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R. D. O'Neill, Administrative Officer
Division of Biology and Medicine

October 29, 1953

ATTENTION: Miss Frances Lazer
D. L. Worf, Biophysics Research Analyst
Biophysics Branch, Division of Biology and Medicine

MONTHLY REPORT - OCTOBER 1953 - BIOPHYSICS BRANCH

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1. Shielding Studies (UNCLASSIFIED)

The problem of designing adequate shielding in x-radiation equipment must be coupled with that of economics. For the lower energy ranges the cost of shielding is a relatively unimportant factor. As the energy of radiation increases, however, the cost of personnel protection becomes a significant portion of the total cost. It is the objective of a study underway at the National Bureau of Standards to investigate any design factors which might reduce the cost of protection and at the same time determine with greater accuracy the validity of former assumptions, in order that more reliable calculations may be made. This work was undertaken to determine the shielding characteristics when the radiation from the source is incident to the shield at angles different from 90°. It has been the custom to handle this radiation by assuming that the thickness of the shield along the incident ray would provide the same protection regardless of the angle of incidence which the radiation source had with the shield. In this study it was shown that while utilization may be made of the oblique thicknesses in designing installations, care must be taken that in addition to the portion of direct transmission the contribution of scattered radiation must be considered. This latter component becomes significant as the angle of incidence increases since a fraction of the photons have shorter path lengths. Results from this study will be employed in the design of protective barriers for personnel operating cyclotrons, Vander Graaf generators, Cobalt-60, and radium sources used in research and therapy.

2. Use of P-32 in Sickle Cell Anemia Studies. Howard University. Dr. Herman Branson. (UNCLASSIFIED)

Sickle cell anemia, a serious blood disorder in which red blood cells assume an abnormal sickle shape, affects approximately one in 500 negro children. Howard University has been studying the blood from victims of this disease both as a means of increasing our understanding of this condition and for information concerning protein synthesis and the dynamics of phosphorous transfer in the blood. Investigators

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using P^{32} have shown that phosphate exchanges across the red blood cell membrane at a slower rate in sickle cells than in normal cells. The alkaline phosphatase in sickle cell anemia plasma is significantly higher than that in normal plasma. Initial studies on phosphate transfer using metabolic inhibitors indicate the absence of a certain enzyme from the sickle cell anemia blood. One of the most significant observations of this group on this problem is that one of the protein components of the plasma has a different mobility as determined by electrophoresis. This finding is being investigated further with additional electrophoresis equipment and under varying experimental conditions.

This work complements other investigations in which the globin part of hemoglobin in sickle cells is found to be different from that of normal cells.

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