Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.
**eTable 1. Associations Between Changes in Drinking Level and Cancer Including Participants With Previous Cardiovascular History**

| Alcohol consumption status | Subjects (N) | Events (n) | Person-years | IR  | aHR (95% CI)* |
|----------------------------|--------------|------------|--------------|-----|---------------|
| 2009 2011                  |              |            |              |     |               |
| Alcohol-related cancers    |              |            |              |     |               |
| None None                  | 2,258,335    | 40,732     | 14,220,119.5 | 2.9 | 1 (Ref.)      |
| Mild 300,068 5,046          | 1,889,920.3  | 2.7        | 1.03 (1.00–1.06) |
| Moderate 43,783 846         | 274,477.1    | 3.1        | 1.11 (1.03–1.19) |
| Heavy 25,169 590            | 156,537.6    | 3.8        | 1.33 (1.22–1.44) |
| Mild None                  | 309,925      | 5,559      | 1,948,075.8  | 2.9 | 0.96 (0.93–0.99) |
| Mild 666,087 10,347         | 4,195,312.0  | 2.5        | 1 (Ref.)     |
| Moderate 138,812 2,393      | 872,245.7    | 2.7        | 1.09 (1.05–1.14) |
| Heavy None                 | 45,507       | 1,015      | 174,053.8    | 3.6 | 1.04 (0.97–1.12) |
| Mild 161,854 2,856          | 1,015,160.5  | 2.8        | 0.98 (0.93–1.03) |
| Moderate 177,863 2,970      | 1,116,637.9  | 2.7        | 1 (Ref.)     |
| Heavy 80,059 1,512          | 501,377.0    | 3.0        | 1.04 (0.97–1.10) |
| All cancers (except thyroid) None None | 2,258,335 | 108,031 | 14,063,390.2 | 7.7 | 1 (Ref.) |
| Mild 300,068 13,251 | 1,870,327.8 | 7.1 | 0.99 (0.97–1.00) |
| Moderate 43,783 2,356 | 270,848.9 | 8.7 | 0.99 (0.95–1.03) |
| Heavy 25,169 1,512 | 154,197.0 | 10.6 | 1.11 (1.06–1.17) |
| Mild None | 309,925 | 15,088 | 1,925,700.3 | 7.8 | 0.98 (0.96–1.00) |
| Mild 666,087 28,991 | 4,150,056.0 | 7.0 | 1 (Ref.) |
| Moderate 138,812 6,616 | 862,319.3 | 7.7 | 1.02 (0.99–1.05) |
| Heavy 42,271 2,428 | 260,607.7 | 9.3 | 1.08 (1.04–1.13) |
| Moderate None | 45,507 | 2,970 | 278,591.3 | 10.7 | 1.07 (1.02–1.11) |
| Mild 161,854 8,045 | 1,002,858.3 | 8.0 | 0.98 (0.95–1.01) |
| Heavy 80,059 4,153 | 495,461.6 | 8.4 | 1.01 (0.97–1.05) |
| Heavy None | 28,375 | 2,257 | 171,028.4 | 13.2 | 1.06 (1.01–1.11) |
| Mild 53,992 3,190 | 331,896.5 | 9.6 | 0.92 (0.89–0.96) |
| Moderate 89,022 4,866 | 548,961.7 | 8.9 | 0.95 (0.92–0.99) |
| Heavy 150,971 9,224 | 928,313.8 | 9.9 | 1 (Ref.) |

IR, incidence rate per 1,000 person-years; aHR, adjusted hazard ratio; CI, confidence interval

*adjusted for age, sex, socioeconomic position (income level and place of residence), smoking status, physical activity, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index
**Table 2.** The Risk of Site-Specific Cancer According to Changes in Drinking Level Between 2009 and 2011

|                | 2009          | 2011          | None (Ref.) | Mild | Moderate | Heavy |
|----------------|---------------|---------------|-------------|------|----------|-------|
| Lip, oral cavity and pharynx (n=3884, IR=0.14) |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 0.94 (0.80–1.11) | 1.00 (0.74–1.35) | 1.13 (0.83–1.55) |       |
| Mild           | 1.20 (1.04–1.38) | 1 (Ref.)      | 0.98 (0.81–1.19) | 1.11 (0.87–1.42) |       |
| Moderate       | 1.21 (0.90–1.63) | 1.15 (0.96–1.38) | 1 (Ref.)      | 0.96 (0.77–1.20) |       |
| Heavy          | 1.47 (1.06–2.05) | 1.22 (0.92–1.61) | 0.93 (0.73–1.18) | 1 (Ref.)      |       |
| Esophagus (n=3,009, IR=0.11)  |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 0.92 (0.76–1.12) | 1.07 (0.81–1.41) | 1.01 (0.79–1.29) |       |
| Mild           | 1.13 (0.92–1.38) | 1 (Ref.)      | 0.80 (0.66–0.96) | 0.74 (0.59–0.92) |       |
| Moderate       | 2.38 (1.79–3.17) | 1.38 (1.13–1.70) | 1 (Ref.)      | 0.73 (0.61–0.88) |       |
| Heavy          | 3.66 (2.77–4.83) | 2.23 (1.74–2.86) | 1.03 (0.83–1.29) | 1 (Ref.)      |       |
| Stomach (n=38,225, IR=1.34) |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 0.97 (0.92–1.02) | 1.09 (0.98–1.20) | 1.12 (1.01–1.25) |       |
| Mild           | 0.98 (0.94–1.03) | 1 (Ref.)      | 0.99 (0.92–1.06) | 0.92 (0.84–1.01) |       |
| Moderate       | 1.02 (0.93–1.13) | 1.04 (0.98–1.11) | 1 (Ref.)      | 0.96 (0.89–1.04) |       |
| Heavy          | 1.16 (1.04–1.30) | 1.16 (1.06–1.27) | 0.97 (0.90–1.06) | 1 (Ref.)      |       |
| Colorectum (n=41,102, IR=1.44) |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 0.96 (0.92–1.01) | 1.01 (0.92–1.12) | 1.02 (0.92–1.14) |       |
| Mild           | 1.08 (1.03–1.12) | 1 (Ref.)      | 0.97 (0.91–1.04) | 0.94 (0.86–1.03) |       |
| Moderate       | 1.09 (0.99–1.20) | 1.12 (1.06–1.19) | 1 (Ref.)      | 0.96 (0.89–1.04) |       |
| Heavy          | 1.31 (1.17–1.46) | 1.12 (1.03–1.23) | 1.04 (0.96–1.13) | 1 (Ref.)      |       |
| Liver (n=15,333, IR=0.54)  |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 1.12 (1.04–1.21) | 1.26 (1.09–1.46) | 1.15 (1.00–1.33) |       |
| Mild           | 0.99 (0.92–1.06) | 1 (Ref.)      | 0.97 (0.91–1.04) | 0.94 (0.86–1.03) |       |
| Moderate       | 1.25 (1.10–1.43) | 1.10 (1.00–1.21) | 1 (Ref.)      | 0.89 (0.80–0.99) |       |
| Heavy          | 1.39 (1.20–1.62) | 1.11 (0.96–1.28) | 1.11 (0.99–1.26) | 1 (Ref.)      |       |
| Gallbladder (n=9,244, IR=0.32) |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 0.89 (0.80–0.99) | 1.28 (1.04–1.57) | 1.29 (1.03–1.61) |       |
| Mild           | 0.98 (0.89–1.07) | 1 (Ref.)      | 0.92 (0.78–1.08) | 0.86 (0.70–1.07) |       |
| Moderate       | 1.25 (1.02–1.53) | 1.06 (0.93–1.22) | 1 (Ref.)      | 1.04 (0.87–1.24) |       |
| Heavy          | 0.95 (0.72–1.26) | 1.16 (0.95–1.42) | 1.07 (0.89–1.29) | 1 (Ref.)      |       |
| Pancreas (n=15,691, IR=0.55) |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 1.04 (0.97–1.12) | 1.02 (0.87–1.19) | 1.06 (0.90–1.25) |       |
| Mild           | 1.01 (0.95–1.08) | 1 (Ref.)      | 1.04 (0.94–1.16) | 0.92 (0.80–1.06) |       |
| Moderate       | 0.89 (0.76–1.04) | 1.07 (0.97–1.17) | 1 (Ref.)      | 0.93 (0.83–1.05) |       |
| Heavy          | 1.15 (0.97–1.36) | 0.96 (0.83–1.11) | 1.02 (0.90–1.15) | 1 (Ref.)      |       |
| Larynx (n=1,642, IR=0.55)  |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 1.01 (0.79–1.29) | 1.10 (0.76–1.60) | 1.31 (0.88–1.95) |       |
| Mild           | 1.10 (0.86–1.41) | 1 (Ref.)      | 0.73 (0.55–0.95) | 1.10 (0.80–1.53) |       |
| Moderate       | 1.65 (1.12–2.41) | 1.11 (0.85–1.45) | 1 (Ref.)      | 0.93 (0.69–1.24) |       |
| Heavy          | 1.51 (0.95–2.41) | 2.10 (1.55–2.85) | 0.75 (0.54–1.03) | 1 (Ref.)      |       |
| Lung (n=32,096, IR=1.12)   |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 1.08 (1.02–1.14) | 1.17 (1.05–1.31) | 1.15 (1.02–1.28) |       |
| Mild           | 0.91 (0.86–0.96) | 1 (Ref.)      | 1.01 (0.93–1.09) | 0.96 (0.87–1.06) |       |
| Moderate       | 0.87 (0.78–0.97) | 1.02 (0.95–1.09) | 1 (Ref.)      | 1.00 (0.92–1.09) |       |
| Heavy          | 1.03 (0.91–1.15) | 1.00 (0.90–1.11) | 0.98 (0.89–1.08) | 1 (Ref.)      |       |
| Breast (n=20,532, IR=0.72) |               |               |             |      |          |       |
| None           | 1 (Ref.)      | 0.97 (0.91–1.04) | 0.83 (0.63–1.10) | 1.07 (0.69–1.67) |       |
| Mild           | 0.94 (0.88–0.99) | 1 (Ref.)      | 0.83 (0.66–1.03) | 0.69 (0.45–1.06) |       |

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| Cancer Type                                      | Stage | OR (95% CI)     | Ref. | p-Value    |
|-------------------------------------------------|-------|-----------------|------|------------|
| **Moderate**                                    |       |                 |      |            |
| Cervix uteri (n=3,048, IR=0.11)                 | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 1.23 (1.08–1.41)| 1 (Ref.) | 0.84 (0.44–1.59) | 1.51 (0.56–4.07) |
|                                                 | Moderate | 0.99 (0.55–1.79)| 0.77 (0.50–1.20) | 1 (Ref.) | 1.30 (0.45–3.77) |
|                                                 | Heavy  | 1.16 (0.43–3.10)| 1.15 (0.54–2.43) | 1.04 (0.38–2.86) | 1 (Ref.) |
| Corpus uteri (n=2,828, IR=0.10)                 | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 0.85 (0.73–0.99)| 1 (Ref.) | 0.51 (0.28–0.92) | 1.16 (0.52–2.59) |
|                                                 | Moderate | 1.15 (0.67–1.99)| 0.80 (0.49–1.31) | 1 (Ref.) | 3.57 (0.40–32.00) |
|                                                 | Heavy  | 0.89 (0.29–2.77)| 1.36 (0.61–3.07) | 4.21 (1.46–12.18)| 1 (Ref.) |
| Ovary (n=3,866, IR=0.14)                        | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 1.03 (0.92–1.16)| 1 (Ref.) | 0.51 (0.28–0.92) | 1.16 (0.52–2.59) |
|                                                 | Moderate | 1.06 (0.67–1.68)| 0.81 (0.56–1.19) | 1 (Ref.) | 0.55 (0.20–1.53) |
|                                                 | Heavy  | 0.95 (0.39–2.28)| 0.78 (0.35–1.74) | 0.93 (0.40–2.18) | 1 (Ref.) |
| Prostate (n=20,990, IR=0.73)                    | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 1.04 (0.99–1.10)| 1 (Ref.) | 0.94 (0.87–1.02) | 0.94 (0.84–1.04) |
|                                                 | Moderate | 1.08 (0.97–1.20)| 0.93 (0.87–1.00) | 1 (Ref.) | 0.98 (0.90–1.08) |
|                                                 | Heavy  | 1.15 (1.01–1.30)| 0.93 (0.83–1.04) | 1.01 (0.92–1.12) | 1 (Ref.) |
| Kidney (n=7,771, IR=0.27)                       | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 0.96 (0.87–1.06)| 1 (Ref.) | 0.85 (0.73–0.99) | 0.85 (0.69–1.04) |
|                                                 | Moderate | 0.97 (0.78–1.21)| 1.02 (0.89–1.17) | 1 (Ref.) | 0.99 (0.84–1.17) |
|                                                 | Heavy  | 1.10 (0.86–1.42)| 0.89 (0.71–1.12) | 0.73 (0.60–0.89) | 1 (Ref.) |
| Bladder (n=7,893, IR=0.28)                      | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 1.01 (0.92–1.12)| 1 (Ref.) | 0.82 (0.70–0.95) | 0.75 (0.61–0.93) |
|                                                 | Moderate | 0.96 (0.78–1.18)| 0.91 (0.80–1.05) | 1 (Ref.) | 0.97 (0.82–1.14) |
|                                                 | Heavy  | 1.22 (0.98–1.52)| 0.93 (0.76–1.14) | 0.81 (0.67–0.97) | 1 (Ref.) |
| Brain and central nerve system (n=3,613, IR=0.13)| None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 0.84 (0.72–0.98)| 1 (Ref.) | 1.22 (0.96–1.55) | 1.16 (0.83–1.63) |
|                                                 | Moderate | 1.12 (0.82–1.52)| 1.12 (0.90–1.38) | 1 (Ref.) | 1.05 (0.78–1.41) |
|                                                 | Heavy  | 1.38 (0.97–1.96)| 1.08 (0.76–1.52) | 0.86 (0.62–1.19) | 1 (Ref.) |
| Hodgkin lymphoma (n=309, IR=0.01)               | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 0.60 (0.34–1.05)| 1 (Ref.) | 1.15 (0.53–2.47) | 1.20 (0.42–3.46) |
|                                                 | Moderate | 0.85 (0.31–2.33)| 0.88 (0.42–1.81) | 1 (Ref.) | 0.75 (0.26–2.12) |
|                                                 | Heavy  | 0.33 (0.05–2.38)| 1.45 (0.57–3.70) | 0.95 (0.36–2.51) | 1 (Ref.) |
| Non-Hodgkin lymphoma (n=5,558, IR=0.19)         | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 0.84 (0.74–0.95)| 1 (Ref.) | 1.00 (0.82–1.23) | 0.73 (0.54–0.98) |
|                                                 | Moderate | 0.79 (0.59–1.06)| 1.08 (0.92–1.28) | 1 (Ref.) | 0.94 (0.75–1.18) |
|                                                 | Heavy  | 0.64 (0.42–0.96)| 1.06 (0.81–1.39) | 0.80 (0.62–1.04) | 1 (Ref.) |
| Multiple myeloma (n=2,353, IR=0.08)             | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 0.93 (0.78–1.10)| 1 (Ref.) | 1.11 (0.81–1.53) | 0.65 (0.39–1.07) |
|                                                 | Moderate | 1.22 (0.86–1.74)| 0.88 (0.68–1.16) | 1 (Ref.) | 1.05 (0.73–1.51) |
|                                                 | Heavy  | 0.89 (0.53–1.49)| 0.70 (0.44–1.14) | 0.93 (0.62–1.39) | 1 (Ref.) |
| Leukemia (n=3,533, IR=0.12)                     | None  | 1 (Ref.)        |      |            |
|                                                 | Mild   | 1.03 (0.85–1.25)| 1.43 (0.93–2.18) | 1.86 (1.22–2.84) |
|                                                 | Moderate | 0.93 (0.78–1.10)| 1 (Ref.) | 1.11 (0.81–1.53) | 0.65 (0.39–1.07) |
|                                                 | Heavy  | 0.89 (0.53–1.49)| 0.70 (0.44–1.14) | 0.93 (0.62–1.39) | 1 (Ref.) |

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| Level  | IR, incidence rate per 1,000 person-years | HR (95% CI) |
|--------|-----------------------------------------|-------------|
| None   | 1 (Ref.)                                | 1.25 (1.06–1.47) | 1.08 (0.77–1.51) | 1.10 (0.76–1.59) |
| Mild   | 0.89 (0.76–1.04)                        | 1 (Ref.)    | 0.91 (0.72–1.16) | 0.77 (0.55–1.09) |
| Moderate | 1.03 (0.74–1.44)                      | 1.26 (1.02–1.54) | 1 (Ref.)     | 0.78 (0.58–1.05) |
| Heavy  | 1.03 (0.68–1.56)                        | 1.27 (0.92–1.77) | 0.83 (0.61–1.13) | 1 (Ref.)     |

HRs are adjusted for age, sex, socioeconomic position (income level and place of residence), smoking status, physical activity, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index.
### eTable 3. Associations Between Changes in Drinking Level From 2009 to 2013 and Alcohol-Related Cancers

| Alcohol consumption status | Subject | Event | IR | aHR (95% CI)* |
|---------------------------|---------|-------|----|---------------|
| **2009**                  | **2011**| **2013**|    |               |
| None                      | None    | None  | 19,873 | 7,087,021.8 | 2.8 | 1 (Ref.) |
| None                      | Mild    | 1,195 | 459,964.8 | 2.6 | 1.02 (0.96–1.08) |
| None                      | Moderate| 114   | 31,792.7 | 3.6 | **1.30 (1.07–1.58)** |
| None                      | Heavy   | 49    | 15,031.9 | 3.3 | 1.28 (0.97–1.69) |
| Mild                      | None    | 1,223 | 465,526.9 | 2.6 | 1.00 (0.95–1.06) |
| Mild                      | Mild    | 133   | 55,021.4 | 2.4 | 0.92 (0.77–1.10) |
| Heavy                     | None    | 49    | 14,015.8 | 3.5 | 1.05 (0.77–1.45) |
| Moderate                  | None    | None  | 203   | 52,042.1 | 3.9 | 1.01 (0.86–1.19) |
| Moderate                  | Mild    | 162   | 52,099.8 | 3.1 | 1.02 (0.86–1.22) |
| Heavy                     | None    | 106   | 35,153.2 | 3.0 | 0.89 (0.72–1.10) |
| Moderate                  | Mild    | 486   | 189,577.0 | 2.6 | 0.98 (0.87–1.10) |
| Moderate                  | Heavy   | 694   | 290,797.5 | 2.4 | 1 (Ref.) |
| Heavy                     | None    | 83    | 16,720.4 | 5.0 | **1.36 (1.08–1.71)** |
| Mild                      | 143     | 48,011.7 | 3.0 | 1.00 (0.83–1.20) |

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|       | IR  | aHR  | CI       | p-value |
|-------|-----|------|----------|---------|
|  Heavy | None | 120  | 36,426.5 | 3.3  | 0.84 (0.70–1.03) | 0.84 (0.78–1.01) |
| Moderate | None  | 77   | 18,980.9 | 4.1 | 0.85 (0.67–1.08) | 0.90 (0.78–1.05) |
| Heavy | None | 138  | 28,663.2 | 4.8 | 1.00 (0.84–1.19) | 1.00 (0.83–1.19) |
| Heavy   | None  | 134  | 28,090.3 | 4.8 | 0.91 (0.76–1.10) | 0.91 (0.76–1.10) |
| Heavy   | Mild  | 80   | 19,988.6 | 4.0 | 0.99 (0.79–1.24) | 0.99 (0.79–1.24) |
| Heavy   | Moderate | 68  | 17,076.1 | 4.0 | 0.89 (0.68–1.16) | 0.89 (0.68–1.16) |
| Heavy | None  | 289  | 96,593.4 | 3.0 | 0.86 (0.73–0.99) | 0.86 (0.73–0.99) |
| Heavy   | None  | 134  | 28,090.3 | 4.8 | 0.91 (0.76–1.10) | 0.91 (0.76–1.10) |
| Heavy   | None  | 222  | 51,153.0 | 4.3 | 1.08 (0.93–1.25) | 1.08 (0.93–1.25) |
| Heavy | None | 120  | 36,426.5 | 3.3 | 0.84 (0.70–1.03) | 0.84 (0.70–1.03) |
| Heavy | None | 289  | 96,593.4 | 3.0 | 0.86 (0.73–0.99) | 0.86 (0.73–0.99) |
| Heavy | None | 134  | 28,090.3 | 4.8 | 0.91 (0.76–1.10) | 0.91 (0.76–1.10) |
| Heavy | None | 222  | 51,153.0 | 4.3 | 1.08 (0.93–1.25) | 1.08 (0.93–1.25) |
| Heavy | None | 120  | 36,426.5 | 3.3 | 0.84 (0.70–1.03) | 0.84 (0.70–1.03) |
| Heavy | None | 289  | 96,593.4 | 3.0 | 0.86 (0.73–0.99) | 0.86 (0.73–0.99) |
| Heavy | None | 134  | 28,090.3 | 4.8 | 0.91 (0.76–1.10) | 0.91 (0.76–1.10) |
| Heavy | None | 222  | 51,153.0 | 4.3 | 1.08 (0.93–1.25) | 1.08 (0.93–1.25) |
| Heavy | None | 120  | 36,426.5 | 3.3 | 0.84 (0.70–1.03) | 0.84 (0.70–1.03) |
| Heavy | None | 289  | 96,593.4 | 3.0 | 0.86 (0.73–0.99) | 0.86 (0.73–0.99) |
| Heavy | None | 134  | 28,090.3 | 4.8 | 0.91 (0.76–1.10) | 0.91 (0.76–1.10) |
| Heavy | None | 222  | 51,153.0 | 4.3 | 1.08 (0.93–1.25) | 1.08 (0.93–1.25) |
| Heavy | None | 120  | 36,426.5 | 3.3 | 0.84 (0.70–1.03) | 0.84 (0.70–1.03) |
| Heavy | None | 289  | 96,593.4 | 3.0 | 0.86 (0.73–0.99) | 0.86 (0.73–0.99) |
| Heavy | None | 134  | 28,090.3 | 4.8 | 0.91 (0.76–1.10) | 0.91 (0.76–1.10) |
| Heavy | None | 222  | 51,153.0 | 4.3 | 1.08 (0.93–1.25) | 1.08 (0.93–1.25) |
| Heavy | None | 120  | 36,426.5 | 3.3 | 0.84 (0.70–1.03) | 0.84 (0.70–1.03) |
| Heavy | None | 289  | 96,593.4 | 3.0 | 0.86 (0.73–0.99) | 0.86 (0.73–0.99) |

IR, incidence rate per 1,000 person-years; aHR, adjusted hazard ratio; CI, confidence interval

*Adjusted for age, sex, socioeconomic position (income level and place of residence), smoking status, physical activity, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index
### eTable 4. Associations Between Changes in Drinking Level From 2009 to 2013 and All Cancers

| Alcohol consumption status | Subject | Event | IR | aHR (95% CI)* |
|----------------------------|---------|-------|----|--------------|
| **2009**                   | **2011**| **2013**|    |              |
| None                       | None    | None  | 1,614,929 | 54,098 | 7.7 | 1 (Ref.) |
| Mild                       | 105,266 | 3,143 | 6.9 | 1.00 (0.96–1.04) |
| Moderate                   | 7,323   | 299   | 9.5 | 1.09 (0.97–1.23) |
| Heavy                      | 3,455   | 160   | 10.8 | 1.10 (0.93–1.30) |
| Mild                       | 106,383 | 3,402 | 7.4 | 1.02 (0.98–1.06) |
| Moderate                   | 110,885 | 3,311 | 6.9 | 0.98 (0.95–1.02) |
| Heavy                      | 12,608  | 421   | 7.7 | 0.96 (0.87–1.06) |
| Mild                       | 3,758   | 161   | 9.9 | 1.12 (0.95–1.31) |
| Moderate                   | 6,394   | 270   | 9.8 | 1.04 (0.92–1.18) |
| Heavy                      | 12,551  | 443   | 8.2 | 0.93 (0.84–1.02) |
| Mild                       | 10,053  | 357   | 8.2 | 0.98 (0.88–1.09) |
| Moderate                   | 4,408   | 179   | 9.4 | 1.03 (0.88–1.20) |
| Heavy                      | 2,922   | 172   | 13.7 | 1.32 (1.14–1.54) |
| Mild                       | 3,961   | 170   | 10.0 | 1.14 (0.98–1.33) |
| Moderate                   | 4,545   | 180   | 9.2 | 1.00 (0.86–1.16) |
| Heavy                      | 7,354   | 342   | 10.8 | 1.12 (1.00–1.25) |
| Mild                       | None    | None  | 144,117 | 5,054 | 8.1 | 0.97 (0.93–1.01) |
| Moderate                   | 83,735  | 2,651 | 7.3 | 1.02 (0.97–1.06) |
| Heavy                      | 8,773   | 358   | 9.4 | 1.19 (1.06–1.32) |
| Mild                       | 107,498 | 3,680 | 7.9 | 1.01 (0.97–1.05) |
| Moderate                   | 362,504 | 10,606 | 6.8 | 1 (Ref.) |
| Heavy                      | 51,708  | 1,627 | 7.3 | 1.01 (0.96–1.06) |
| Mild                       | 10,288  | 386   | 8.7 | 1.12 (1.01–1.24) |
| Moderate                   | None    | None  | 10,340 | 463   | 10.4 | 1.09 (0.99–1.20) |
| Heavy                      | 51,785  | 1,675 | 7.5 | 1.01 (0.95–1.06) |
| Mild                       | 36,959  | 1,181 | 7.4 | 1.02 (0.96–1.09) |
| Moderate                   | 10,012  | 357   | 8.2 | 1.06 (0.96–1.18) |
| Heavy                      | 10,567  | 369   | 8.1 | 1.02 (0.96–1.18) |
| Mild                       | 3,341   | 178   | 12.4 | 1.22 (1.05–1.42) |
| Moderate                   | 9,840   | 355   | 8.4 | 1.02 (0.92–1.14) |
| Heavy                      | 9,158   | 418   | 10.6 | 1.22 (1.10–1.35) |
| Moderate                   | None    | None  | 11,942 | 603   | 11.7 | 0.99 (0.90–1.09) |
| Heavy                      | 11,964  | 522   | 10.1 | 1.11 (1.00–1.23) |
| Mild                       | 6,861   | 270   | 9.1 | 1.09 (0.96–1.25) |
| Moderate                   | 3,215   | 142   | 10.2 | 1.11 (0.93–1.33) |
| Heavy                      | 13,689  | 611   | 10.4 | 1.00 (0.91–1.10) |
| Mild                       | 69,131  | 2,286 | 7.7 | 0.95 (0.90–1.01) |
| Moderate                   | 36,098  | 1,195 | 7.7 | 1.01 (0.94–1.08) |
| Heavy                      | 9,362   | 400   | 9.9 | 1.13 (1.01–1.26) |
| Moderate                   | 8,070   | 367   | 10.6 | 1.00 (0.89–1.13) |
| Heavy                      | 43,605  | 1,523 | 8.1 | 1.01 (0.95–1.08) |
| Moderate                   | 66,854  | 2,073 | 7.2 | 1 (Ref.) |
| Heavy                      | 23,092  | 801   | 8.0 | 1.06 (0.97–1.15) |
| Mild                       | 3,876   | 217   | 13.2 | 1.09 (0.95–1.27) |
| Moderate                   | 11,030  | 457   | 9.6 | 1.08 (0.97–1.20) |

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| Level   | IR  | aHR (95% CI) |
|---------|-----|--------------|
| Heavy   | 23,066 | 783 | 7.9 | 0.97 (0.89–1.05) |
| Heavy   | 24,184 | 874 | 8.4 | 1.02 (0.94–1.11) |
| Heavy   | 6,515  | 398 | 14.4 | 0.97 (0.87–1.09) |
| Heavy   | 4,605  | 250 | 12.7 | 1.08 (0.95–1.24) |
| Heavy   | 3,937  | 190 | 11.3 | 1.04 (0.90–1.21) |
| Heavy   | 5,418  | 302 | 13.0 | 1.16 (1.03–1.32) |
| Heavy   | 4,726  | 256 | 12.6 | 0.90 (0.79–1.03) |
| Heavy   | 16,139 | 620 | 8.9 | 0.89 (0.81–0.98) |
| Heavy   | 11,911 | 440 | 8.6 | 0.88 (0.80–0.98) |
| Heavy   | 8,369  | 362 | 10.0 | 0.94 (0.84–1.05) |
| Heavy   | 4,379  | 237 | 12.7 | 0.97 (0.85–1.11) |
| Heavy   | 15,049 | 607 | 9.4 | 0.94 (0.86–1.02) |
| Heavy   | 27,597 | 1,054 | 8.9 | 1.02 (0.94–1.09) |
| Heavy   | 22,232 | 825 | 8.6 | 0.93 (0.86–1.01) |
| Heavy   | 6,616  | 411 | 14.6 | 0.99 (0.89–1.11) |
| Heavy   | 11,822 | 569 | 11.2 | 1.00 (0.91–1.10) |
| Heavy   | 26,960 | 1,054 | 9.1 | 0.94 (0.88–1.01) |
| Heavy   | 70,176 | 2,983 | 9.9 | 1 (Ref.) |

IR, incidence rate per 1,000 person-years; aHR, adjusted hazard ratio; CI, confidence interval

*Adjusted for age, sex, socioeconomic position (income level and place of residence), smoking status, physical activity, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index
### eTable 5. Adjusted Hazard Ratios* and 95% Confidence Intervals for Cancer According to Changes in Drinking Level by Age

| Alcohol-related cancers | 2009 | 2011 | Male | Female |
|-------------------------|------|------|------|--------|
| **<65 years**           |      |      |      |        |
| None                    | 1 (Ref.) | 1.05 (1.00–1.12) | 1.14 (1.03–1.26) | 1.34 (1.20–1.50) | 1 (Ref.) | 0.99 (0.94–1.03) | 0.96 (0.80–1.15) | 0.85 (0.60–1.21) |
| Mild                    | 1.07 (1.01–1.13) | 1 (Ref.) | 1.10 (1.04–1.17) | 1.20 (1.09–1.31) | 0.99 (0.94–1.05) | 1 (Ref.) | 1.04 (0.91–1.18) | 0.81 (0.60–1.09) |
| Moderate                | 1.12 (1.01–1.24) | 1.02 (0.96–1.09) | 1 (Ref.) | 1.04 (0.96–1.12) | 0.92 (0.73–1.15) | 0.81 (0.67–0.98) | 1 (Ref.) | 0.68 (0.49–0.96) |
| Heavy                   | 1.13 (1.01–1.26) | 0.94 (0.86–1.03) | 0.91 (0.85–0.98) | 1 (Ref.) | 0.95 (0.64–1.41) | 0.87 (0.61–1.23) | 1.11 (0.79–1.57) | 1 (Ref.) |
| **≥65 years**           |      |      |      |        |
| None                    | 1 (Ref.) | 1.11 (1.04–1.19) | 1.40 (1.23–1.59) | 1.70 (1.48–1.94) | 1 (Ref.) | 1.06 (0.95–1.18) | 0.93 (0.57–1.52) | 0.71 (0.27–1.89) |
| Mild                    | 0.98 (0.91–1.05) | 1 (Ref.) | 1.21 (1.11–1.32) | 1.21 (1.07–1.37) | 0.95 (0.81–1.12) | 1 (Ref.) | 0.97 (0.60–1.57) | 1.26 (0.59–2.67) |
| Moderate                | 1.10 (0.97–1.25) | 0.91 (0.82–1.01) | 1 (Ref.) | 1.12 (0.99–1.26) | 0.62 (0.27–1.42) | 1.44 (0.69–3.03) | 1 (Ref.) | 1.36 (0.45–4.08) |
| Heavy                   | 1.00 (0.89–1.13) | 0.89 (0.79–0.99) | 0.90 (0.81–1.00) | 1 (Ref.) | 0.54 (0.16–1.81) | 0.89 (0.29–2.76) | 0.66 (0.16–2.78) | 1 (Ref.) |
| **All cancers (except thyroid cancers)** |      |      |      |        |
| **<65 years**           |      |      |      |        |
| None                    | 1 (Ref.) | 1.00 (0.97–1.03) | 1.04 (0.98–1.10) | 1.17 (1.10–1.26) | 1 (Ref.) | 1.00 (0.96–1.03) | 0.95 (0.83–1.09) | 1.00 (0.80–1.27) |
| Mild                    | 1.05 (1.01–1.08) | 1 (Ref.) | 1.04 (1.01–1.08) | 1.11 (1.05–1.18) | 1.01 (0.97–1.06) | 1 (Ref.) | 1.03 (0.94–1.14) | 1.00 (0.82–1.21) |
| Moderate                | 1.16 (1.09–1.24) | 0.99 (0.96–1.03) | 1 (Ref.) | 1.00 (0.96–1.05) | 1.03 (0.87–1.22) | 0.98 (0.85–1.13) | 1 (Ref.) | 0.85 (0.66–1.08) |
| Heavy                   | 1.11 (1.04–1.19) | 0.94 (0.89–1.00) | 0.96 (0.92–1.00) | 1 (Ref.) | 0.96 (0.72–1.29) | 0.96 (0.74–1.24) | 1.04 (0.80–1.36) | 1 (Ref.) |
| **≥65 years**           |      |      |      |        |
| None                    | 1 (Ref.) | 1.00 (0.96–1.04) | 1.09 (1.02–1.17) | 1.22 (1.12–1.32) | 1 (Ref.) | 1.00 (0.93–1.07) | 1.05 (0.79–1.39) | 1.03 (0.63–1.69) |
| Mild                    | 1.01 (0.97–1.05) | 1 (Ref.) | 1.04 (0.99–1.09) | 1.07 (1.00–1.15) | 0.97 (0.88–1.07) | 1 (Ref.) | 1.03 (0.77–1.37) | 0.79 (0.45–1.40) |
| Moderate                | 1.06 (0.98–1.14) | 0.95 (0.90–1.01) | 1 (Ref.) | 1.03 (0.96–1.10) | 0.81 (0.49–1.33) | 1.04 (0.64–1.69) | 1 (Ref.) | 1.76 (0.93–3.34) |
| Heavy                   | 1.08 (1.00–1.16) | 0.89 (0.83–0.96) | 0.94 (0.89–1.00) | 1 (Ref.) | 0.64 (0.31–1.30) | 0.85 (0.42–1.71) | 0.95 (0.43–2.09) | 1 (Ref.) |
| **Death**               |      |      |      |        |
| **<65 years**           |      |      |      |        |
| None                    | 1 (Ref.) | 0.94 (0.89–1.00) | 1.09 (1.00–1.20) | 1.26 (1.13–1.40) | 1 (Ref.) | 1.01 (0.93–1.10) | 0.97 (0.71–1.34) | 1.01 (0.59–1.74) |
| Mild                    | 1.22 (1.16–1.30) | 1 (Ref.) | 1.10 (1.03–1.17) | 1.30 (1.19–1.42) | 1.03 (0.93–1.15) | 1 (Ref.) | 1.04 (0.82–1.31) | 1.41 (0.95–2.09) |
| Moderate                | 1.38 (1.25–1.51) | 1.03 (0.97–1.10) | 1 (Ref.) | 1.06 (0.98–1.14) | 1.45 (1.01–2.06) | 0.95 (0.69–1.32) | 1 (Ref.) | 1.71 (1.13–2.59) |
| Heavy                   | 1.50 (1.36–1.65) | 1.01 (0.93–1.10) | 0.94 (0.88–1.00) | 1 (Ref.) | 0.81 (0.47–1.40) | 0.63 (0.38–1.03) | 1.00 (0.64–1.56) | 1 (Ref.) |
| **≥65 years**           |      |      |      |        |
| None                    | 1 (Ref.) | 0.93 (0.89–0.97) | 1.04 (0.96–1.13) | 1.25 (1.15–1.36) | 1 (Ref.) | 1.02 (0.95–1.09) | 0.96 (0.71–1.30) | 1.62 (1.06–2.49) |

*Adjusted for age, smoking status, BMI, diabetes, and hypertension.

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| Years | Mild          | Reference (1) | 1.17 (1.10–1.24) | 1.40 (1.30–1.52) | 1.19 (1.06–1.34) | Reference (1) | 1.04 (0.74–1.48) | 1.04 (0.58–1.84) |
|-------|---------------|---------------|------------------|------------------|------------------|---------------|------------------|------------------|
|       |               |               |                  |                  |                  |               |                  |                  |
|       | Moderate      | 1.03 (0.96–1.11) | 1 (Ref.) | 1.16 (1.06–1.26) | 1.22 (0.73–2.06) | 1.16 (0.68–2.01) | 1 (Ref.) | 1.69 (0.78–3.68) |
|       |               |               |                  |                  |                  |               |                  |                  |
|       | Heavy         | 0.97 (0.90–1.05) | 0.95 (0.89–1.02) | 1 (Ref.) | 1.25 (0.59–2.65) | 0.96 (0.42–2.21) | 1.18 (0.44–3.15) | 1 (Ref.) |

Adjusted for sex, socioeconomic position (income level and place of residence), smoking status, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index.
**eTable 6. Adjusted Hazard Ratios* and 95% Confidence Intervals for Cancer According to Changes in Drinking Level by Sex**

| 2009  | 2011  | None | Mild | Moderate | Heavy |
|-------|-------|------|------|----------|-------|
| **Alcohol-related cancers** | | | | | | |
| Male | None | 1 (Ref.) | 1.07 (1.03–1.12) | 1.22 (1.13–1.32) | 1.47 (1.35–1.60) |
| | Mild | 1.02 (0.97–1.06) | 1 (Ref.) | 1.14 (1.08–1.19) | 1.20 (1.12–1.29) |
| | Moderate | **1.10 (1.02–1.19)** | 0.99 (0.93–1.04) | 1 (Ref.) | 1.05 (0.99–1.12) |
| | Heavy | 1.06 (0.97–1.15) | **0.92 (0.86–0.98)** | 0.90 (0.85–0.96) | 1 (Ref.) |
| Female | None | 1 (Ref.) | 1.01 (0.97–1.05) | 0.96 (0.81–1.14) | 0.83 (0.60–1.16) |
| | Mild | 0.99 (0.94–1.04) | 1 (Ref.) | 1.03 (0.91–1.17) | 0.84 (0.64–1.12) |
| | Moderate | 0.86 (0.69–1.07) | 0.84 (0.70–1.01) | 1 (Ref.) | 0.72 (0.52–1.00) |
| | Heavy | 0.90 (0.62–1.31) | 0.88 (0.63–1.22) | 1.08 (0.78–1.51) | 1 (Ref.) |
| **All cancers (except thyroid cancers)** | | | | | | |
| Male | None | 1 (Ref.) | 0.99 (0.97–1.02) | 1.05 (1.00–1.10) | 1.19 (1.13–1.25) |
| | Mild | 1.02 (0.99–1.05) | 1 (Ref.) | 1.04 (1.01–1.07) | 1.10 (1.05–1.15) |
| | Moderate | **1.10 (1.05–1.15)** | 0.98 (0.95–1.01) | 1 (Ref.) | 1.01 (0.97–1.05) |
| | Heavy | **1.08 (1.03–1.14)** | **0.92 (0.88–0.96)** | 0.95 (0.92–0.99) | 1 (Ref.) |
| Female | None | 1 (Ref.) | 1.00 (0.98–1.03) | 0.97 (0.86–1.09) | 1.01 (0.82–1.24) |
| | Mild | 1.01 (0.97–1.05) | 1 (Ref.) | 1.03 (0.94–1.12) | 0.96 (0.80–1.16) |
| | Moderate | 0.99 (0.84–1.16) | 0.99 (0.86–1.13) | 1 (Ref.) | 0.93 (0.74–1.17) |
| | Heavy | 0.90 (0.69–1.18) | 0.94 (0.74–1.20) | 1.03 (0.80–1.32) | 1 (Ref.) |
| **Death** | | | | | | |
| Male | None | 1 (Ref.) | 0.94 (0.91–0.97) | 1.07 (1.01–1.14) | 1.27 (1.19–1.35) |
| | Mild | **1.26 (1.22–1.31)** | 1 (Ref.) | 1.14 (1.09–1.19) | 1.36 (1.28–1.44) |
| | Moderate | **1.41 (1.32–1.50)** | 1.03 (0.98–1.08) | 1 (Ref.) | 1.11 (1.05–1.17) |
| | Heavy | **1.43 (1.34–1.51)** | 0.99 (0.93–1.04) | **0.94 (0.90–0.99)** | 1 (Ref.) |
| Female | None | 1 (Ref.) | **1.06 (1.00–1.12)** | 1.03 (0.82–1.28) | 1.41 (1.01–1.98) |
| | Mild | **1.09 (1.01–1.18)** | 1 (Ref.) | 1.05 (0.87–1.27) | 1.27 (0.92–1.76) |
| | Moderate | 1.30 (0.98–1.74) | 0.96 (0.73–1.27) | 1 (Ref.) | **1.72 (1.20–2.47)** |
| | Heavy | 0.90 (0.59–1.37) | 0.67 (0.44–1.02) | 1.00 (0.67–1.50) | 1 (Ref.) |

*Adjusted for age, socioeconomic position (income level and place of residence), smoking status, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index*
**eTable 7.** Adjusted Hazard Ratios and 95% Confidence Intervals for Cancer According to Changes in Drinking Level by Smoking Status in 2009 (Male)

| 2009 | 2011          | None       | Mild       | Moderate   | Heavy       |
|------|---------------|------------|------------|------------|-------------|
|      |               | Alcohol-related cancers |               |            |             |
|      |               | None       |           |            |             |
|      |               | Never smoker | 1 (Ref.)  | 1.04 (0.96–1.12) | 1.26 (1.09–1.47) | 1.77 (1.51–2.08) |
|      |               | Mild       | 0.99 (0.92–1.07) | 1 (Ref.)  | 1.08 (0.97–1.20) | 1.32 (1.14–1.54) |
|      |               | Moderate   | 1.09 (0.95–1.26) | 0.95 (0.84–1.08) | 1 (Ref.)  | 1.06 (0.91–1.24) |
|      |               | Heavy      | 1.05 (0.92–1.19) | 0.89 (0.77–1.02) | 0.97 (0.85–1.10) | 1 (Ref.)  |
|      |               | Former smoker, <20 PY | 1 (Ref.)  | 0.97 (0.87–1.07) | 1.21 (1.00–1.46) | 1.09 (0.84–1.43) |
|      |               | Mild       | 1.14 (1.03–1.26) | 1 (Ref.)  | 1.34 (1.20–1.49) | 1.18 (0.96–1.44) |
|      |               | Moderate   | 1.01 (0.80–1.27) | 0.95 (0.83–1.08) | 1 (Ref.)  | 1.00 (0.84–1.18) |
|      |               | Heavy      | 1.02 (0.78–1.34) | 0.92 (0.77–1.11) | 0.85 (0.72–1.00) | 1 (Ref.)  |
|      |               | Former smoker, ≥20 PY | None       | 1 (Ref.)  | 1.04 (0.93–1.16) | 1.09 (0.90–1.33) | 1.35 (1.10–1.64) |
|      |               | Mild       | 1.07 (0.95–1.20) | 1 (Ref.)  | 1.13 (1.00–1.27) | 1.14 (0.95–1.36) |
|      |               | Moderate   | 1.34 (1.11–1.62) | 1.02 (0.89–1.17) | 1 (Ref.)  | 1.09 (0.94–1.27) |
|      |               | Heavy      | 1.19 (0.99–1.44) | 0.94 (0.80–1.11) | 0.91 (0.79–1.04) | 1 (Ref.)  |
|      |               | Current smoker, <20 PY | None       | 1 (Ref.)  | 1.15 (1.02–1.30) | 1.19 (0.97–1.47) | 1.63 (1.27–2.09) |
|      |               | Mild       | 0.93 (0.82–1.06) | 1 (Ref.)  | 1.03 (0.92–1.17) | 0.90 (0.72–1.12) |
|      |               | Moderate   | 0.89 (0.70–1.15) | 0.93 (0.82–1.05) | 1 (Ref.)  | 0.86 (0.72–1.02) |
|      |               | Heavy      | 1.29 (0.97–1.72) | 1.09 (0.90–1.31) | 1.03 (0.87–1.23) | 1 (Ref.)  |
|      |               | Current smoker, ≥20 PY | None       | 1 (Ref.)  | 1.27 (1.14–1.41) | 1.35 (1.16–1.58) | 1.49 (1.27–1.75) |
|      |               | Mild       | 0.97 (0.87–1.08) | 1 (Ref.)  | 1.12 (1.02–1.24) | 1.29 (1.14–1.47) |
|      |               | Moderate   | 1.07 (0.89–1.28) | 1.04 (0.94–1.16) | 1 (Ref.)  | 1.15 (1.04–1.28) |
|      |               | Heavy      | 0.90 (0.74–1.09) | 0.88 (0.78–1.00) | 0.86 (0.78–0.95) | 1 (Ref.)  |
|      |               | All cancers (except thyroid cancers) |               |            |             |
|      |               | Never smoker | 1 (Ref.)  | 1.01 (0.96–1.05) | 1.14 (1.04–1.25) | 1.41 (1.28–1.56) |
|      |               | Mild       | 1.02 (0.98–1.07) | 1 (Ref.)  | 1.00 (0.94–1.07) | 1.20 (1.10–1.32) |
|      |               | Moderate   | 1.10 (1.02–1.20) | 0.95 (0.88–1.02) | 1 (Ref.)  | 0.99 (0.91–1.09) |
|      |               | Heavy      | 1.11 (1.02–1.20) | 0.87 (0.80–0.95) | 0.93 (0.86–1.01) | 1 (Ref.)  |
|      |               | Former smoker, <20 PY | None       | 1 (Ref.)  | 1.01 (0.95–1.06) | 1.07 (0.96–1.20) | 1.03 (0.87–1.20) |
|      |               | Mild       | 1.01 (0.95–1.07) | 1 (Ref.)  | 1.12 (1.05–1.20) | 1.04 (0.92–1.17) |
|      |               | Moderate   | 1.11 (0.97–1.26) | 0.92 (0.85–0.99) | 1 (Ref.)  | 0.99 (0.89–1.09) |
|      |               | Heavy      | 1.03 (0.87–1.22) | 0.95 (0.85–1.07) | 0.98 (0.89–1.08) | 1 (Ref.)  |
|      |               | Former smoker, ≥20 PY | None       | 1 (Ref.)  | 0.96 (0.91–1.02) | 1.02 (0.91–1.14) | 1.08 (0.96–1.22) |
|      |               | Mild       | 1.06 (0.99–1.13) | 1 (Ref.)  | 1.08 (1.01–1.15) | 1.09 (0.98–1.20) |
|      |               | Moderate   | 1.07 (0.95–1.19) | 1.03 (0.95–1.11) | 1 (Ref.)  | 1.00 (0.92–1.09) |
|      |               | Heavy      | 1.04 (0.92–1.17) | 0.92 (0.83–1.02) | 0.93 (0.85–1.00) | 1 (Ref.)  |
|      |               | Current smoker, <20 PY | None       | 1 (Ref.)  | 0.99 (0.92–1.07) | 0.93 (0.81–1.07) | 1.15 (0.97–1.36) |
|      |               | Mild       | 0.97 (0.90–1.05) | 1 (Ref.)  | 0.99 (0.92–1.07) | 0.95 (0.83–1.08) |
|      |               | Moderate   | 0.93 (0.80–1.09) | 0.95 (0.88–1.03) | 1 (Ref.)  | 0.89 (0.80–1.00) |
|      |               | Heavy      | 1.24 (1.04–1.49) | 1.06 (0.94–1.20) | 1.07 (0.96–1.19) | 1 (Ref.)  |
|      |               | Current smoker, ≥20 PY | None       | 1 (Ref.)  | 1.01 (0.95–1.07) | 1.08 (0.99–1.17) | 1.18 (1.08–1.30) |
|      |               | Mild       | 1.00 (0.94–1.07) | 1 (Ref.)  | 1.01 (0.96–1.07) | 1.09 (1.00–1.17) |
|      |               | Moderate   | 1.16 (1.05–1.28) | 1.02 (0.96–1.08) | 1 (Ref.)  | 1.07 (1.00–1.14) |
|      |               | Heavy      | 1.01 (0.90–1.13) | 0.92 (0.86–1.00) | 0.95 (0.90–1.01) | 1 (Ref.)  |
|      |               | Death      | None       | 1 (Ref.)  | 0.92 (0.87–0.98) | 1.03 (0.91–1.16) | 1.37 (1.21–1.55) |
| smoker                      | Mild          | 1 (Ref.) | 1.19 (1.09–1.30) | 1.61 (1.43–1.81) |
|----------------------------|---------------|----------|------------------|------------------|
|                            | Moderate      | 1.09 (0.98–1.22) | 1 (Ref.) | 1.07 (0.93–1.23) |
|                            | Heavy         | 0.97 (0.87–1.09) | 1.00 (0.89–1.11) | 1 (Ref.) |
| Former smoker, <20 PY      | None          | 1 (Ref.) | 0.88 (0.81–0.95) | 1.04 (0.87–1.23) | 1.34 (1.09–1.64) |
|                            | Mild          | 1.26 (1.15–1.38) | 1 (Ref.) | 1.14 (1.02–1.28) | 1.23 (1.02–1.48) |
|                            | Moderate      | 1.08 (0.94–1.23) | 1 (Ref.) | 1.11 (0.94–1.32) |
|                            | Heavy         | 1.24 (0.99–1.54) | 0.88 (0.73–1.05) | 0.84 (0.71–0.99) | 1 (Ref.) |
| Former smoker, ≥20 PY      | None          | 1 (Ref.) | 0.92 (0.85–0.99) | 1.01 (0.87–1.16) | 1.13 (0.98–1.32) |
|                            | Mild          | 1.29 (1.19–1.41) | 1 (Ref.) | 1.10 (0.99–1.22) | 1.29 (1.12–1.48) |
|                            | Moderate      | 1.10 (0.98–1.24) | 1 (Ref.) | 1.23 (1.08–1.41) |
|                            | Heavy         | 0.95 (0.83–1.09) | 0.91 (0.81–1.03) | 1 (Ref.) |
| Current smoker, <20 PY     | None          | 1 (Ref.) | 1.02 (0.93–1.12) | 1.07 (0.91–1.27) | 1.18 (0.96–1.45) |
|                            | Mild          | 1.13 (1.02–1.25) | 1 (Ref.) | 1.07 (0.97–1.19) | 1.15 (0.97–1.36) |
|                            | Moderate      | 1.06 (0.87–1.28) | 0.91 (0.81–1.01) | 1 (Ref.) | 1.02 (0.89–1.18) |
|                            | Heavy         | 1.44 (1.17–1.76) | 1.09 (0.94–1.27) | 1.09 (0.95–1.26) | 1 (Ref.) |
| Current smoker, ≥20 PY     | None          | 1 (Ref.) | 1.01 (0.94–1.08) | 1.17 (1.05–1.31) | 1.30 (1.16–1.45) |
|                            | Mild          | 1.15 (1.06–1.24) | 1 (Ref.) | 1.12 (1.03–1.21) | 1.34 (1.21–1.48) |
|                            | Moderate      | 0.99 (0.91–1.08) | 1 (Ref.) | 1.12 (1.03–1.22) |
|                            | Heavy         | 1.34 (1.19–1.51) | 0.99 (0.90–1.09) | 0.90 (0.83–0.97) | 1 (Ref.) |

*Adjusted for age, socioeconomic position (income level and place of residence), smoking status, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index
### eTable 8. Adjusted Hazard Ratios and 95% Confidence Intervals for Cancer According to Changes in Drinking Level by Smoking Status in 2009 (Female)

|                | 2009          | 2011          | Moderate | Heavy          |
|----------------|---------------|---------------|----------|----------------|
| **Alcohol-related cancers** |               |               |          |                |
| **Never smoker** |               |               |          |                |
| None            | 1 (Ref.)      | 1.01 (0.96–1.05) | 0.94 (0.78–1.14) | 0.92 (0.64–1.33) |
| Mild            | 1.00 (0.95–1.06) | 1 (Ref.)      | 1.05 (0.92–1.20) | 0.89 (0.65–1.22) |
| Moderate        | 0.90 (0.71–1.14) | 0.87 (0.70–1.07) | 1 (Ref.)    | 0.78 (0.52–1.16) |
| Heavy           | 1.02 (0.65–1.59) | 0.99 (0.65–1.52) | 1.09 (0.70–1.71) | 1 (Ref.)        |
| **Former smoker, <20 PY** |               |               |          |                |
| None            | 1 (Ref.)      | 1.16 (0.82–1.64) | 1.08 (0.44–2.64) | N/A            |
| Mild            | 0.57 (0.35–0.93) | 1 (Ref.)      | 1.07 (0.62–1.86) | 0.81 (0.26–2.56) |
| Moderate        | 1.55 (0.48–5.02) | 1.25 (0.51–3.10) | 1 (Ref.)    | 0.32 (0.04–2.65) |
| Heavy           | 1.32 (0.32–5.48) | 1.00 (0.32–3.16) | 1.42 (0.50–4.02) | 1 (Ref.)        |
| **Former smoker, ≥20 PY** |               |               |          |                |
| None            | 1 (Ref.)      | 1.94 (0.89–4.23) | 0.80 (0.11–5.91) | N/A            |
| Mild            | 0.71 (0.16–3.13) | 1 (Ref.)      | 0.99 (0.07–13.40) | N/A            |
| Moderate        | N/A           | N/A           | 1 (Ref.)    | N/A            |
| Heavy           | N/A           | N/A           | N/A        | 1 (Ref.)       |
| **Current smoker, <20 PY** |               |               |          |                |
| None            | 1 (Ref.)      | 0.90 (0.68–1.20) | 1.26 (0.77–2.06) | 1.03 (0.46–2.33) |
| Mild            | 0.90 (0.64–1.26) | 1 (Ref.)      | 0.92 (0.60–1.39) | 0.89 (0.41–1.91) |
| Moderate        | 0.52 (0.23–1.16) | 0.60 (0.38–0.95) | 1 (Ref.)    | 0.63 (0.32–1.22) |
| Heavy           | 0.41 (0.09–1.79) | 0.71 (0.32–1.56) | 1.15 (0.60–2.21) | 1 (Ref.)       |
| **Current smoker, ≥20 PY** |               |               |          |                |
| None            | 1 (Ref.)      | 0.85 (0.43–1.69) | 0.28 (0.04–2.03) | N/A            |
| Mild            | 1.25 (0.51–3.07) | 1 (Ref.)      | 0.53 (0.12–2.44) | N/A            |
| Moderate        | N/A           | N/A           | 1 (Ref.)    | N/A            |
| Heavy           | N/A           | N/A           | N/A        | 1 (Ref.)       |
| **All cancers (except thyroid cancers)** |               |               |          |                |
| **Never smoker** |               |               |          |                |
| None            | 1 (Ref.)      | 1.01 (0.98–1.04) | 0.96 (0.84–1.10) | 1.13 (0.90–1.42) |
| Mild            | 1.02 (0.98–1.06) | 1 (Ref.)      | 1.03 (0.93–1.13) | 1.04 (0.84–1.27) |
| Moderate        | 0.99 (0.83–1.18) | 1.00 (0.85–1.16) | 1 (Ref.)    | 0.94 (0.71–1.24) |
| Heavy           | 0.99 (0.72–1.37) | 1.11 (0.82–1.50) | 1.10 (0.79–1.53) | 1 (Ref.)       |
| **Former smoker, <20 PY** |               |               |          |                |
| None            | 1 (Ref.)      | 0.93 (0.72–1.21) | 0.93 (0.48–1.81) | 0.26 (0.04–1.84) |
| Mild            | 1.45 (0.62–3.42) | 1.08 (0.56–2.07) | 1 (Ref.)    | 0.68 (0.22–2.07) |
| Moderate        | 2.13 (0.74–6.15) | 0.92 (0.34–2.49) | 1.25 (0.50–3.13) | 1 (Ref.)       |
| Heavy           | 1.59 (0.90–2.82) | 0.41 (0.06–2.97) | 0.63 (0.09–4.62) | N/A            |
| **Former smoker, ≥20 PY** |               |               |          |                |
| None            | 1 (Ref.)      | 1.59 (0.90–2.82) | 0.41 (0.06–2.97) | 0.63 (0.09–4.62) |
| Mild            | 1.12 (0.39–3.27) | 1 (Ref.)      | 1.63 (0.30–8.93) | N/A            |
| Moderate        | N/A           | N/A           | 1 (Ref.)    | N/A            |
| Heavy           | N/A           | N/A           | N/A        | 1 (Ref.)       |
| **Current smoker, <20 PY** |               |               |          |                |
| None            | 1 (Ref.)      | 0.82 (0.68–0.99) | 1.18 (0.84–1.66) | 0.72 (0.37–1.39) |
| Mild            | 0.83 (0.66–1.05) | 1 (Ref.)      | 1.02 (0.78–1.35) | 0.92 (0.55–1.55) |
| Moderate        | 0.81 (0.47–1.40) | 0.80 (0.57–1.13) | 1 (Ref.)    | 0.82 (0.50–1.33) |
| Heavy           | 0.58 (0.24–1.41) | 0.63 (0.35–1.14) | 0.93 (0.56–1.55) | 1 (Ref.)       |
| **Current smoker, ≥20 PY** |               |               |          |                |
| None            | 1 (Ref.)      | 0.84 (0.54–1.29) | 0.60 (0.25–1.46) | 0.90 (0.37–2.21) |
| Mild            | 1.35 (0.78–2.32) | 1 (Ref.)      | 0.92 (0.39–2.15) | 0.42 (0.10–1.76) |
| Moderate        | 1.92 (0.50–7.39) | 2.84 (0.99–8.14) | 1 (Ref.)    | 2.31 (0.76–7.03) |
| Heavy           | 0.20 (0.03–1.54) | 0.44 (0.13–1.53) | 0.71 (0.30–1.67) | 1 (Ref.)       |
| **Death** |               |               |          |                |
| **Never** |               |               |          |                |
| None            | 1 (Ref.)      | 1.06 (1.00–1.13) | 1.03 (0.80–1.33) | 1.53 (1.03–2.26) |
| smoker                  | Mild          | Moderate      | Heavy         | Former smoker, <20 PY | None    | 1 (Ref.) | 0.83 (0.60–1.15) | 1.11 (0.63–1.95) | 1 (Ref.) | 1.11 (0.66–1.85) |
|-------------------------|---------------|---------------|---------------|-----------------------|---------|---------|-----------------|-----------------|---------|-----------------|
|                         |               |               |               | None                  | 1 (Ref.)| 1 (Ref.)| 1 (Ref.) | 1.00 (0.80–1.26) | 1 (Ref.)| 1.49 (1.04–2.15)|
|                         |               |               |               | Moderate              | 1.11 (0.55–1.57) | 0.86 (0.51–1.46) | 1.11 (0.63–1.95) | 1 (Ref.) | 1.11 (0.66–1.85) |
|                         |               |               |               | Heavy                 | 0.93 (0.55–1.57) | 0.86 (0.51–1.46) | 1.11 (0.63–1.95) | 1 (Ref.) | 1.11 (0.66–1.85) |
| Former smoker, ≥20 PY   | None          | 2.26 (0.33–15.61) | 0.22 (0.02–2.35) | 0.19 (0.01–2.75) | 1 (Ref.)| 1.00 (0.59–1.76) | 1.00 (0.90–1.11) | 1 (Ref.) | 1.00 (0.80–1.26) |
|                         | Mild          | 1.64 (0.39–6.86) | 1.19 (0.37–3.85) | 1 (Ref.) | 1.07 (0.19–5.96) | 1.11 (0.66–1.85) | 1 (Ref.) | 1.11 (0.66–1.85) |
|                         | Heavy         | 2.26 (0.33–15.61) | 0.22 (0.02–2.35) | 0.19 (0.01–2.75) | 1 (Ref.)| 1.00 (0.59–1.76) | 1.00 (0.90–1.11) | 1 (Ref.) | 1.00 (0.80–1.26) |
| Current smoker, <20 PY  | None          | 2.78 (0.55–13.99) | 1 (Ref.) | 1.07 (0.19–5.96) | 1.07 (0.19–5.96) | 1.07 (0.19–5.96) | 1.07 (0.19–5.96) | 1 (Ref.) | 1.07 (0.19–5.96) |
|                         | Mild          | 1.30 (0.76–2.21) | 1 (Ref.) | 1.25 (0.52–2.98) | 1 (Ref.) | 1.25 (0.52–2.98) | 1 (Ref.) | 1.25 (0.52–2.98) | 1 (Ref.) | 1.25 (0.52–2.98) |
|                         | Heavy         | 1.30 (0.76–2.21) | 1 (Ref.) | 1.25 (0.52–2.98) | 1 (Ref.) | 1.25 (0.52–2.98) | 1 (Ref.) | 1.25 (0.52–2.98) | 1 (Ref.) | 1.25 (0.52–2.98) |
| Current smoker, ≥20 PY  | None          | 0.78 (0.25–2.43) | 0.30 (0.10–0.92) | 1.13 (0.56–2.27) | 1 (Ref.) | 0.78 (0.25–2.43) | 0.30 (0.10–0.92) | 1.13 (0.56–2.27) | 1 (Ref.) | 0.78 (0.25–2.43) |
|                         | Mild          | 0.91 (0.51–1.62) | 1 (Ref.) | 0.81 (0.28–2.37) | 1.34 (0.50–3.59) | 0.91 (0.51–1.62) | 1 (Ref.) | 0.81 (0.28–2.37) | 1.34 (0.50–3.59) | 1 (Ref.) | 0.91 (0.51–1.62) |
|                         | Heavy         | 0.80 (0.08–8.33) | 1.70 (0.35–8.20) | 1 (Ref.) | 1.78 (0.32–9.87) | 0.80 (0.08–8.33) | 1.70 (0.35–8.20) | 1 (Ref.) | 1.78 (0.32–9.87) | 1 (Ref.) | 0.80 (0.08–8.33) |

PY, pack-years
*Adjusted for age, socioeconomic position (income level and place of residence), smoking status, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index
**eTable 9.** Associations Between Changes in Drinking Level and Cancer (Sustained Non-Drinker as a Referent)

| Alcohol consumption status | 2009 | 2011          | aHR (95% CI)* |
|----------------------------|------|---------------|--------------|
| Alcohol-related cancers    |      |               |              |
| None                       | None | 1 (Ref.)      |              |
| Mild                       | 1.11 | (1.07–1.14)  |              |
| Moderate                   | 1.19 | (1.11–1.28)  |              |
| Heavy                      | 1.44 | (1.32–1.56)  |              |
| Mild                       | None | 1.11          | (1.08–1.14)  |
| Mild                       | 1.07 | (1.04–1.09)  |              |
| Moderate                   | 1.15 | (1.10–1.20)  |              |
| Heavy                      | 1.24 | (1.16–1.33)  |              |
| Moderate                   | None | 1.35          | (1.27–1.44)  |
| Mild                       | 1.16 | (1.11–1.20)  |              |
| Moderate                   | 1.13 | (1.09–1.18)  |              |
| Heavy                      | 1.22 | (1.16–1.29)  |              |
| Heavy                      | None | 1.68          | (1.56–1.80)  |
| Mild                       | 1.34 | (1.26–1.42)  |              |
| Moderate                   | 1.26 | (1.20–1.33)  |              |
| Heavy                      | 1.41 | (1.36–1.47)  |              |

| All cancers (except thyroid cancers) | 2009 | 2011          | aHR (95% CI)* |
|--------------------------------------|------|---------------|--------------|
| None                                 | None | 1 (Ref.)      |              |
| Mild                                 | 0.96 | (0.93–0.99)  |              |
| Moderate                              | 1.10 | (1.05–1.15)  |              |
| Heavy                                | 1.17 | (1.09–1.25)  |              |
| Mild                                 | None | 1.05          | (0.98–1.14)  |
| Mild                                 | 0.98 | (0.93–1.03)  |              |
| Moderate                              | 1.05 | (0.98–1.12)  |              |
| Heavy                                | 1.05 | (0.98–1.14)  |              |
| Moderate                              | None | 0.98          | (0.93–1.04)  |
| Mild                                 | 1.04 | (0.98–1.11)  |              |
| Moderate                              | 1.03 | (0.95–1.12)  |              |
| Heavy                                | 0.91 | (0.85–0.97)  |              |
| Heavy                                | None | 0.91          | (0.86–0.96)  |
| Mild                                 | 1.04 | (0.96–1.12)  |              |
| Moderate                              | 0.92 | (0.86–0.98)  |              |
| Heavy                                | 0.91 | (0.86–0.97)  |              |

*aHR, adjusted hazard ratio; CI, confidence interval

*adjusted for age, sex, socioeconomic position (income level and place of residence), smoking status, physical activity, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index*
**eFigure 1. Flow Chart of the Study Population**

Subjects (age ≥ 40 years) who underwent health examination in both 2009 and 2011 (n = 4,961,441)

Subject who underwent health examination in 2013 (n = 3,624,356)

| Exclusion criteria | n   |
|--------------------|-----|
| Cancer before the health examination | 111,746 |
| CVD before the health examination | 99,861 |
| Cancer, CVD, or death within 1 year after health examination | 62,944 |
| Missing information | 178,077 |

Followed up from 1 year after the last screening date (2011) to December 31, 2018

Followed up from 1 year after the last screening date (2013) to December 31, 2018

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eFigure 2. The Risk of Site-Specific Cancer According to Changes in Drinking Level Between 2009 and 2011

A. Lip, oral cavity and pharynx

B. Esophagus

C. Stomach

© 2022 Yoo JE et al. JAMA Network Open.
D. Colorectum

E. Liver

F. Gallbladder

G. Pancreas

© 2022 Yoo JE et al. JAMA Network Open.
H. Larynx

I. Lung

J. Breast
K. Cervix uteri

L. Corpus uteri

M. Ovary

© 2022 Yoo JE et al. JAMA Network Open.
N. Prostate

O. Kidney

P. Bladder
T. Multiple myeloma

![Graph showing HRs for multiple myeloma across different years and exposure levels.]

U. Leukemia

![Graph showing HRs for leukemia across different years and exposure levels.]

HRs are adjusted for age, sex, socioeconomic position (income level and place of residence), smoking status, physical activity, comorbidities (hypertension, diabetes, dyslipidemia, chronic kidney disease, and chronic obstructive pulmonary disease), and Charlson comorbidity index.