Pregnancies generally convey protection against breast cancer, and the degree of protection depends on the woman’s age at childbirth (Trichopoulos et al., 1983). An early age at first birth provides a particularly strong protective effect that is independent of the effects of subsequent pregnancies (Rosner et al., 1994). This effect has been attributed to terminal differentiation of mammary cells brought about by the hormonal milieu of pregnancy (Russio and Russo, 1999). It has been shown that pregnancies that are spontaneously or intentionally interrupted in early gestation do not provide protection against breast cancer (Melbye et al., 1997). There have been, however, no data directly addressing the hypothesis that the protective effect of a pregnancy depends on the length of gestation across the whole range of gestational age.

In this study we have combined information from two nationwide health registries in Norway in order to examine whether length of gestation is related to breast cancer risk. Data were derived from the Medical Birth Registry that comprises all births since 1967, and the Norwegian Cancer Registry, which has registered incident cancers since 1953. Midwives and doctors have to fill in a standardised form to notify the Birth Registry about each filling number of births (data not shown). However, increased length of gestation in the first pregnancy was strongly and independently related to reduction in breast cancer risk (Table 2). A relatively short pregnancy of less than 32 weeks was associated with a 3% to 53% greater than after a pregnancy of 40 weeks or more, with a significant declining trend in risk (P for trend=0.02).

We found, as expected (Trichopoulos et al., 1983; Rosner et al., 1994), a gradual increase in breast cancer risk with increasing age at first birth (Table 1), and an additional protection with increasing number of births (data not shown). However, increased length of gestation in the first pregnancy was strongly and independently related to reduction in breast cancer risk (Table 2). A relatively short pregnancy of less than 32 weeks was associated with a 22% (95% confidence interval, –3 to 53%) higher risk of breast cancer than a full term pregnancy of 40 weeks or more. The increase in risk related to shorter length of gestation displayed, a consistent pattern across the range of gestational age (P for trend=0.02).

This large prospective study is based on linkage between reliable data from two established national registries (Irgens, 2000), and it is unlikely that selection or information bias could have influenced the results. Our findings indicate that the protection against breast cancer related to length of gestation.
cancer depends on the duration of exposure to pregnancy, and that there is no threshold effect after a length of gestation of about 30 weeks. Combined with the evidence that pregnancies stimulate the terminal differentiation of mammary cells (Russo and Russo, 1999), these findings could be useful for our understanding of how breast cancer occurs and how it could be prevented.

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### Table 2

Length of gestation in first pregnancy in relation to breast cancer risk

| Length of gestation | Cases | Women years | Rate ratio | 95% CI |
|---------------------|-------|-------------|------------|--------|
| ≥ 40                | 3467  | 7207178     | 1.0        | Reference |
| 37–39               | 1639  | 3231826     | 1.03       | (0.98–1.05) |
| 32–36               | 291   | 542795      | 1.11       | (0.97–1.19) |
| < 32                | 77    | 131883      | 1.22       | (0.97–1.53) |

In weeks. Adjusted for attained age (<30, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–80), calendar period of diagnoses (1967–76, 1977–1986, 1987–98), age at first birth (<20, 20–24, 25–29, 30–34, 35–39), and total number of births (1, 2, 3, 4, 5–16).