New research suggests how low doses of radiation can cause heart disease and stroke

October 23 2009

A mathematical model constructed by researchers at Imperial College London predicts the risk of cardiovascular disease (heart attacks, stroke) associated with low background levels of radiation. The model shows that the risk would vary almost in proportion with dose. Results, published October 23 in the open-access journal *PLoS Computational Biology*, are consistent with risk levels reported in previous studies involving nuclear workers.

Cardiovascular disease is the leading cause of death and one of the leading causes of disability in developed countries, as reported in the paper and also by the World Health Organization (www.who.int/whosis/en/). For some time, scientists have understood how high-dose radiotherapy (RT) causes inflammation in the heart and large arteries and how this results in the increased levels of cardiovascular disease observed in many groups of patients who receive RT. However, in the last few years, studies have shown that there may also be cardiovascular risks associated with the much lower fractionated doses of radiation received by groups such as nuclear workers, but it is not clear what biological mechanisms are responsible.

The Imperial College London team, led by Dr. Mark Little, has explored a novel mechanism that suggests that radiation kills monocytes (a type of white blood cell) in the arterial wall, which would otherwise bind to monocyte chemo-attractant protein 1 (MCP-1). The resultant higher levels of MCP-1 cause inflammation which leads to cardiovascular disease. As well as being consistent with what is seen in nuclear workers,

the changes in MCP-1 caused by dietary cholesterol that are predicted by the model are also consistent with experimental and epidemiologic data.

If the mechanism is valid it implies that risks from low dose radiation exposures (e.g., medical and dental X-rays), which until now have been assumed to result only from cancer, may have been substantially underestimated, say the authors.

The biological mechanism has yet to be experimentally tested. Further research is planned to investigate this.

More information: Little MP, Gola A, Tzoulaki I (2009) A Model of Cardiovascular Disease Giving a Plausible Mechanism for the Effect of Fractionated Low-Dose Ionizing Radiation Exposure. *PLoS Comput Biol* 5(10): e1000539. doi:10.1371/journal.pcbi.1000539

Source: Public Library of Science (news : web)