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Even low radiation doses in infants may reduce future cognitive function

Small amounts of radiation, equivalent to the doses used in CT scans of the skull, could adversely affect an infant's intellectual capacity in adulthood, according to a new study.

Swedish researchers studying the dose-related responses for both learning ability and logical reasoning found that the number of boys attending high school decreased in relation to the amount of ionizing radiation they had received as infants. Results of the study were published in the January issue of the British Medical Journal.

"This is the first study that shows effects at such low doses," said Dr. Per Hall, an associate professor of medical epidemiology and biostatistics at the Karolinska Institute in Stockholm.

Hall and colleagues examined the records of 4577 men who had received radiation therapy for cutaneous hemangioma before the age of 18 months at the Karolinska University Hospital between 1930 and 1959. The types of radiation included beta rays, gamma rays, and x-rays, with the most common type of treatment using applicators containing radium-226. X-ray treatment included contact therapy at less than or equal to 60 kVp.

Today's CT scanners deliver far higher doses of radiation than ordinary x-rays, and new techniques such as spiral CT scanning deliver even higher doses, according to Hall.

After excluding subjects who had missing information and records, Hall and colleagues were able to analyze 2551 for high school attendance and 2211 for cognitive function. They found a significant decrease in high school attendance in boys who had received radiation doses higher than 100 mGy compared with those who had received the lowest doses of 1 to 20 mGy.

The researchers also reported a significant decreasing trend in cognitive test results for concept discrimination, general instruction, and technical comprehension in relation to increasing radiation doses received as infants.

Comments published along with the original paper raised several questions about the study. One concern was the fact that most children having a CT head scan today would not be receiving doses as high as 100 mGy and that radiation exposure and machines in the past were notorious for inadequate shielding protection and inaccuracy.

Hall noted in response that a Swedish survey found radiation doses for a CT head scan in children to average 68 mGy, going as high as 130 mGy.

"We believe that there is a causal relationship between ionizing radiation at low doses and decreased mental capacity," Hall said.