# The Relationship of Ovarian Dysfunction with Neoplasia and Life Span in Female B6C3F1 Mice Exposed to Chronic Low Dose-rate Radiation

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## Abstract

Carcinogenesis is one of the deadly effects of ionizing-radiation exposure and it is considered sex-dependent. We investigate the effects of hormonal changes in female B6C3F1 mice exposed to continuous low-dose rate gamma-rays on tumorigenesis and life span.

Female B6C3F1 mice continuously irradiated with low dose-rate (20 mGy/day) gamma-rays to a total dose of 3 Gy (irradiation period: 9 to 30 weeks of age), showed complete ovarian atrophy and loss of ovarian function. To examine the relationship of ovarian function with neoplasm development in various organs (ovary, adrenal gland, liver, lung and Harderian gland) and life span, we performed surgical transplantation of healthy ovaries onto female B6C3F1 mice post-irradiation exposure and the neoplasm incidence rates at 95 weeks of age were determined. Some of the mice were allowed to live out their natural life span.

Results show that incidence rates for neoplasms originating from the ovary, adrenal and liver were significantly increased in irradiated mice in comparison to the non-irradiated controls. Transplantation of healthy ovaries to irradiated mice alleviated incidence rates in these organs. This suggests that radiation-induced loss of ovarian endocrine function is a major factor in the development of neoplasms in these organs. There was no change in the incidence rates of neoplasms originating from the lungs and Harderian gland, suggesting no effect from the loss of endocrine function of the ovary. The life-span shortening in irradiated mice was also significantly alleviated by transplantation of the healthy ovary, suggesting that loss of ovarian endocrine function contributes to radiation-induced life-span shortening.

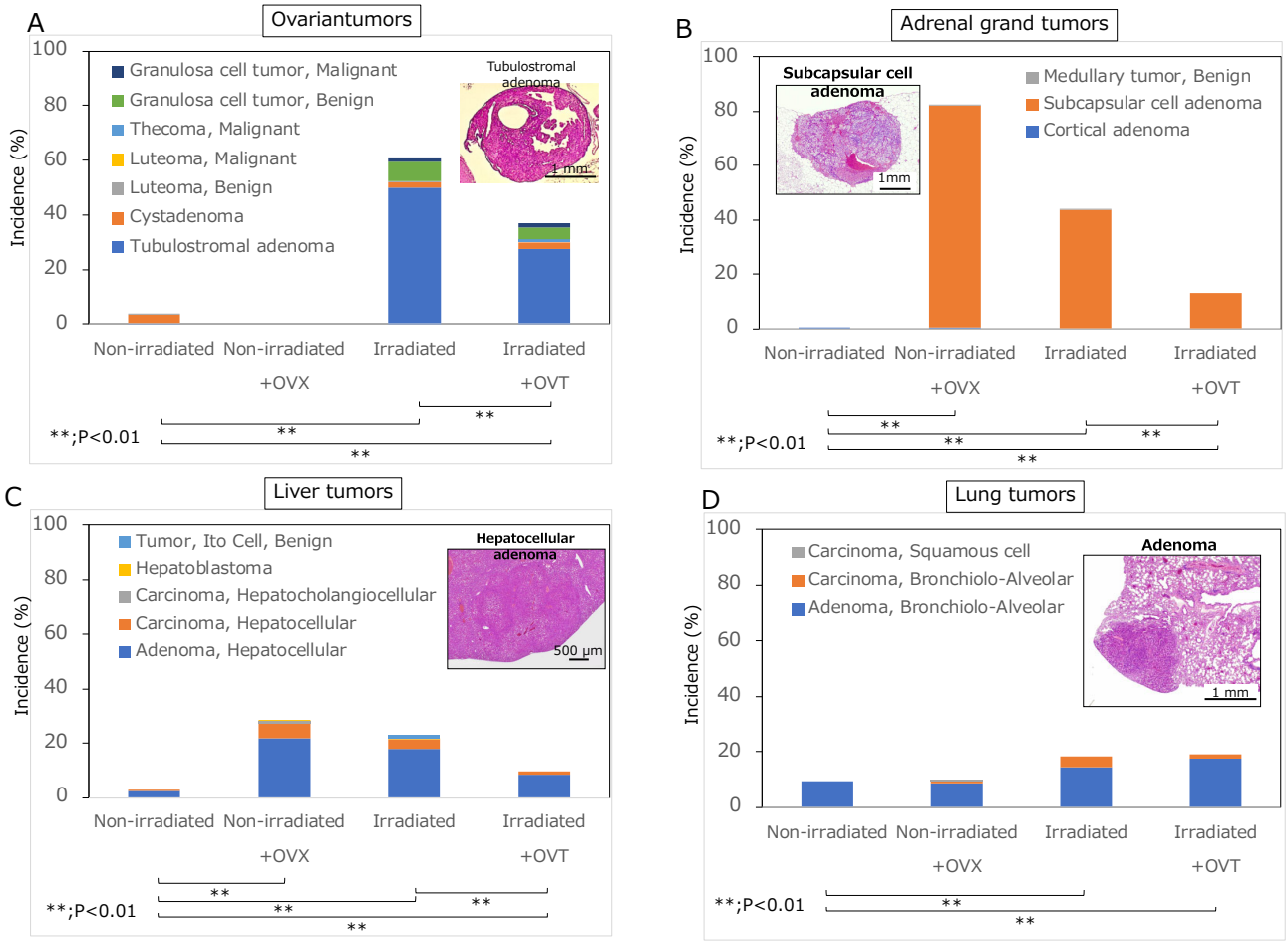


Fig. 1 Relationship between ovarian dysfunction and neoplasm incidence rates. A, ovary; B, adrenal gland; C, liver; and D, lung.

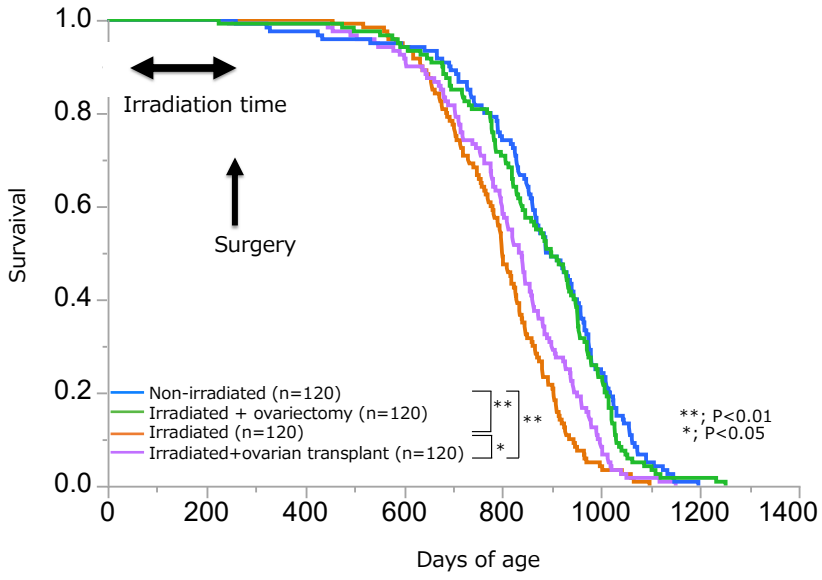


Fig. 2 Survival curves of non-irradiated, irradiated, ovariectomized and ovarian transplanted mice.