THE EFFECT OF IONIZING RADIATION ON CALF
THYMUS DEOXYRIBONUCLEOPROTEIN AS
A TEMPLATE FOR RNA SYNTHESIS

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The effect of ionizing radiation on calf thymus DNA and deoxyribonucleoprotein (DNP), which served as a template for RNA synthesis in vitro, was investigated.

The template activity of calf thymus DNA for RNA synthesis was rapidly reduced by irradiation. In unirradiated systems, the template activity of calf thymus DNP was observed to be only 10% of that of DNA. The template activity of DNP decreased by 7-irradiation at a dose lower than 5 Krads, whereas the template activity increased with a dose range from 10 to 30 Krads and decreased again at a dose higher than 30 Krads.

Only a small amount of protein, 2.65%, has been dissociated from DNP at a dose of 170 Krads.

In the presence of Ca\(^{2+}\), the template activity of DNP by 7-irradiation increased at a much lower dose than in the absence of Ca\(^{2+}\). Twice the dose was needed to enhance the same proportion of DNP in the presence of Ca\(^{2+}\) as in the absence of Ca\(^{2+}\). When Ca\(^{2+}\) was added to the DNA solution, no change of the dose-effect curve of the template activity could be observed, as compared with pure DNA.

The length of RNA chain synthesized was determined by sucrose gradient centrifugation. Using irradiated DNA as a template, the RNA chain size was distinctly reduced and the long RNA chain disappeared. Using irradiated DNP as a template, the RNA chain size was reduced, but a relative amount of the long RNA chain was left even at a high dose.

The author has obtained some evidence that the increase of the template activity of DNP by 7-irradiation is attributable to the labilization of the bond between the DNA and the protein on irradiation.