

UNITED STATES GOVERNMENT

Memorandum

TO : Chief, Center Medical Programs/C. A. Berry, M.D. DATE: 15 February 1966

FROM : Director, Medical Science & Technology/S. P. Vinograd, M.D.

SUBJECT: Formulation of Apollo Medical Mission Rules with Reference to Ionizing Radiation

The following comments relate to your forthcoming consultations with Drs. Wright Langham and Douglas Grahn to establish Apollo medical mission rules with respect to flight crew exposure to ionizing radiation. In recent discussions with Drs. Langham and Grahn, it became evident that in order for them to give us maximal assistance in establishing medical operational guidelines on this subject, we (NASA) will have to be as specific as possible in stating our requirements and in providing sufficient background information to include most, or preferably all, of the factors which might influence our combined judgement. To that end, it is hoped that you will find these comments and suggestions helpful to you.

(1) Background information and philosophy would include our position with respect to the expected duration of activity of an astronaut, frequency of his participation as a flight crew member, mission changes which might be introduced during each mission if the situation warranted, general concept of the severity of situations which would warrant aborting a mission, and the possibilities of providing for extra shielding to the crew or to particular areas of their bodies, viz. eye shielding, various shielding devices to less protected areas, etc.

(2) It is suggested that the most useful dosimetry guides for the medical monitors to have would be information on both dose (in RAD-with computer conversion to REM from measured or expected quality factors-if within the state of the art) and dose rates as actually measured by dosimeters at the (a) skin, (b) eye (behind whatever shielding may be worn), and (c) by means of an integrated dosimeter which would measure five centimeter depth dose. It is suggested that this kind of dosimetry would indicate to medical operations the extent of ionizing radiation hazard to the man regardless of the type or source of radiation, i.e., whether protons, gamma, heavy particles, etc.

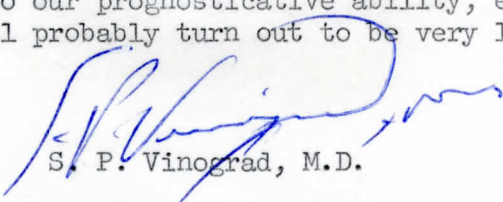
(3) It would be practical to request that three limits or narrow zones be defined for each mission. The first and lowest would be an "alert" level which would warn the medical operational team that ionizing radiation dosimetry had better be watched very carefully from that point on; secondly, a level which would indicate that a significant alteration of the mission or an abort is mandatory; and the third



and highest level which would be the maximum permissible level allowable for each mission. These three levels would have to be established for each mission and for both dose and dose rates for each of the three areas measured.

(4) It would be helpful for the medical operations network to have at hand a profile of anticipated ranges of ionizing radiation exposure in the same dose and dose rate measurements to be used during the actual mission. This would serve as an effective guide and basis for judgements (perhaps with the aid of consultants available by telephone) which might have to be made during the mission. Drs. Langham and Grahn might be asked to assist us in obtaining and setting forth this information.

With reference to this last point, we in Headquarters are taking additional steps to have the space mapping people translate the radiation environment information they have into biomedically useable form. This should contribute significantly to our prognosticative ability, even though the anticipated ranges will probably turn out to be very large.



S. P. Vinograd, M.D.

cc:

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Dr. W. E. Hull