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Multiplied Risks of Second Breast Cancer

Breast cancer patients, whose direct relatives (mother or sister) are also affected by the disease, have a particularly high risk of developing a second breast cancer of independent origin. Epidemiologists of the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) have calculated this connection using data from the Swedish Family Cancer Register.

For their calculations, **Professor Dr. Kari Hemminki** and colleagues of the German Cancer Research Center used the data of 102,176 Swedish women who were diagnosed with breast cancer between the years of 1970 and 2000. As a reference value, the scientists chose the risk of women with no family history of breast cancer and without a second breast cancer. Their breast cancer risk was specified at a relative value of 1. Compared to this group, the risk of breast cancer patients with a family history of breast cancer (mother or sister affected) is elevated by factor 1.76. The risk of developing a second breast cancer is 3.4 for breast cancer patients with no family history. “If the causes for the first and the second breast cancer were the same, then both risks would be equal. But they are not,” says Hemminki, who heads the Division of Molecular-Genetic Epidemiology at the DKFZ. “The risk for the second carcinoma is substantially higher and can also not be accounted for by causes that are connected with the treatment of the first cancer.”

But when the scientists looked at breast cancer patients with a family history, they found an even higher risk for a second carcinoma of 5.48. This empirically determined value is a strong indication that the effects of the two independent risk factors, ‘family history’ and ‘first breast cancer’, become multiplied instead of added. “Genetic counseling of breast cancer patients should definitely take these data into account; for women with a family history, the risk of a second tumor in the breast is particularly high,” says Hemminki. “We assume the actual risk to be considerably higher. Our investigation covers only second tumors in the other, not yet affected breast. To these we should also add second tumors occuring in the breast that is already affected. But we do not have figures that are precise enough to do so.”

The researchers assume that the results of their investigation indicate that familial breast cancer and the occurrence of a second breast cancer have different causes. “From what is known today, we think it likely that there are genetic causes underlying in the first case, while in the second case it might be epigenetic ones.” The term ‘epigenetic factors’ usually refers to the binding of methyl groups to particular building blocks of the genes. “Epigenetic changes that occur after the first breast cancer diagnosis might predispose affected women particularly for developing a second breast cancer, while their relatives would have no risk elevation. Our next step will be to investigate the methylation status in tumor tissue samples in order to prove this connection.”

Kari Hemminki, Jianguang Ji und Asta Försti: Risks for Familial and Contralateral Breast Cancer Interact Multiplicatively and Cause a High Risk. Cancer Research, February 1, 2007

This press release is available at www.dkfz.de/pressemitteilungen

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