マンモグラフィーによる散乱放射線はがんリスクとはならない（Abstract # SSG02-07）

スクリーニングマンモグラフィーによる散乱放射線の被曝量は微々たるもので患者に対するリスクは無視できるものである

Scatter radiation from screening mammography is minimal with negligible risk to the patient

マンモグラフィーによる乳房周辺の被曝線量は無視できる程度であるか非常に低く、がんのリスクとはならないものであるとのスタディ結果が2012年Radiological Society of North America学会で発表された。散乱放射線の影響の可能性をより理解するために研究者らは、スクリーニングデジタルマンモグラフィー中に甲状腺、唾液腺、胸骨、子宮および水晶体の被曝量を計測した。スタディ対象群の女性207人それぞれが2方向のスクリーニングマンモグラフィー施行中に6つの光刺激ルミネセンス線量計を装着した。検査直後の線量計の解析の結果、乳房以外の数か所の被曝量は無視できる程度から非常に低い程度の範囲内であった。例えば、唾液腺や甲状腺への臓器平均被曝線量は0.05mGyと推定された。これらの放射線量は人々が浴びる自然放射線の一部に過ぎない。実際、胸骨以外の全ての部位の被曝量は年間自然放射線被曝量の2%未満であった。目から臍部にかけて計測された被曝量は微々たるものであった。研究者らは、マンモグラフィー施行の際の甲状腺シールドは不要であると述べている。

Full Text

The radiation dose to areas of the body near the breast during mammography is negligible, or very low, and does not result in an increased risk of cancer, according to a study presented at the 2012 annual meeting of the Radiological Society of North America (RSNA). The results suggest that the use of thyroid shields during mammography is unnecessary.

"Thyroid shields can impede good mammographic quality and, therefore, are not recommended during mammography," said Alison L. Chetlen, D.O., assistant professor of radiology at Penn State Hershey Medical Center.

During mammography, some X-rays scatter away from the primary beam in the breast and spread outward in different directions. Although this scatter radiation is much weaker than the primary beam, there has been concern that women exposed to it during mammography could face an increased risk of cancer, especially in radiosensitive areas like the thyroid gland.

To better understand the potential impact of scatter radiation, Dr. Chetlen and colleagues set out to measure the dose received by the thyroid gland, salivary gland, sternum, uterus and the lens of the eye during screening digital mammography. Each of the 207 women in the study group wore six optically stimulated luminescent dosimeters—a device used to measure an absorbed dose of ionizing radiation—while undergoing two-view screening mammography.

Analysis of the dosimeters by a medical physicist immediately after the exam revealed that the doses to the various areas outside of the breast ranged from negligible to very low.

The average estimated organ dose to the salivary gland was 0.05 mGy. The average estimated organ dose to the thyroid gland was 0.05 mGy. These doses are only a fraction of the radiation people are exposed to from natural background sources, such as cosmic radiation and radionuclides in the ground. In fact, all areas except for the sternum received less than 2 percent of annual background radiation dose.

Measured dose to the bridge of the eye and umbilicus was negligible, indicating no increased risk to the patient of cataracts or interference with normal embryonic development in early pregnancy.

"The risk of cancer induction at these low levels is indistinguishable from background incidence of cancer due to other sources," Dr. Chetlen said.

The findings are particularly important in light of a recent increase in the incidence of thyroid cancer, one of the most radiosensitive of all cancers. The number of thyroid cancer diagnoses in women nearly doubled from 2000 to 2008, leading some to suspect that mammography may be a contributing factor and that women should wear lead thyroid shields during exams, an idea that Dr. Chetlen and other mammography experts strongly discourage.

Based on the extremely low scatter radiation dose to the thyroid—equivalent to just a few minutes of background radiation—thyroid shields are unnecessary during mammography. In addition, the researchers warn that use of thyroid shields could result in an increased radiation dose to patients.

"A thyroid shield gets in the way of the exam and can actually cause an increase in radiation dose by necessitating repeat exams," Dr. Chetlen said.

Dr. Chetlen also pointed out that the thyroid gland is far less radiosensitive after age 30. The American Cancer Society and other organizations recommend that women have mammography screening once every year, beginning at age 40.
"In the age group eligible for screening, the thyroid gland is not very radiosensitive," Dr. Chetlen said.

Coauthors are Steven King, M.S., Karen Brown, C.H.P., D.A.B.R., Brian Lorah, Susann Schetter, D.O., Claudia Kasales, M.D., Shelley Tuzzato, R.T.R.M., and Shelly Rambler, R.T.R.M.

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