Long term effects of radiation treatments on micro RNAs in mice

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In the course of irradiation experiments conducted at Argonne National Laboratory, IL between 1952 and 1992 led to creation of archives of paraffin embedded tissues accompanied by extensive datasets with gross pathology and histopathology information. Over the past 40 years these data and archived samples were investigated with every new technique available for work with paraffin tissues. We now decided to explore the paraffin embedded tissues by running a limited microarray experiment to evaluate micro RNA (miRNA) modulation in irradiated mice.
A custom made miRNA microarray, manufactured by High Throughput Genomics, containing a set of 42 miRNAs was tested with material isolated from archived tissues. We used spleen samples from 90 animals: controls, gamma-rayand neutron irradiated. These mice were exposed to different doses and dose rates of radiation; no samples with diagnosis of spleen cancer were included in the analysis.Animals were age matched to be 750-950 days of age at the time of death. In most cases that meant that these mice survived the last irradiation by more than two hundred days. Therefore, in this experiment we investigated late effects of radiation on miRNAs.
In most irradiated mice, majority of the 42 selected miRNAs were upregulated or unchanged at the time of death. Total numbers of de-regulated miRNAs were higher in animals exposed to protracted irradiation than those acutely irradiated. Since upregulation of miRNAs generally leads to downregulation of mRNAs, it can be assumed that the long term results of irradiation at the doses/does rates investigated lead to suppressed protein production. For example, upregulation of let7miRNAfamily (noticeably upregulated in archived mouse samples) is known to inhibit Ras mRNAs and carcinogenesis. It is possible that in mice selected for these experiments, increased let7b and let7f contributed to a healthy spleen status.

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