Archive building and interrogation of archived samples: new techniques and old materials

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A large collection of paraffin tissues was accumulated from an extensive series of irradiation experiments conducted on 7,000 dogs and 49,000 mice between 1950-1990's at Argonne National Laboratory. Paraffin embedded tissues from these animals represent a unique resource: large numbers of animals were exposed to different qualities of radiation, different doses and dose rates. In many cases these animals have been allowed to live out their entire life span after irradiation and at the time of death (in many cases years after completion of irradiation) tissues from these animals were embedded in paraffin and preserved for later studies. At present these tissues are located at Northwestern University and our laboratory has developed two websites with digitized information on every animal including radiation exposures (dose, dose rate, etc), pathology, symptoms, and health records. While much of this data comes from the same period when irradiations were done, we have begun to interrogate these samples using different types of imaging (from optical to X-ray fluorescence) and molecular techniques depending on DNA content (quantitative real time PCR).

To study effects of radiation on genomic and mitochondrial DNA we isolated DNA from tissue sections from archived samples and performed quantitative real time PCR amplification. This study revealed variations in mitochondrial gene copy numbers in different tissues and samples. Gene copy number variations produced by gamma ray versus neutron irradiation showed distinctly different patterns.

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