.org/10.2307/3574988 PMID:160056

Ullrich RL, Jernigan MC, Cosgrove GE, Satterfield LC, Bowles ND, Storer JB (1976). The influence of dose and dose rate on the incidence of neoplastic disease in RFM mice after neutron irradiation. Radiat Res. 68:115–131. http://dx.doi.org/10.2307/3574539 PMID:967967

Ullrich RL, Jernigan MC, Storer JB (1977). Neutron carcinogenesis. Dose and dose-rate effects in BALB/c mice. Radiat Res. 72:487–498. http://dx.doi.org/10.2307/3574612 PMID:339261

Ullrich RL, Preston RJ (1987). Myeloid leukemia in male RFM mice following irradiation with fission spectrum neutrons or gamma rays. Radiat Res. 109:165–170. http://dx.doi.org/10.2307/3576877 PMID:3468555

Ullrich RL, Storer JB (1979a). Influence of gamma irradiation on the development of neoplastic disease in mice. I. Reticular tissue tumors. Radiat Res. 80:303–316. http://dx.doi.org/10.2307/3575059 PMID:388507

Ullrich RL, Storer JB (1979b). Influence of gamma irradiation on the development of neoplastic disease in mice. II. Solid tumors. Radiat Res. 80:317–324. http://dx.doi.org/10.2307/3575060 PMID:504578
Ullrich RL, Storer JB (1979c). Influence of gamma irradiation on the development of neoplastic disease in mice. III. Dose-rate effects. *Radiat Res.* 80:325–342. http://dx.doi.org/10.2307/3575061 PMID:504579

Upton AC, Randolph ML, Conklin JW, Kastenbaum MA, Slater M, Melville GS Jr, et al. (1970). Late effects of fast neutrons and gamma-rays in mice as influenced by the dose rate of irradiation: induction of neoplasia. *Radiat Res.* 41:467–491. http://dx.doi.org/10.2307/3572837 PMID:4908840

van den Heuvel R, Gerber GB, Leppens H, Vander Plaetse F, Schoeters GE (1995). Long-term effects on tumour incidence and survival from 241Am exposure of the BALB/c mouse in utero and during adulthood. *Int J Radiat Biol.* 68:679–686. http://dx.doi.org/10.1080/09553009514551691 PMID:8551111

van der Houwen van Oordt CW, Schouten TG, van Krieken JH, van Dierendonck JH, van der Eb AJ, Breuer ML (1998). X-ray-induced lymphomagenesis in E mu-pim-1 transgenic mice: an investigation of the co-operating molecular events. *Carcinogenesis.* 19:847–853. http://dx.doi.org/10.1039/carcin/19.5.847 PMID:9635873

van Weelden H, de Grujil FR, van der Putte SC, Toonstra J, van der Leun JC (1988a). The carcinogenic risks of modern tanning equipment: is UV-A safer than UV-B? *Arch Dermatol Res.* 280:300–307. http://dx.doi.org/10.1007/BF00440604 PMID:3178287

van Weelden H, De La Faille HB, Young E, van der Leun JC (1988b). A new development in UVB phototherapy of psoriasis. *Br J Dermatol.* 119:11–9. http://dx.doi.org/10.1111/j.1365-2133.1988.tb07096.x PMID:3408653

Van Weelden H, de Grujil ER, van der Leun JC (1986). Carcinogenesis by UVA, with an attempt to assess the carcinogenic risks of tanning with UVA and UVB. In: Urbach E, Gange RW, editors. The biological effects of UV radiation. New York, USA: Praeger; pp. 137–146.

Vogel HH Jr, Turner JE (1982). Genetic component in rat mammary carcinogenesis. *Radiat Res.* 89:264–273. http://dx.doi.org/10.2307/3575772 PMID:7038744

Vogel HH Jr, Zaldívar R (1972). Neutron-induced mammary neoplasms in the rat. *Cancer Res.* 32:933–938. PMID:5017741

Walinder G (1972). Late effects of irradiation on the thyroid gland in mice. I. Irradiation of adult mice. *Acta Radiol Ther Phys Biol.* 11:433–451. http://dx.doi.org/10.3109/02841867209129790 PMID:4649691

Walinder G, Sjödén AM (1972). Late effects of irradiation on the thyroid gland in mice. II. Irradiation of mouse foetuses. *Acta Radiol Ther Phys Biol.* 11:577–589. http://dx.doi.org/10.3109/02841867209129803 PMID:4661525

Watanabe H, Kashimoto N, Kajimura J, Ishikawa M, Kamiya K (2007). Tumor induction by monoenergetic neutrons in B6C3F1 mice. *J Radiat Res.* 48:205–210. http://dx.doi.org/10.1269/jrr.0614 PMID:17443058

Wegener K, Hasenöhrl K, Wesch H (1983). Recent results of the German Thorotrast study – pathoanatomical changes in animal experiments and comparison to human thorotraastris. *Health Phys.* 44:307–316. PMID:6862908

Wesch H, van Kaick G, Riedel W, Kaul A, Wegener K, Hasenöhrl K, et al. (1983). Recent results of the German Thorotrast study – statistical evaluation of animal experiments with regard to the nonradiation effects in human thorotraastris. *Health Phys.* 44:317–321. PMID:6862909

White RG, Raabe OG, Culbertson MR, Parks NJ, Samuels SJ, Rosenblatt LS (1993). Bone sarcoma characteristics and distribution in beagles fed strontium-90. *Radiat Res.* 136:178–189. http://dx.doi.org/10.2307/3578609 PMID:8248474

White RG, Raabe OG, Culbertson MR, Parks NJ, Samuels SJ, Rosenblatt LS (1994). Bone sarcoma characteristics and distribution in beagles injected with radium-226. *Radiat Res.* 137:361–370. http://dx.doi.org/10.2307/3578711 PMID:8146280

Yamamoto O, Seyama T, Itoh H, Fujimoto N (1998). Oral administration of tritiated water (HTO) in mouse. III: Low dose-rate irradiation and threshold dose-rate for radiation risk. *Int J Radiat Biol.* 73:535–541. http://dx.doi.org/10.1080/095530098142086 PMID:9652811
Yamamoto O, Seyama T, Jo T, Terato H, Saito T, Kinomura A (1995). Oral administration of tritiated water (HTO) in mouse. II. Tumour development. *Int J Radiat Biol.* 68:47–54. http://dx.doi.org/10.1080/09553009514550911 PMID:7629437

Yamamoto O, Yokoro K, Seyama T, Kinomura A, Nomura T (1990). HTO oral administration in mice. I: Threshold dose rate for haematopoietic death. *Int J Radiat Biol.* 57:543–549. http://dx.doi.org/10.1080/09553009014552681 PMID:1968947

**Volume 100E**

Balansky R, Ganchev G, Iltcheva M, Steele VE, D’Agostini F, De Flora S (2007). Potent carcinogenicity of cigarette smoke in mice exposed early in life. *Carcinogenesis.* 28:2236–2243. http://dx.doi.org/10.1093/carcin/bgm122 PMID:17522065

Belinsky SA, Foley JF, White CM, Anderson MW, Maronpot RR (1990). Dose-response relationship between O\(^6\)-methylguanine formation in Clara cells and induction of pulmonary neoplasia in the rat by 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone. *Cancer Res.* 50:3772–3780. PMID:2340522

Bernfeld P, Homburger F, Russfield AB (1974). Strain differences in the response of inbred Syrian hamsters to cigarette smoke inhalation. *J Natl Cancer Inst.* 53:1141–1157. http://dx.doi.org/10.1093/jnci/53.4.1141 PMID:4279301

Bernfeld P, Homburger F, Soto E, Pai KJ (1979). Cigarette smoke inhalation studies in inbred Syrian golden hamsters. *J Natl Cancer Inst.* 63:675–689. http://dx.doi.org/10.1093/jnci/63.3.675 PMID:288930

Campbell JA (1939). Carcinogenic agents present in the atmosphere and incidence of primary tumours in mice. *Br J Exp Pathol.* 20:122–132.

Correa E, Joshi PA, Castonguay A, Schüller HM (1990). The tobacco-specific nitrosamine 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone is an active transplacental carcinogen in Syrian golden hamsters. *Cancer Res.* 50:3435–3438. PMID:2334940

Dagle GE, McDonald KE, Smith LG, Stevens DL Jr (1978). Pulmonary carcinogenesis in rats given implants of cigarette smoke condensate in beeswax pellets. *J Natl Cancer Inst.* 61:905–910. PMID:278868

Dontenwill W, Chevalier HJ, Harke HP, Klimisch HJ, Kuhnigk C, Reckzeh G, et al. (1977). Untersuchungen über den Effekt der chronischen Zigarettenrauchinhalation beim syrischen Goldhamster und über die Bedeutung des Vitamin A auf die bei Berauchung gefundenen Organveränderungen. *Z Krebsforsch Klin Onkol Cancer Res Clin Oncol.* 89:153–180. http://dx.doi.org/10.1007/BF00308516 PMID:143143

Dontenwill W, Chevalier HJ, Harke HP, LaFrenz U, Reckzeh G, Schneider B (1973). Investigations on the effects of chronic cigarette-smoke inhalation in Syrian golden hamsters. *J Natl Cancer Inst.* 51:1781–1832. http://dx.doi.org/10.1093/jnci/51.6.1781 PMID:4765388

Finch GL, Nikula KJ, Barr EB, Bechtold WE, Chen BT, Griffith WC, et al. (1995). Effects of combined exposure of F344 rats to radiation and chronically inhaled cigarette smoke. In: Bice DE, Hahn FF, Hoover MD, Neft RE, Thornton-Manning JR, Bradley PL, editors. Annual Report of the Inhalation Toxicology Research Institute (ITRI-146). Albuquerque (NM), USA: *Inhalation Toxicology Research Institute*; pp. 77–79. http://dx.doi.org/10.2172/381371

Gargus JL, Powers MB, Habermann RT, Everly JR (1976). Mouse dermal bioassays of cigarette smoke condensates. In: Gori GB, editor. Report No. 1. Toward less hazardous cigarettes. The first set of experimental cigarettes. DHEW Publ. No. (NIH) 76-905. Washington (DC), USA: Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute; pp. 85–94.

Gori GB (1976). Report on the second set of experimental cigarettes. In: Gori GB, editor. Report No. 2. Toward less hazardous cigarettes. The second set of experimental cigarettes. DHEW Publ. No. (NIH) 76-1111. Washington (DC), USA: Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute; pp. 4–15.
Gori GB (1977). Report on the third set of experimental cigarettes. In: Gori GB, editor. Report No. 3. Toward less hazardous cigarettes. The third set of experimental cigarettes. DHEW Publ. No. (NIH) 77-1280. Washington (DC), USA: Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute; pp. 3–24.

Gori GB (1980). Report on the fourth set of experimental cigarettes. In: Gori GB, editor. Report No. 4. Toward less hazardous cigarettes. The fourth set of experimental cigarettes. Washington (DC), USA: Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute; pp. 5–40.

Harris RJ, Negroni G (1967). Production of lung carcinomas in C57BL mice exposed to a cigarette smoke and air mixture. Br Med J. 4:637–641. http://dx.doi.org/10.1136/bmj.4.5580.637 PMID:4293822

Hayes JR, Meckley DR, Stavanja MS, Nelson PR, Van Kampen KR, Swauger JE (2007). Effect of a flue-curing process that reduces tobacco specific nitrosamines on the tumor promotion in SENCAR mice by cigarette smoke condensate. Food Chem Toxicol. 45:419–430. http://dx.doi.org/10.1016/j.fct.2006.08.024 PMID:17070977

Hecht SS, Rivenson A, Braley J, DiBello J, Adams JD, Hoffmann D (1986b). Induction of oral cavity tumors in F344 rats by tobacco-specific nitrosamines and snuff. Cancer Res. 46:4162–416. PMID:3731083

Hecht SS, Trushin N, Castonguay A, Rivenson A (1986a). Comparative tumorigenicity and DNA methylation in F344 rats by 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone and N-nitrosodimethylamine. Cancer Res. 46:498–502. PMID:3940627

Hecht SS, Young R, Maeura Y (1983). Comparative carcinogenicity in F344 rats and Syrian golden hamsters of N′-nitrosonornicotine and N′-nitrosodimethylamine. Cancer Res. 46:498–502. PMID:3940627

Hoffmann D, Castonguay A, Rivenson A, Hecht SS (1981). Comparative carcinogenicity and metabolism of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone and N′-nitrosodimethylamine in Syrian golden hamsters. Cancer Res. 41:2386–2393. PMID:7237437

Hoffmann D, Raineri R, Hecht SS, Maronpot R, Wynder EL (1975). A study of tobacco carcinogenesis. XIV. Effects of N′-nitrosonornicotine and N′-nitrosodimethylamine in rats. J Natl Cancer Inst. 55:977–981. http://dx.doi.org/10.1093/jnci/55.4.977 PMID:1237631

Hoffmann D, Rivenson A, Hecht SS (1984). Dose-response study of the carcinogenicity of tobacco-specific N-nitrosoamines in F344 rats. J Cancer Res Clin Oncol. 108:81–86. http://dx.doi.org/10.1007/BF00390978 PMID:6746721

Hutt JA, Vuillemenot BR, Barr EB, Grimes MJ, Hahn FF, Hobbs CH, et al. (2005). Life-span inhalation exposure to mainstream cigarette smoke induces lung cancer in B6C3F1 mice through genetic and epigenetic pathways. Carcinogenesis. 26:1999–2009. http://dx.doi.org/10.1093/carcin/bgi150 PMID:15944214

Johansson SL, Hirsch JM, Larsson PA, Saidi J, Osterdahl BG (1989). Snuff-induced carcinogenesis: effect of snuff in rats initiated with 4-nitroquinoline N-oxide. Cancer Res. 49:3063–3069. PMID:2497972

Johansson SL, Saidi J, Osterdahl BG, Smith RA (1991). Promoting effect of snuff in rats initiated by 4-nitroquinoline-N-oxide or 7,12-dimethylbenz(a)anthracene. Cancer Res. 51:4388–4394. PMID:1907884

Leuchtenberger C, Leuchtenberger R (1970). Effects of chronic inhalation of whole fresh cigarette smoke and of its gas phase on pulmonary tumorigenesis in Snell’s mice. In: Nettesheim P, Hanna MG Jr, Deathevage JW Jr, editors. Morphology of experimental respiratory carcinogenesis. Proceedings of a Biology Division, Oak Ridge National Laboratory Conference, United States Atomic Energy Commission; pp. 329–346.

Liang CK, Guan NY, Ma F, Zhang Y, Wang EM, Yin XR (1983). Carcinogenicity in mice of soot extract collected from Xuan Wei County [in Chinese]. Zhongguo Yi Xue Ke Xue Yuan Xue Bao. 5:307–310. PMID:6329534

Liang CK, Guan NY, Yin XR (1984). Extracts from Xuan Wei coal and wood smoke induce lung cancer in mice. Wei Sheng Yan Jiu. 13:19–23.

Liang CK, Guan NY, Cao SR, He XZ, Ma F (1988). Natural inhalation exposure to coal smoke and wood smoke induces lung cancer in mice and rats. Biomed Environ Sci. 1:42–50. PMID:3268107
Lin C, Dai X, Sun X (1995). Expression of oncogene and anti-oncogene in mouse lung cancer induced by coal-burning smoke [in Chinese]. Zhonghua Zhong Liu Za Zhi. 17:432–4. PMID:8697995
Mauderly JL, Gigliotti AP, Barr EB, Bechtold WE, Belinsky SA, Hahn FF, et al. (2004). Chronic inhalation exposure to mainstream cigarette smoke increases lung and nasal tumor incidence in rats. Toxicol Sci. 81:280–92. http://dx.doi.org/10.1093/toxsci/kfh203 PMID:15213336
Mumford JL, Helmes CT, Lee XM, Seidenberg J, Nesnow S (1990). Mouse skin tumorigenicity studies of indoor coal and wood combustion emissions from homes of residents in Xuan Wei, China with high lung cancer mortality. Carcinogenesis. 11:397–403. http://dx.doi.org/10.1093/carcin/11.3.397 PMID:2311182
Prokopczyk B, Rivenson A, Hoffmann D (1991). A study of betel quid carcinogenesis. IX. Comparative carcinogenicity of 3-(methylnitrosamino)propionitrile and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butane on local application to mouse skin and rat oral mucosa. Cancer Lett. 60:153–157. http://dx.doi.org/10.1016/0304-3835(91)90222-4 PMID:1933838
Ranadive KJ, Gothoskar SV, Rao AR, Tezabwalla BU, Ambaye RY (1976). Experimental studies on betel nut and tobacco carcinogenicity. Int J Cancer. 17:469–476. http://dx.doi.org/10.1002/ijc.2910170409 PMID:1279039
Ranadive KJ, Ranadive SN, Shivapurkar NM, Gothoskar SV (1979). Betel quid chewing and oral cancer: experimental studies on hamsters. Int J Cancer. 24:835–843. http://dx.doi.org/10.1002/ijc.2910240623 PMID:544535
Rivenson A, Hoffmann D, Prokopczyk B, Amin S, Hecht SS (1988). Induction of lung and exocrine pancreas tumors in F344 rats by tobacco-specific and Areca-derived N-nitrosamines. Cancer Res. 48:6912–6917. PMID:3180100
Schüller HM, Jorquera R, Lu X, Riechert A, Castonguay A (1994). Transplacental carcinogenicity of low doses of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butane administered subcutaneously or intratracheally to hamsters. J Cancer Res Clin Oncol. 120:200–203. http://dx.doi.org/10.1007/BF01372556 PMID:8288673
Schüller HM, Witschi HP, Nylen E, Joshi PA, Correa E, Becker KL (1990). Pathobiology of lung tumors induced in hamsters by 4-(methylnitrosamino)-1-(3-pyridyl)-1-butane and the modulating effect of hyperoxia. Cancer Res. 50:1960–1965. PMID:2306745
Shivapurkar NM, Ranadive SN, Gothoskar SV, Bhide SV, Ranadive KJ (1980). Tumorigenic effect of aqueous & polyphenolic fractions of betel nut in Swiss strain mice. Indian J Exp Biol. 18:1159–1161. PMID:7216269
Soffritti M, Belpoggi F, Cevolani D, Guarino M, Padovani M, Maltoni C (2002). Results of long-term experimental studies on the carcinogenicity of methyl alcohol and ethyl alcohol in rats. Ann N Y Acad Sci. 982:46–69. http://dx.doi.org/10.1111/j.1749-6632.2002.tb04924.x PMID:12562628
Stanton MF, Miller E, Wrench C, Blackwell R (1972). Experimental induction of epidermoid carcinoma in the lungs of rats by cigarette smoke condensate. J Natl Cancer Inst. 49:867–877. PMID:4647499
Suri K, Goldman HM, Wells H (1971). Carcinogenic effect of a dimethyl sulphoxide extract of betel nut on the mucosa of the hamster buccal pouch. Nature. 230:383–384. http://dx.doi.org/10.1038/230383a0 PMID:4927728
Witschi H, Espiritu I, Maronpot RR (2006). Lung tumors in 2 year old strain A/J mice exposed for 6 months to tobacco smoke. Cancer Lett. 241:64–68. http://dx.doi.org/10.1016/j.canlet.2005.10.002 PMID:16290922
Witschi H, Espiritu I, Maronpot RR, Pinkerton KE, Jones AD (1997a). The carcinogenic potential of the gas phase of environmental tobacco smoke. Carcinogenesis. 18:2035–2042. http://dx.doi.org/10.1093/carcin/18.11.2035 PMID:9395199
Witschi H, Espiritu I, Peake JL, Wu K, Maronpot RR, Pinkerton KE (1997b). The carcinogenicity of environmental tobacco smoke. Carcinogenesis. 18:575–586. http://dx.doi.org/10.1093/carcin/18.3.575 PMID:9067559
Wynder EL, Graham EA, Croninger AB (1953). Experimental production of carcinoma with cigarette tar. Cancer Res. 13:855–864. PMID:13116124
Yin XR, Guan N, Liang C (1984). Study on lung cancer in mice by intra-bronchial injection of Xuan Wei coal fumes extracts. Wei Sheng Yan Jiu. 13:21–25.
Yu MC, Nichols PW, Zou XN, Estes J, Henderson BE (1989). Induction of malignant nasal cavity tumours in Wistar rats fed Chinese salted fish. Br J Cancer. 60:198–201. http://dx.doi.org/10.1038/bjc.1989.250 PMID:2765365

Zheng X, Luo Y, Christensson B, Drettner B (1994). Induction of nasal and nasopharyngeal tumours in Sprague-Dawley rats fed with Chinese salted fish. Acta Otolaryngol. 114:98–104. http://dx.doi.org/10.3109/0001649490126024 PMID:7510449

Volume 100F

Adkins B Jr, Van Stee EW, Simmons JE, Eustis SL (1986). Oncogenic response of strain A/J mice to inhaled chemicals. J Toxicol Environ Health. 17:311–322. http://dx.doi.org/10.1080/1528798609530825 PMID:3083111

Anderson LM, Priest LJ, Deschner EE, Budinger JM (1983). Carcinogenic effects of intracolonic benzo[a]pyrene in beta-naphthoflavone-induced mice. Cancer Lett. 20:117–123. http://dx.doi.org/10.1016/0304-3835(83)90039-3 PMID:6321017

Anna CH, Maronpot RR, Pereira MA, Foley JF, Malarkey DE, Anderson MW (1994). ras proto-oncogene activation in dichloroacetic acid-, trichloroethylene- and tetrachloroethylene-induced liver tumors in B6C3F1 mice. Carcinogenesis. 15:2255–2261. http://dx.doi.org/10.1093/carcin/15.10.2255 PMID:7955063

Asada I, Matsumoto Y, Tobe T, Yoshida O, Miyakawa M (1981). Induction of hepatoma in mice by direct deep Black-Extra (DDB-EX) and occurrence of serum AFP. Nihon Geka Hokan. 50:45–55. PMID:6169317

Badary OA, Al-Shabanah OA, Nagi MN, Al-Rikabi AC, Elmazar MM (1999). Inhibition of benzo(a)pyrene-induced forestomach carcinogenesis in mice by thymoquinone. Eur J Cancer Prev. 8:435–440. http://dx.doi.org/10.1097/00008469-199910000-00009 PMID:10548399

Balansky R, Ganchev G, Iltcheva M, Steele VE, D’Agostini F, De Flora S (2007). Potent carcinogenicity of cigarette smoke in mice exposed early in life. Carcinogenesis. 28:2236–2243. http://dx.doi.org/10.1093/carcin/cbm122 PMID:17522065

Berenblum I (1930). Experimental induction of tumours with blast-furnace tar. Lancet. 216:1344–1346. http://dx.doi.org/10.1016/S0140-6736(00)90871-7

Bingham E, Horton AW (1966). Environmental carcinogenesis: Experimental observations related to occupational cancer. Adv Biol Skin. 7:183–193.

Bingham E, Horton AW, Tye R (1965). The carcinogenic potency of certain oils. Arch Environ Health. 10:449–451. http://dx.doi.org/10.1080/00039896.1965.10664027 PMID:14247342

Block NL, Sigel MM, Lynne CM, Ng AB, Grosberg RA (1978). The initiation, progress, and diagnosis of dog bladder cancer induced by 4-aminobiphenyl. Invest Urol. 16:50–54. PMID:689839

Bogovski PA (1958). On the blastomogenic action of oil shale generator tar. In: Bogovski PA, editor. Problems of industrial hygiene in the shale-oil industry in the Estonian SSR. Volume 3. Tallinn, Estonia: Valgus Publishers; pp. 172–185.

Bogovski PA, Vinkmann F (1979). Carcinogenicity of oil shale tars, some of their components, and commercial products. Environ Health Perspect. 30:165–169. http://dx.doi.org/10.1289/ehp.7930165 PMID:446447

Bonser GM (1932). Tumours of the skin produced by blast-furnace tar. Lancet. 219:775–776. http://dx.doi.org/10.1016/S0140-6736(01)24727-8

Bonser GM, Clayson DB, Jull JW (1956). The induction of tumours of the subcutaneous tissues, liver and intestine in the mouse by certain dye-stuffs and their intermediates. Br J Cancer. 10:653–667. http://dx.doi.org/10.1038/bjc.1956.79 PMID:13426377

Bonser GM, Clayson DB, Jull JW, Pyrah LN (1952). The carcinogenic properties of 2-amino-1-naphthol hydrochloride and its parent amine 2-naphthylamine. Br J Cancer. 6:412–424. http://dx.doi.org/10.1038/bjc.1952.47 PMID:13032313

Bull RJ, Orner GA, Cheng RS, Stillwell L, Stauber AJ, Sasser LB, et al. (2002). Contribution of dichloroacetate and trichloroacetate to liver tumor induction in mice by trichloroethylene. Toxicol Appl Pharmacol. 182:55–65. http://dx.doi.org/10.1006/taap.2002.9427 PMID:12127263
Busby WF Jr, Stevens EK, Martin CN, Chow FL, Garner RC (1989). Comparative lung tumorigenicity of parent and mononitro-polynuclear aromatic hydrocarbons in the BLU:Ha newborn mouse assay. *Toxicol Appl Pharmacol.* 99:555–563. [http://dx.doi.org/10.1016/0041-008X(89)90162-2 PMID:2749740](http://dx.doi.org/10.1016/0041-008X(89)90162-2)

Butler WH, Greenblatt M, Lijinsky W (1969). Carcinogenesis in rats by aflatoxins B1, G1, and B2. *Cancer Res.* 29:2206–2211. PMID:4318833

Campbell JA (1939). Carcinogenic agents present in the atmosphere and incidence of primary lung tumours in mice. *Br J Exp Pathol.* 20:122–132.

Cavaliere E, Mailander P, Pelfrene A (1977). Carcinogenic activity of anthanthrene on mouse skin. *Z Krebsforsch Klin Onkol Cancer Res Clin Oncol.* 89:113–118. [http://dx.doi.org/10.1007/BF00308512 PMID:143140](http://dx.doi.org/10.1007/BF00308512)

Cavaliere E, Rogan E, Cremonesi P, Higginbotham S, Salmasi S (1988a). Tumorigenicity of 6-halogenated derivatives of benzo[a]pyrene in mouse skin and rat mammary gland. *J Cancer Res Clin Oncol.* 114:10–15. [http://dx.doi.org/10.1007/BF00390479 PMID:3350835](http://dx.doi.org/10.1007/BF00390479)

Cavaliere E, Rogan E, Sinha D (1988b). Carcinogenicity of aromatic hydrocarbons directly applied to rat mammary gland. *J Cancer Res Clin Oncol.* 114:3–9. [http://dx.doi.org/10.1007/BF00390478 PMID:3350839](http://dx.doi.org/10.1007/BF00390478)

Cavaliere E, Higginbotham S, RamaKrishna NVS, Devanesan PD, Todorovic R, Rogan EG, et al. (1991). Comparative dose-response tumorigenicity studies of dibenzo[a,l]pyrene versus 7,12-dimethylbenz[a]anthracene, benzo[a]pyrene and two dibenzo[a,l]pyrene dihydriodols in mouse skin and rat mammary gland. *Carcinogenesis.* 12:1939–1944.

CIIT (1981). Chemical Industry Institute of Toxicology Final report on a chronic inhalation toxicology study in rats and mice exposed to formaldehyde. CIIT docket #10922. Columbus (OH), USA: Battelle Columbus Laboratories.

Clayson DB, Lawson TA, Pringle JA (1967). The carcinogenic action of 2-aminodiphenylene oxide and 4-aminodiphenyl on the bladder and liver of the C57 X IF mouse. *Br J Cancer.* 21:755–762. [http://dx.doi.org/10.1038/bjc.1967.88 PMID:6074696](http://dx.doi.org/10.1038/bjc.1967.88)

Conzelman GM Jr, Moulton JE (1972). Dose-response relationships of the bladder tumorigen 2-naphthylamine: a study in beagle dogs. *J Natl Cancer Inst.* 49:193–205. PMID:5037435

Conzelman GM Jr, Moulton JE, Flanders LE 3rd, Springer K, Crout DW (1969). Induction of transitional cell carcinomas of the urinary bladder in monkeys fed 2-naphthylamine. *J Natl Cancer Inst.* 42:825–836. PMID:4977557

Cronkite EP, Bullis J, Inoue T, Drew RT (1984). Benzene inhalation produces leukemia in mice. *Toxicol Appl Pharmacol.* 75:358–361. [http://dx.doi.org/10.1016/0041-008X(84)90219-9 PMID:6474468](http://dx.doi.org/10.1016/0041-008X(84)90219-9)

Cronkite EP, Drew RT, Inoue T, Hirabayashi Y, Bullis JE (1989). Hematotoxicity and carcinogenicity of inhaled benzene. *Environ Health Perspect.* 82:97–108. [http://dx.doi.org/10.1289/ehp.898297 PMID:2792054](http://dx.doi.org/10.1289/ehp.898297)

Culp SJ, Gaylor DW, Sheldon WG, Goldstein LS, Beland FA (1998). A comparison of the tumors induced by coal tar and benzo[a]pyrene in a 2-year bioassay. *Carcinogenesis.* 19:117–24. [http://dx.doi.org/10.1093/carcin/19.1.117 PMID:9472702](http://dx.doi.org/10.1093/carcin/19.1.117)

Deichmann WB, Radomski J, Glass E, Anderson WA, Coplan M, Woods F (1965). Synergism among oral carcinogens. 3. Simultaneous feeding of four bladder carcinogens to dogs. *Ind Med Surg.* 34:640–649. PMID:14334179

Deichmann WB, Radomski JL, Anderson WA, Coplan MM, Woods FM (1958). The carcinogenic action of p-aminobiphenyl in the dog; final report. *Ind Med Surg.* 27:25–16. PMID:13491120

Della Porta G, Dragani TA, Sozzi G (1987). Carcinogenic effects of infantile and long-term 2,3,7,8-tetrachlorodibenzo-p-dioxin treatment in the mouse. *Tumori.* 73:99–107. PMID:3576718

Deutsch-Wenzel RP, Brune H, Grimmmer G, Dettbarn G, Misfeld J (1983). Experimental studies in rat lungs on the carcinogenicity and dose-response relationships of eight frequently occurring environmental polycyclic aromatic hydrocarbons. *J Natl Cancer Inst.* 71:539–544. PMID:6577228

Dooley KL, Von Tungeln LS, Bucci T, Fu PP, Kladlubar FF (1992). Comparative carcinogenicity of 4-aminobiphenyl and the food pyrolysates, Glu-P-1, IQ, PhIP, and MeIQx in the neonatal B6C3F1...
male mouse. Cancer Lett. 62:205–209. http://dx.doi.org/10.1016/0304-3835(92)90097-F PMID:1596864

Drew RT, Boorman GA, Haseman JK, McConnell EE, Busey WM, Moore JA (1983). The effect of age and exposure duration on cancer induction by a known carcinogen in rats, mice, and hamsters. Toxicol Appl Pharmacol. 68:120–130. http://dx.doi.org/10.1016/0041-008X(83)90361-7 PMID:6682580

el-Bayoumy K, Chae YH, Upadhyaya P, Rivenson A, Kurtzke C, Reddy B, et al. (1995). Comparative tumorigenicity of benz(a)pyrene, 1-nitropyrene and 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine administered by gavage to female CD rats. Carcinogenesis. 16:431–434. http://dx.doi.org/10.1093/carcin/16.2.431 PMID:7859378

Emmett EA, Bingham EM, Barkley W (1981). A carcinogenic bioassay of certain roofing materials. Am J Ind Med. 2:59–64. http://dx.doi.org/10.1002/ajim.4700020110 PMID:7349096

Epstein SM, Bartus B, Farber E (1969). Renal epithelial neoplasms induced in male Wistar rats by oral aflatoxin B1. Cancer Res. 29:1045–1050. PMID:7349035

Emmett EA, Bingham EM, Barkley W (1981). A carcinogenic bioassay of certain roofing materials. Am J Ind Med. 2:59–64. http://dx.doi.org/10.1002/ajim.4700020110 PMID:7349096

Farris GM, Everitt JI, Irons RD, Popp JA (1993). Carcinogenicity of inhaled benzene in CBA mice. Fundam Appl Toxicol. 20:503–507. http://dx.doi.org/10.1016/0041-008X(93)90361-7 PMID:8314465

Feron VJ (1972). Respiratory tract tumors in hamsters after intratracheal instillations of benz(a)pyrene alone and with furfural. Cancer Res. 32:28–36. PMID:5007686

Feron VJ, de Jong D, Emmelot P (1973). Letter: Dose-response correlation for the induction of respiratory-tract tumours in Syrian golden hamsters by intratracheal instillations of benzo(a)pyrene. Eur J Cancer. 9:387–390. http://dx.doi.org/10.1016/0014-2964(73)90057-1 PMID:4746737

Feron VJ, Hendriksen CF, Speek AJ, Til HP, Spijt BJ (1981). Lifespan oral toxicity study of vinyl chloride in rats. Food Cosmet Toxicol. 19:317–333. http://dx.doi.org/10.1016/0015-6264(81)90391-6 PMID:7196371

Feron VJ, Kroes R (1979). One-year time-sequence inhalation toxicity study of vinyl chloride in rats. II. Morphological changes in the respiratory tract, ceruminous glands, brain, kidneys, heart and spleen. Toxicology. 13:131–141. PMID:516073

Feron VJ, Kruysse A, Til HP (1979). One-year time sequence inhalation toxicity study of vinyl chloride in rats. I. Growth, mortality, haematology, clinical chemistry and organ weights. Toxicology. 13:25–28. PMID:516069

French JE, Saulnier M (2000). Benzene leukemogenesis: an environmental carcinogen-induced tissue-specific model of neoplasia using genetically altered mouse models. J Toxicol Environ Health A. 61:377–379. http://dx.doi.org/10.1080/0098410005166389 PMID:11086942

Fukuda K, Takemoto K, Tsuruta H (1983). Inhalation carcinogenicity of trichloroethylene in mice and rats. Ind Health. 21:243–254. http://dx.doi.org/10.2486/indhealth.21.243 PMID:6654707

Garman RH, Snellings WM, Maronpot RR (1985). Brain tumors in F344 rats associated with chronic inhalation exposure to ethylene oxide. Neurotoxicology. 6:117–137. PMID:3887231

Garman RH, Snellings WM, Maronpot RR (1986). Frequency, size and location of brain tumours in F-344 rats chronically exposed to ethylene oxide. Food Chem Toxicol. 24:145–153. http://dx.doi.org/10.1016/0278-6915(86)90349-2 PMID:3957162

Gibson JE (1984). Coordinated toxicology: an example study with formaldehyde. Concepts Toxicol. 1:276–282.

Goodman DG, Sauer RM (1992). Hepatotoxicity and carcinogenicity in female Sprague-Dawley rats treated with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD): a pathology working group reevaluation. Regul Toxicol Pharmacol. 15:245–252. http://dx.doi.org/10.1016/0273-2300(92)90036-9 PMID:1509118

Grigor’Ev ZE (1960). On carcinogenic properties of Pechera coal tar [in Russian]. Vopr Onkol. 6:83–86. PMID:13851781

Grimmer G, Dettbarn G, Brune H, Deutsch-Wenzel R, Misfeld J (1982). Quantification of the carcinogenic effect of polycyclic aromatic hydrocarbons in used engine oil by topical application onto the skin of mice. Int Arch Occup Environ Health. 50:95–100. http://dx.doi.org/10.1007/BF00432496 PMID:7085089
Griswold DP Jr, Casey AE, Weisburger EK, Weisburger JH (1968). The carcinogenicity of multiple intragastric doses of aromatic and heterocyclic nitro or amino derivatives in young female Sprague-Dawley rats. *Cancer Res.* 28:924–933. PMID:5652305

Groth DH, Coate WB, Ulland BM, Hornung RW (1981). Effects of aging on the induction of angiosarcoma. *Environ Health Perspect.* 41:53–57. http://dx.doi.org/10.1289/ehp.814153 PMID:7199429

Grundmann E, Steinhoff D (1970). Leber- und Lungentumoren nach 3,3'-Dichlor-4,4'-diaminophenylmethan bei Ratten. *Z Krebsforsch.* 74:28–39. http://dx.doi.org/10.1007/BF00524677 PMID:4326955

Habs M, Jahn SA, Schmähl D (1984). Carcinogenic activity of condensate from coloquint seeds (*Citrullus colocynthis*) after chronic epicutaneous administration to mice. *J Cancer Res Clin Oncol.* 108:154–156. http://dx.doi.org/10.1007/BF00390988 PMID:6746706

Hao YR, Yang F, Cao J, Ou C, Zhang JJ, Yang C, et al. (2009). *Ginkgo biloba* extracts (EGb761) inhibits aflatoxin B1-induced hepatocarcinogenesis in Wistar rats [in Chinese]. *Zhong Yao Cai.* 32:92–96. PMID:19445131

Harrison LH, Cox CE, Banks KW, Boyce WH (1969). Distant metastases from beta-naphthylamine induced vesical tumors in dogs. *J Urol.* 102:586–589. http://dx.doi.org/10.1016/S0022-5347(17)62205-5 PMID:5347766

Hays SM, Aylward LL, Karch NJ, Paustenbach DJ (1997). The relative susceptibility of animals and humans to the carcinogenic hazard posed by exposure to 2,3,7,8-TCDD: an analysis using standard and internal measures of dose. *Chemosphere.* 34:1507–1522. http://dx.doi.org/10.1016/S0045-6535(97)00447-5 PMID:9134683

Hecht SS, El-Bayoumy K, Rivenson A, Fiala E (1982). Comparative carcinogenicity of *o*-toluidine hydrochloride and *o*-nitrosotoluene in F-344 rats. *Cancer Lett.* 16:103–108. http://dx.doi.org/10.3109/08958379509015211

Heinrich U, Fuhlst R, Rittinghausen S, Creutzzenberg O, Bellmann B, Koch W, et al. (1995). Chronic inhalation exposure of Wistar rats and two different strains of mice to diesel engine exhaust, carbon black, and titanium dioxide. *Inhal Toxicol.* 7:533–556. http://dx.doi.org/10.1080/152873959015221

Henry MC, Port CD, Bates RR, Kaufman DG (1973). Respiratory tract tumors in hamsters induced by benzo(a)pyrene. *Cancer Res.* 33:1585–1592. PMID:4721222

Hicks RM, Chowaniec J (1977). The importance of synergy between weak carcinogens in the induction of bladder cancer in experimental animals and humans. *Cancer Res.* 37:2943–2949. PMID:872124

Hicks RM, Wright R, Wakefield JS (1982). The induction of rat bladder cancer by 2-naphthylamine. *Br J Cancer.* 46:646–661. http://dx.doi.org/10.1038/bjc.1982.250 PMID:7138770

Hieger I (1929). The influence of dilution on the carcinogenic effect of tar. *J Pathol Bacteriol.* 32:419–423. http://dx.doi.org/10.1002/path.1700320308

Holmberg B, Kronevi T, Winell M (1976). The pathology of vinyl chloride exposed mice. *Acta Vet Scand.* 17:328–342. PMID:988738

Homburger F, Hsueh SS, Kerr CS, Russfield AB (1972). Inherited susceptibility of inbred strains of Syrian hamsters to induction of subcutaneous sarcomas and mammary and gastrointestinal carcinomas by subcutaneous and gastric administration of polynuclear hydrocarbons. *Cancer Res.* 32:360–366. PMID:5058191

Hong CB, Winston JM, Thornburg LP, Lee CC, WSoods JS (1981). Follow-up study on the carcinogenicity of vinyl chloride and vinylidene chloride in rats and mice: tumor incidence and mortality subsequent to exposure. *J Toxicol Environ Health.* 7:909–924. http://dx.doi.org/10.1080/15287398109530034 PMID:7265317

Hong HH, Devereux TR, Melnick RL, Moomaw CR, Boorman GA, Sills RC (2000). Mutations of ras protooncogenes and p53 tumor suppressor gene in cardiac hemangiosarcomas from B6C3F1 mice exposed to 1,3-butadiene for 2 years. *Toxicol Pathol.* 28:529–534. http://dx.doi.org/10.1177/019262330002800404 PMID:10930038

Hueper WC, Payne WW (1960). Carcinogenic studies on petroleum asphalt, cooling oil, and coal tar. *Arch Pathol.* 70:372–384. PMID:14403794
Huff JE, Haseman JK, DeMarini DM, Eustis S, Maronpot RR, Peters AC, et al. (1989). Multiple-site carcinogenicity of benzene in Fischer 344 rats and B6C3F1 mice. *Environ Health Perspect.* 82:125–163. PMID:2676495

Huff JE, Melnick RL, Solleveld HA, Haseman JK, Powers M, Miller RA (1985). Multiple organ carcinogenicity of 1,3-butadiene in B6C3F1 mice after 60 weeks of inhalation exposure. *Science.* 227:548–549. http://dx.doi.org/10.1126/science.3966163 PMID:3966163

IARC (1984). Polynuclear aromatic hydrocarbons, Part 2, Carbon blacks, mineral oils (lubricant base oils and derived products) and some nitroarenes. *IARC Monogr Eval Carcinog Risk Chem Hum.* 33:1–222. Available from: http://publications.iarc.fr/51 PMID:6590450

IARC (1985). Polynuclear aromatic compounds, Part 4, Bitumens, coal-tars and derived products, shale-oils and soots. *IARC Monogr Eval Carcinog Risk Chem Hum.* 35:1–247. Available from: http://publications.iarc.fr/53 PMID:2991123

Ishinishi N, Kuwabara N, Nagase S, Suzuki T, Iishiwata S, Kohno T (1986). Long-term inhalation studies on effects of exhaust from heavy and light duty diesel engines on F344 rats. *Dev Toxicol Environ Sci.* 13:329–348. PMID:2435494

Iwagawa M, Maeda T, Izumi K, Otsuka H, Nishifuji K, Ohnishi Y, et al. (1989). Comparative dose-response study on the pulmonary carcinogenicity of 1,6-dinitropyrene and benzo[a]pyrene in F344 rats. *Carcinogenesis.* 10:1285–1290. http://dx.doi.org/10.1093/carcin/10.7.1285 PMID:2736719

Iwai K, Adachi S, Takahashi M, Möller L, Udagawa T, Mizuno S, et al. (2000). Early oxidative DNA damages and late development of lung cancer in diesel exhaust-exposed rats. *Environ Res.* 84:255–264. http://dx.doi.org/10.1006/enrs.2000.4072 PMID:11097799

Iwai K, Udagawa T, Yamagishi M, Yamada H (1986). Long-term inhalation studies of diesel exhaust on F344 SPF rats. Incidence of lung cancer and lymphoma. *Dev Toxicol Environ Sci.* 13:349–360. PMID:2435495

Kamata E, Nakadate M, Uchida O, Ogawa Y, Suzuki S, Kaneko T, et al. (1997). Results of a 28-month chronic inhalation toxicity study of formaldehyde in male Fisher-344 rats. *J Toxicol Sci.* 22:239–254. http://dx.doi.org/10.2131/jts.22.3_239 PMID:9279826

Kane ML, Ladov EN, Holdsworth CE, Weaver NK (1984). Toxicological characteristics of refinery streams used to manufacture lubricating oils. *Am J Ind Med.* 5:183–200. http://dx.doi.org/10.1002/ajim.4700050304 PMID:6702826

Kirs DS, Donofrio DJ, Pavkov KL (1983b). The chronic effects of formaldehyde inhalation in rats and mice: a preliminary report. In: Gibson JE, editor. Formaldehyde toxicity. Washington (DC), USA: Hemisphere; pp. 111–131.

Kim Y, Hong HH, Lachat Y, Clayton NP, Devereux TR, Melnick RL, et al. (2005). Genetic alterations in brain tumors following 1,3-butadiene exposure in B6C3F1 mice. *Toxicol Pathol.* 33:307–312. http://dx.doi.org/10.1080/01926230590922848 PMID:15814359

Kimbrough RD, Squire RA, Linder RE, Strandberg JD, Montalli RJ, Burse VW (1975). Induction of liver tumor in Sherman strain female rats by polychlorinated biphenyl Aroclor 1260. *J Natl Cancer Inst.* 55:1453–1459. http://dx.doi.org/10.1093/jnci/55.6.1453 PMID:173869

Kireeva IS (1968). On the carcinogenic properties of coal pitch and petroleum bitumen used as bonding agents in coal briquettes [in Russian]. *Gig Sanit.* 33:35–41. PMID:5731604

Kobayashi N (1975). Production of respiratory tract tumors in hamsters by benzo(a)pyrene. *Gan.* 66:311–315. PMID:1181231
Kociba RJ, Keyes DG, Beyer JE, Carreon RM, Wade CE, Dittenber DA, et al. (1978). Results of a two-year chronic toxicity and oncogenicity study of 2,3,7,8-tetrachlorodibenzo-p-dioxin in rats. *Toxicol Appl Pharmacol.* 46:279–303. [http://dx.doi.org/10.1016/0041-008X(78)90075-3](http://dx.doi.org/10.1016/0041-008X(78)90075-3) PMID:734660

Kommnineni C, Groth DH, Frockt IJ, Voelker RW, Stanovick RP (1979). Determination of the tumorigenic potential of methylene-bis-orthochloroaniline. *J Environ Pathol Toxicol.* 2:149–171. PMID:512554

Kouri RE, Wood AW, Levin W, Rude TH, Yagi H, Mah HD, et al. (1980). Carcinogenicity of benzo[a]pyrene and thirteen of its derivatives in C3H/fCum mice. *J Natl Cancer Inst.* 64:617–623. PMID:6766516

Kuschner M, Laskin S, Drew RT, Cappiello V, Nelson N (1975). Inhalation carcinogenicity of alpha halo ethers. III. Lifetime and limited period inhalation studies with bis(chloromethyl)ether at 0.1 ppm. *Arch Environ Health.* 30:73–77. [http://dx.doi.org/10.1080/00039896.1975.10666646](http://dx.doi.org/10.1080/00039896.1975.10666646) PMID:1115531

Lavoie EJ, Braley J, Rice JE, Rivenson A (1987). Tumorigenic activity of non-alternant polynuclear aromatic hydrocarbons in newborn mice. *Cancer Lett.* 34:15–20. [http://dx.doi.org/10.1016/0304-3835(87)90068-1](http://dx.doi.org/10.1016/0304-3835(87)90068-1) PMID:3802065

Lee CC, Bhandari JC, Winston JM, House WB, Dixon RL, Woods JS (1978). Carcinogenicity of vinyl chloride and vinylidene chloride. *J Toxicol Environ Health.* 30:73–77. [http://dx.doi.org/10.1080/15287397809529640](http://dx.doi.org/10.1080/15287397809529640) PMID:633405

Leong BK, Kociba RJ, Jersey GC (1981). A lifetime study of rats and mice exposed to vapors of bis(chloromethyl)ether. *Toxicol Appl Pharmacol.* 58:269–281. [http://dx.doi.org/10.1016/0041-008X(81)90432-4](http://dx.doi.org/10.1016/0041-008X(81)90432-4) PMID:7245201

Levin W, Wood AW, Wislocki PG, Kapitulnik J, Yagi H, Jerina DM, et al. (1977). Carcinogenicity of benzo-ring derivatives of benzo(a)pyrene on mouse skin. *Cancer Res.* 37:3356–3361. PMID:884679

Littlefield NA, Nelson CJ, Frith CH (1983). Benzidine dihydrochloride: toxicological assessment in mice during chronic exposures. *J Toxicol Environ Health.* 12:671–685. [http://dx.doi.org/10.1080/15287398309530459](http://dx.doi.org/10.1080/15287398309530459) PMID:6366243

Littlefield NA, Nelson CJ, Gaylor DW (1984). Benzidine dihydrochloride: risk assessment. *Fundam Appl Toxicol.* 4:69–80. [http://dx.doi.org/10.1016/0272-0590(84)90220-3](http://dx.doi.org/10.1016/0272-0590(84)90220-3) PMID:6363187

Lynch DW, Lewis TR, Moorman WJ, Burg JR, Groth DH, Khan A, et al. (1984). Carcinogenic and toxicologic effects of inhaled ethylene oxide and propylene oxide in F344 rats. *Toxicol Appl Pharmacol.* 76:69–84. [http://dx.doi.org/10.1016/0041-008X(84)90030-9](http://dx.doi.org/10.1016/0041-008X(84)90030-9) PMID:6484993

MacEwen JD, Hall A 3rd, Scheel LD (1976). Experimental oncogenesis in rats and mice exposed to coal tar aerosols. In: Proceedings of the Seventh Annual Conference on Environmental Toxicology, 13–15 October 1976, Dayton, OH (AMRL Technical Report No. 76–125). Wright-Patterson Air Force Base (OH), USA: *Aerospace Medical Research Laboratory.*

Maltoni C, Ciliberti A, Cotti G, Conti B, Belpoggi F (1989). Benzene, an experimental multipotential carcinogen: results of the long-term bioassays performed at the Bologna Institute of Oncology. *Environ Health Perspect.* 82:109–124. [http://dx.doi.org/10.1289/ehp.8982109](http://dx.doi.org/10.1289/ehp.8982109) PMID:2792037

Maltoni C, Conti B, Cotti G (1983). Benzene: a multipotential carcinogen. Results of long-term bioassays performed at the Bologna Institute of Oncology. *Am J Ind Med.* 4:589–630. [http://dx.doi.org/10.1002/ajim.4700040503](http://dx.doi.org/10.1002/ajim.4700040503) PMID:6353911

Maltoni C, Conti B, Cotti G, Belpoggi F (1985). Experimental studies on benzene carcinogenicity at the Bologna Institute of Oncology: current results and ongoing research. *Am J Ind Med.* 7:415–446. [http://dx.doi.org/10.1002/ajim.4700070508](http://dx.doi.org/10.1002/ajim.4700070508) PMID:4003403

Maltoni C, Conti B, Perino G, Di Maio V (1988a). Further evidence of benzene carcinogenicity. Results on Wistar rats and Swiss mice treated by ingestion. *Ann N Y Acad Sci.* 534:412–426. [http://dx.doi.org/10.1111/j.1749-6632.1988.tb30131.x](http://dx.doi.org/10.1111/j.1749-6632.1988.tb30131.x) PMID:3389671

Maltoni C, Cotti G (1988). Carcinogenicity of vinyl chloride in Sprague-Dawley rats after prenatal and postnatal exposure. *Ann N Y Acad Sci.* 534:145–159. [http://dx.doi.org/10.1111/j.1749-6632.1988.tb30108.x](http://dx.doi.org/10.1111/j.1749-6632.1988.tb30108.x) PMID:3389652
Maltoni C, Cotti G, Valgimigli L, Mandrioli A (1982a). Hepatocarcinomas in Sprague-Dawley rats, following exposure to benzene by inhalation. First experimental demonstration. Med Lav. 73:446–450. PMID:7177032

Maltoni C, Cotti G, Valgimigli L, Mandrioli A (1982b). Zymbal gland carcinomas in rats following exposure to benzene by inhalation. Am J Ind Med. 3:11–16. http://dx.doi.org/10.1002/ajim.4700030104 PMID:7124739

Maltoni C, Lefemine G, Ciliberti A, Cotti G, Carretti D (1981). Carcinogenicity bioassays of vinyl chloride monomer: a model of risk assessment on an experimental basis. Environ Health Perspect. 41:3–29. http://dx.doi.org/10.1289/ehp.81413 PMID:6800782

Maltoni C, Lefemine G, Cotti G (1986). Experimental research on trichloroethylene carcinogenesis. Volume 5. Princeton (NJ), USA: Princeton Scientific Publishing; pp. 1–393.

Maltoni C, Lefemine G, Cotti G, Perino G (1988b). Long-term carcinogenicity bioassays on trichloroethylene administered by inhalation to Sprague-Dawley rats and Swiss and B6C3F1 mice. Ann N Y Acad Sci. 534:316–342. http://dx.doi.org/10.1111/j.1749-6632.1988.tb30120.x PMID:3389663

Maltoni C, Scarnato C (1979). First experimental demonstration of the carcinogenic effects of benzene; long-term bioassays on Sprague-Dawley rats by oral administration. Med Lav. 70:352–357. PMID:554913

Maronpot RR (1987). Ovarian toxicity and carcinogenicity in eight recent National Toxicology Program studies. Environ Health Perspect. 73:125–130. http://dx.doi.org/10.1289/ehp.8773125 PMID:3665857

Mauderly JL, Jones RK, Griffith WC, Henderson RF, McClellan RO (1987). Diesel exhaust is a pulmonary carcinogen in rats exposed chronically by inhalation. Fundam Appl Toxicol. 9:208–221. http://dx.doi.org/10.1016/0272-0590(87)90044-3 PMID:2443412

Mauderly JL, Jones RK, McClellan RO, Henderson RF, Griffith WC (1986). Carcinogenicity of diesel exhaust inhaled chronically by rats. Dev Toxicol Environ Sci. 13:397–409. PMID:2435498

Mayes BA, McConnell EE, Neal BH, Brunner MJ, Hamilton SB, Sullivan TM, et al. (1998). Comparative carcinogenicity in Sprague-Dawley rats of the polychlorinated biphenyl mixtures Aroclors 1016, 1242, 1254, and 1260. Toxicol Sci. 41:62–76. PMID:9520342

Mehlman MA (2002). Carcinogenic effects of benzene: Cesare Maltoni’s contributions. Ann N Y Acad Sci. 982:137–148. http://dx.doi.org/10.1111/j.1749-6632.2002.tb04929.x PMID:12562633

Melnick RL, Huff J, Chou BJ, Miller RA (1990b). Carcinogenicity of 1,3-butadiene in C57BL/6 x C3H F1 mice at low exposure concentrations. Cancer Res. 50:6592–6599. PMID:2208121

Melnick RL, Huff JE (1993). 1,3-Butadiene induces cancer in experimental animals at all concentrations from 6.25 to 8000 parts per million. IARC Sci Publ. 127:309–322. PMID:8070878

Melnick RL, Huff JE, Roycroft JH, Chou BJ, Miller RA (1990a). Inhalation toxicology and carcinogenicity of 1,3-butadiene in B6C3F1 mice following 65 weeks of exposure. Environ Health Perspect. 86:27–36. PMID:2401263

Melnick RL, Shackelford CC, Huff J (1993). Carcinogenicity of 1,3-butadiene. Environ Health Perspect. 100:227–236. http://dx.doi.org/10.1289/ehp.93100227 PMID:8354171

Melnick RL, Sills RC (2001). Comparative carcinogenicity of 1,3-butadiene, isoprene, and chloroprene in rats and mice. Chem Biol Interact. 135-136:27–42. http://dx.doi.org/10.1016/S0009-2797(01)00213-7 PMID:11397379

Miller RA, Melnick RL, Boorman GA (1989). Neoplastic lesions induced by 1,3-butadiene in B6C3F1 mice. Exp Pathol. 37:136–146. http://dx.doi.org/10.1016/S0232-1513(89)80033-7 PMID:2637144

Monticello TM, Swenberg JA, Gross EA, Leininger JR, Kimbell JS, Seilkop S, et al. (1996). Correlation of regional and nonlinear formaldehyde-induced nasal cancer with proliferating assessment of cells. Cancer Res. 56:1012–1022. PMID:8640755

Morton KC, Wang CY, Garner CD, Shirai T (1981). Carcinogenicity of benzidine, N,N′-diacetylbenzidine, and N-hydroxy-N,N′-diacetylbenzidine for female CD rats. Carcinogenesis. 2:747–752. http://dx.doi.org/10.1093/carcin/2.8.747 PMID:7285281
NCI (1976). National Cancer Institute. Carcinogenesis bioassay of trichloroethylene. Bethesda, MD: US Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health. Tech Rep Ser (World Health Organ). 2:1–215. Available from: http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr002.pdf.

NCI (1978). Thirteen-week subchronic toxicity studies of Direct Blue 6, Direct Black 38 and Direct Brown 95 Dyes. Technical Report Series No 108. DHEW (NIH) Publication No. 78-1358. Bethesda (MD), USA: National Institutes of Health.

Nesnow S, Triplett LL, Slaga TJ (1983). Mouse skin tumor initiation-promotion and complete carcinogenesis bioassays: mechanisms and biological activities of emission samples. Environ Health Perspect. 47:255–268. http://dx.doi.org/10.1289/ehp.8347255 PMID:6825618

Nesnow S, Triplett LL, Slaga TJ (1982). Comparative tumor-initiating activity of complex mixtures from environmental particulate emissions on SENCAR mouse skin. J Natl Cancer Inst. 68:829–834. PMID:6951092

Nikula KJ, Snipes MB, Barr EB, Griffith WC, Henderson RF, Mauderly JL (1995). Comparative pulmonary toxicities and carcinogenicities of chronically inhaled diesel exhaust and carbon black in F344 rats. Fundam Appl Toxicol. 25:80–94. http://dx.doi.org/10.1006/faat.1995.1042 PMID:7541380

Norback DH, Weltman RH (1985). Polychlorinated biphenyl induction of hepatocellular carcinoma in the Sprague-Dawley rat. Environ Health Perspect. 60:97–105. http://dx.doi.org/10.1289/ehp.856097 PMID:3928368

NTP (1978). Bioassay of Aroclor for possible carcinogenicity. Natl Cancer Inst Carcinog Tech Rep Ser. 38:1–62. PMID:12844169

NTP (1979). Bioassay of o-toluidine hydrochloride for possible carcinogenicity. Natl Cancer Inst Carcinog Tech Rep Ser. 153:1–147. PMID:12799709

NTP (1982a). Carcinogenesis bioassay of 2,3,7,8-tetrachlorodibenzo-p-dioxin (CAS No. 1746-01-6) in Osborne-Mendel rats and B6C3F1 mice (gavage study). Natl Toxicol Program Tech Rep Ser. 209:1–195. PMID:12778226

NTP (1982b). Carcinogenesis bioassay of 2,3,7,8-tetrachlorodibenzo-p-dioxin (CAS No. 1746-01-6) in Swiss-Webster mice (dermal study). Natl Toxicol Program Tech Rep Ser. 201:1–113. PMID:12778178

NTP (1984). NTP toxicology and carcinogenesis studies of 1,3-butadiene (CAS No. 106-99-0) in B6C3F1 mice (inhalation studies). Natl Toxicol Program Tech Rep Ser. 288:1–111. PMID:12748715

NTP (1986). NTP toxicology and carcinogenesis studies of benzene (CAS No. 71-43-2) in F344/N rats and B6C3F1 mice (gavage studies). Natl Toxicol Program Tech Rep Ser. 289:1–277. PMID:12748714

NTP (1987). NTP toxicology and carcinogenesis studies of ethylene oxide (CAS No. 75-21-8) in B6C3F1 mice (inhalation studies). Natl Toxicol Program Tech Rep Ser. 326:1–114. PMID:12748727

NTP (1988). NTP toxicology and carcinogenesis studies of trichloroethylene (CAS No. 79-01-6) in four strains of rats (ACI, August, Marshall, Osborne-Mendel) (gavage studies). Natl Toxicol Program Tech Rep Ser. 273:1–297. PMID:12748681

NTP (1990). NTP carcinogenesis studies of trichloroethylene (without epichlorohydrin) (CAS No. 79-01-6) in F344/N rats and B6C3F1 mice (gavage studies). Natl Toxicol Program Tech Rep Ser. 243:1–174. PMID:12750750

NTP (1993). NTP toxicology and carcinogenesis studies of 1,3-butadiene (CAS No. 106-99-0) in B6C3F1 mice (inhalation studies). Natl Toxicol Program Tech Rep Ser. 434:1–389. PMID:12616297

NTP (2006a). NTP toxicology and carcinogenesis studies of 3,3′,4,4′,5-pentachlorobiphenyl (PCB 126) (CAS No. 57465-28-8) in female Harlan Sprague-Dawley rats (gavage studies). Natl Toxicol Program Tech Rep Ser. 520:4–246. PMID:16628245

NTP (2006b). NTP technical report on the toxicology and carcinogenesis studies of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) (CAS No. 1746-01-6) in female Harlan Sprague-Dawley rats (Gavage Studies). Natl Toxicol Program Tech Rep Ser. 521:4–232. PMID:16835633

NTP (2006c). Toxicology and carcinogenesis studies of a binary mixture of 3,3′,4,4′,5-pentachlorobiphenyl (PCB 126) (CAS No. 57465-28-8) and 2,2′,4,4′,5,5′-hexachlorobiphenyl
(PCB 153) (CAS No. 35065-27-1) in female Harlan Sprague-Dawley rats (gavage studies). Natl Toxicol Program Tech Rep Ser. 530:1–258. PMID:17160104

NTP (2006d). Toxicology and carcinogenesis studies of a binary mixture of 3,3′,4,4′,5-pentachlorobiphenyl (PCB 126) (CAS No. 57465-28-8) and 2,3′,4,4′,5-pentachlorobiphenyl (PCB 118) (CAS No. 31508-00-6) in female Harlan Sprague-Dawley rats (gavage studies). Natl Toxicol Program Tech Rep Ser. 531:1–218. PMID:17342196

NTP (2007). NTP report on the toxicology and carcinogenesis study of benzene (CAS No. 71-43-2) in genetically modified haploinsufficient p16 Ink4a/p19 Arf mice (gavage study). Natl Toxicol Program Genet Modif Model Rep. 8:1–81. PMID:18784769

NTP (2010). Toxicology and carcinogenesis studies of 2,3′,4,4′,5-pentachlorobiphenyl (PCB 118) (CAS No. 31508-00-6) in female Harlan Sprague-Dawley rats (gavage studies). Natl Toxicol Program Tech Rep Ser. 559:1–174. PMID:21383778

Passey RD (1922). Experimental soot cancer. BMJ. ii:1112–1113.

Passey RD, Carter-Braine J (1925). Experimental soot cancer. J Pathol Bacteriol. 28:133–144. http://dx.doi.org/10.1002/path.1700280202

Picut CA, Aoyama H, Holder JW, Gold LS, Maronpot RR, Dixon D (2003). Bromoethane, chloroethane and ethylene oxide induced uterine neoplasms in B6C3F1 mice from 2-year NTP inhalation bioassays: pathology and incidence data revisited. Exp Toxicol Pathol. 55:1–9. http://dx.doi.org/10.1078/0940-2993-00303 PMID:12940622

Pott F, Brockhaus A, Huth F (1973a). Tests on the production of tumors in animal experiment with polycyclic aromatic hydrocarbons [in German]. Zentralbl Bakteriol Orig B. 157:34–43. PMID:4734048

Pott F, Dungworth DL, Heinrich U, Muhle H, Kamino K, Germann P-G, et al. (1994). Lung tumours in rats after intratracheal instillation of dusts. Ann Occup Hyg. 38:357–363.

Pott F, Rippe RM, Roller M, Csicsaky M, Rosenbuch M, Huth F (1989). Tumours in the abdominal cavity of rats after intraperitoneal injection of nickel compounds. In: Vernet JP, editor. Proceedings of the International Conference on Heavy Metals in the Environment: 12–15 September. Geneva, Switzerland: World Health Organization; pp. 127–9.

Pott F, Tomingas R, Reiffen FJ (1973b). Experimental studies of the carcinogenicity and the retention of benzo(a)pyrene in application region after intratracheal and subcutaneous injection [in German]. Zentralbl Bakteriol Orig B. 158:97–108. PMID:4779177

Pott F, Ziem U, Reiffen FJ, Huth F, Ernst H, Mohr U (1987). Carcinogenicity studies on fibres, metal compounds, and some other dusts in rats. Exp Pathol. 32:129–152. http://dx.doi.org/10.1016/S0232-1513(87)80044-0 PMID:3436395

Purchase IF, Kalinowski AE, Ishmael J, Wilson J, Gore CW, Chart IS (1981). Lifetime carcinogenicity study of 1- and 2-naphthylamine in dogs. Br J Cancer. 44:892–901. http://dx.doi.org/10.1038/bjc.1981.289 PMID:7326199

Rigotti E, Fontana D, Negri GL, Palestro G, Randone DF, Borgno M (1977). Results of hyperthermia on the bladder carcinomas of the dog [in French]. J Urol Nephrol (Paris). 83:175–184. PMID:853554

Rippe RM, Pott D (1989). Kanzerogenitätsuntersuchungen von Nitro-PAH (Nitroarenen) im Hinblick auf ihre Bedeutung für die krebszerzeugende Wirkung von Dieselmotorabgas. Gesellschaft zur Förderung der Lufthygiene und Silikoseforschung. Düsseldorf, Germany: Stefan W. Albers; pp. 65–89.

Robens JF, Dill GS, Ward JM, Joiner JR, Griesemer RA, Douglas JF (1980). Thirteen-week subchronic toxicity studies of Direct Blue 6, Direct Black 38, and Direct Brown 95 dyes. Toxicol Appl Pharmacol. 54:431–442. http://dx.doi.org/10.1016/0041-008X(80)90170-2 PMID:7394798

Rodriguez LV, Dunsford HA, Steinberg M, Chaloupka KK, Zhu L, Safe S, et al. (1997). Carcinogenicity of benzo[a]pyrene and manufactured gas plant residues in infant mice. Carcinogenesis. 18:127–135. http://dx.doi.org/10.1093/carcin/18.1.127 PMID:9054599

Romanenko AM, Martynenko AG (1972). Morphology of bladder neoplasms induced by beta-naphthylamine in dogs [in Russian]. Vopr Onkol. 18:70–75. PMID:4345575
Rossi L, Barbieri O, Sanguineti M, Staccione A, Santi LF, Santi L (1983). Carcinogenic activity of benzo[a]pyrene and some of its synthetic derivatives by direct injection into the mouse fetus. *Carcinogenesis*. 4:153–156. http://dx.doi.org/10.1093/carcin/4.2.153 PMID:6297822

Rowland J, Shubik P, Wallcave L, Sellakumar A (1980). Carcinogenic bioassay of oil shale: long-term percutaneous application in mice and intratracheal instillation in hamsters. *Toxicol Appl Pharmacol.* 55:522–534. http://dx.doi.org/10.1016/0041-008X(80)90054-X PMID:7434364

Saffiotti U, Cefis F, Montesano R, Sellakumar AR (1967). Induction of bladder cancer in hamsters fed aromatic amines. In: Deichmann W, Lampe KF, editors. Bladder cancer: a symposium. Birmingham (AL), USA: *Aesculapius Publishing Co.*, pp. 129–135.

Saffiotti U, Montesano R, Sellakumar AR, Cefis F, Kaufman DG (1972). Respiratory tract carcinogenesis in hamsters induced by different numbers of administrations of benzo(a)pyrene and ferric oxide. *Cancer Res.* 32:1073–1081. PMID:4336025

Schieferstein GJ, Littlefield NA, Gaylor DW, Sheldon WG, Burger GT (1985). Carcinogenesis of 4-aminobiphenyl in BALB/cStCrlC3Hf/Nctr mice. *Eur J Cancer Clin Oncol.* 21:865–873. http://dx.doi.org/10.1016/0277-5379(85)90227-5 PMID:2995043

Sellakumar A, Stenbäck F, Rowland J (1976). Effects of different dusts on respiratory carcinogenesis in hamsters induced by benzo (a) pyrene and diethylnitrosamine. *Eur J Cancer*. 12:313–319. http://dx.doi.org/10.1016/0014-2964(76)90112-2 PMID:954792

Sellakumar AR, Montesano R, Saffiotti U, Kaufman DG (1973). Hamster respiratory carcinogenesis induced by benzo(a)pyrene and different dose levels of ferric oxide. *J Natl Cancer Inst.* 50:507–510. http://dx.doi.org/10.1093/jnci/50.2.507 PMID:4702121

Stenbäck F, Rowland J (1978). Role of particle size in the formation of respiratory tract tumors induced by benzo(a)pyrene. *Eur J Cancer*. 14:321–326. http://dx.doi.org/10.1016/0014-2964(78)90200-1 PMID:656185

Stenbäck F, Rowland J (1979). Experimental respiratory carcinogenesis in hamsters: environmental, physicochemical and biological aspects. *Oncology*. 36:63–71. http://dx.doi.org/10.1159/000225320 PMID:223099

Solt DB, Polverini PJ, Caldeiron L (1987). Carcinogenic response of hamster buccal pouch epithelium to 4 polycyclic aromatic hydrocarbons. *J Oral Pathol.* 16:294–302. http://dx.doi.org/10.1111/j.1600-0714.1987.tb00697.x PMID:2445943

Stenhoff D, Mohr U, Hahnemann S (1991). Carcinogenesis studies with iron oxides. *Exp Pathol.* 43:189–194. http://dx.doi.org/10.1016/0015-0836(91)12975-Q PMID:197572

Suzuki Y (1983). Neoplastic effect of vinyl chloride in mouse lung–lower doses and short-term exposure. *Environ Res.* 32:91–103. http://dx.doi.org/10.1016/0013-9351(83)90195-0 PMID:6617622
Swenberg JA, Kerns WD, Mitchell RI, Gralla EJ, Pavkov KL (1980). Induction of squamous cell carcinomas of the rat nasal cavity by inhalation exposure to formaldehyde vapor. Cancer Res. 40(9):3398–33402. PMID:7427950

Thyssen J, Althoff J, Kimmerle G, Mohr U (1981). Inhalation studies with benzo[a]pyrene in Syrian golden hamsters. J Natl Cancer Inst. 66:575–577. PMID:6937711

Til HP, Feron VJ, Immel HR (1991). Lifetime (149-week) oral carcinogenicity study of vinyl chloride in rats. Food Chem Toxicol. 29:713–718. http://dx.doi.org/10.1016/0278-6915(91)90130-Y PMID:1959825

Toth B (1980). Tumorigenesis by benzo(a)pyrene administered intracolonically. Oncology. 37:77–82. http://dx.doi.org/10.1159/000225408 PMID:7360483

Tóth K, Somfai-Relle S, Sugár J, Bence J (1979). Carcinogenicity testing of herbicide 2,4,5-trichlorophenoxyethanol containing dioxin and of pure dioxin in Swiss mice. Nature. 278:548–549. http://dx.doi.org/10.1038/278548a0 PMID:431718

Tsutsui H (1918). Über das künstlich erzeugte Cancroid bei der Maus. Gann. XII:17–21.

Tye R, Stemmer KL (1967). Experimental carcinogenesis of the lung. II. Influence of phenols in the production of carcinoma. J Natl Cancer Inst. 39:175–186. PMID:18623937

Van Duuren BL, Goldschmidt BM, Seidman I (1975). Carcinogenic activity of di- and trifunctional alpha-chloro ethers and of 1,4-dichlorobutene-2 in ICR/HA Swiss mice. Cancer Res. 35:2553–2557. PMID:1149050

Van Duuren BL, Katz C, Goldschmidt BM (1973). Cocarcinogenic agents in tobacco carcinogenesis. J Natl Cancer Inst. 51(2):703–705. PMID:4765384

Vesselinovitch SD (1983). Perinatal hepatocarcinogenesis. Biol Res Pregnancy Perinatol. 4:22–25. PMID:6303459

Vesselinovitch SD, Kyriazis AP, Mihailovich N, Rao KV (1975a). Factors influencing augmentation and/or acceleration of lymphoreticular tumors in mice by benzo(a)pyrene treatment. Cancer Res. 35:1963–1969. PMID:1097103

Vesselinovitch SD, Kyriazis AP, Mihailovich N, Rao KV (1975b). Conditions modifying development of tumors in mice at various sites by benzo(a)pyrene. Cancer Res. 35:2948–2953. PMID:1182688

Vesselinovitch SD, Rao KV, Mihailovich N (1975). Factors modulating benzidine carcinogenicity bioassay. Cancer Res. 35:2814–2819. PMID:1157051

Vinkmann FY (1972). On the results of a comparative investigation on the cancerogenic action of several oil shale tars in CC57Br mice. In: Loogna G, editor. Experimental and clinical oncology. Tallinn, Estonia: Valgus Publishers; pp. 243–250. [in Russian].

Wallcave L, Garcia H, Feldman R, Lijinsky W, Shubik P (1971). Skin tumorigenesis in mice by petroleum asphalts and coal-tar pitches of known polynuclear aromatic hydrocarbon content. Toxicol Appl Pharmacol. 18:41–52. http://dx.doi.org/10.1016/0041-008X(71)90313-9 PMID:5542832

Warshawsky D, Barkley W (1987). Comparative carcinogenic potencies of 7H-dibenzo[c,g]carbazole, dibenz[a,j]acridine and benzo[a]pyrene in mouse skin. Cancer Lett. 37:337–344. http://dx.doi.org/10.1016/0304-3835(87)90119-4 PMID:3677065

Weisburger EK, Russfield AB, Homburger F, Weisburger JH, Boger E, Van Dongen CG, et al. (1978). Testing of twenty-one environmental aromatic amines or derivatives for long-term toxicity or carcinogenicity. J Environ Pathol Toxicol. 2:325–356. PMID:84039

Wenzel-Hartung R, Brune H, Grimmer G, Germann P, Timm J, Wosniok W (1990). Evaluation of the carcinogenic potency of 4 environmental polycyclic aromatic compounds following intrapulmonary application in rats. Exp Pathol. 40:221–227. http://dx.doi.org/10.1016/S0232-1513(11)80302-6 PMID:1711479

Weyand EH, Chen YC, Wu Y, Koganti A, Dunsford HA, Rodriguez LV (1995). Differences in the tumorigenic activity of a pure hydrocarbon and a complex mixture following ingestion: benzo[a]pyrene vs manufactured gas plant residue. Chem Res Toxicol. 8:949–954. http://dx.doi.org/10.1021/tr00049a008 PMID:8555410

Wilson JS, Holland LM (1988). Periodic response difference in mouse epidermis chronically exposed to crude-oils or BaP: males vs. females. Toxicology. 50:83–94. http://dx.doi.org/10.1016/0300-483X(88)90123-0 PMID:3388432
Wislocki PG, Bagan ES, Lu AY, Dooley KL, Fu PP, Han-Hsu H, et al. (1986). Tumorigenicity of nitrated derivatives of pyrene, benz[a]anthracene, chrysene and benzo[a]pyrene in the newborn mouse assay. *Carcinogenesis*. 7:1317–1322. [http://dx.doi.org/10.1093/carcin/7.8.1317 PMID:3731386](http://dx.doi.org/10.1093/carcin/7.8.1317)

Wogan GN, Edwards GS, Newberne PM (1971). Structure-activity relationships in toxicity and carcinogenicity of aflatoxins and analogs. *Cancer Res.* 31:1936–1942. [PMID:4353043](http://dx.doi.org/10.1111/1528-006X.00280)

Wogan GN, Newberne PM (1967). Dose-response characteristics of aflatoxin B1 carcinogenesis in the rat. *Cancer Res.* 27:2370–2376.

Wogan GN, Paglialunga S, Newberne PM (1974). Carcinogenic effects of low dietary levels of aflatoxin B1 in rats. *Food Cosmet Toxicol.* 12:681–685. [http://dx.doi.org/10.1016/0015-6264(74)90239-9 PMID:4375655](http://dx.doi.org/10.1016/0015-6264(74)90239-9)

Woglom WH, Herly L (1929). The carcinogenic activity of tar in various dilutions. *J Cancer Res.* 13:367–372.

Woutersen RA, van Garderen-Hoetmer A, Bruijntjes JP, Zwart A, Feron VJ (1989). Nasal tumours in rats after severe injury to the nasal mucosa and prolonged exposure to 10 ppm formaldehyde. *J Appl Toxicol.* 9:39–46. [http://dx.doi.org/10.1002/jat.2550090108 PMID:2926095](http://dx.doi.org/10.1002/jat.2550090108)

Yoshida M, Numoto S, Otsuka H (1979). Histopathological changes induced in the urinary bladder and liver of female BALB/c mice treated simultaneously with 2-naph-thylamine and cyclophosphamide. *Gan.* 70:645–652. [PMID:520755](http://dx.doi.org/10.1016/0015-6264(79)90041-0)

Yoshizawa K, Walker NJ, Jokinen MP, Brix AE, Sells DM, Marsh T, et al. (2005). Gingival carcinogenicity in female Harlan Sprague-Dawley rats following two-year oral treatment with 2,3,7,8-tetrachlorodibenzo-p-dioxin and dioxin-like compounds. *Toxicol Sci.* 83:64–77. [http://dx.doi.org/10.1093/toxsci/kfi016 PMID:15509667](http://dx.doi.org/10.1093/toxsci/kfi016)

Zajdela F, Croisy A, Barbin A, Malaveille C, Tomatis L, Bartsch H (1980). Carcinogenicity of chloroethylene oxide, an ultimate reactive metabolite of vinyl chloride, and bis(chloromethyl)ether after subcutaneous administration and in initiation-promotion experiments in mice. *Cancer Res.* 40:352–356. [PMID:7356519](http://dx.doi.org/10.1111/j.1528-006X.1980.tb00501.x)