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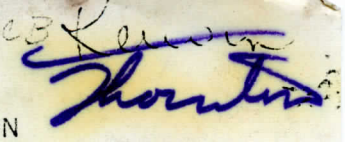

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS 77058

IN REPLY REFER TO: DA-69-M831

JAN 13 1970

MEMORANDUM TO: CA/Director of Flight Crew Operations

FROM : DA/Director of Medical Research and Operations

SUBJECT : AAP Medical Experiments M071 and M073

This is in reply to your memorandum on the same subject, dated October 8, 1969. Your concern over the operational feasibility of these complex AAP medical experiments is understandable and is fully appreciated. The experiments as presently configured in the existing documentation are not considered by the Director of Research and Operations to be finished products ready for implementation. Several features such as hardware development, vehicle integration of experiment equipment and mission planning still remain uncertain at this date and have important bearing on the ultimate way in which the experiments are conducted.

Your concerns have been expressed in terms of a heavy imposition on available crewtime and restriction of the flexibility of crew activity in the pre- and postflight control periods and concern over the difficulty anticipated in carrying out the proposed inflight procedures. The objective of these experiments is to obtain scientifically valid data concerning fluid, biochemical, and caloric balance in flight crewmembers under conditions that will clearly demonstrate changes which are due to exposure to the flight environment. This objective must not be compromised by arbitrary limitation of the extent of pre- and postflight control observations in the Apollo Applications Program. The importance of obtaining meaningful results from these experiments demands a thorough evaluation by all appropriate people at MSC of the essential features of crew training and preflight preparation practices as well as experimental design details. The difference between 23 days of preflight sampling and 10 days of preflight sampling needs to be objectively assessed in terms of impact on the experiment objective and impact on the ability of the crew to achieve full mission readiness. The manner in which crews prepare for Apollo Applications missions may have to be reevaluated, and, if necessary, changed if a period substantially longer than 10 days of preflight control is found to be vital to the successful

conduct of these experiments. The enclosed memorandum from the principal coordinating scientist for these experiments on the MSC medical staff indicates a clear understanding on the part of Dr. Rambaut of the operational realities associated with conducting these studies in the space flight environment. His comments indicate the same spirit of willingness to evaluate each factor objectively and solely in terms of enhancing the chances of mission success by the AAP astronauts. We believe the experiments can be conducted in a manner that does not impose excessive regimentation upon the crewmen who are participating as experimental subjects and yet preserve the essence of quantitative objective data collection which is essential to the success of this endeavor.

With regard to inflight procedures, the Medical Directorate is continuing to work with the Apollo Applications Program Office to achieve a satisfactory system for acquiring the necessary inflight data. We value the experience and judgment of the Astronaut Office in helping us determine the best approach to take with respect to manual versus automatic procedures in the workshop. We must seek a proper balance between the requirement of the Flight Crew Operations Directorate to keep medical tasks imposed on the crew to a minimum, a requirement of the Medical Research and Operations Directorate to obtain highly accurate data reliably and the requirement of the Apollo Applications Program Office to develop the experiments within severe time and budget constraints. The Medical Directorate has consistently advocated automated equipment for urine volume measuring and sample collecting functions. Time and cost factors must however now be recognized in developing equipment for the conduct of these experiments as assigned on AAP flights. Certain functions involved in the urine sampling and labeling process are amenable to automation and are being evaluated for implementation at this time. The Medical Directorate position that a fully automated urine volume measuring and sample collecting system should be the primary method under development for AAP, with use of the small mass measuring device as a secondary or fall-back technique, has not been accepted as valid by AAP porgram managers in Headquarters, MSFC, and MSC. The Medical Directorate is preparing a formal case presentation championing the development of an automated system and will seek support from the Astronaut

Office in documenting the premise that an automated system is much more than an expensive nicety supporting the successful accomplishment of this series of experiments.

In summary, the firm position of the Medical Research and Operations Directorate is that AAP medical experiments M071 and M073 are vitally important measurements that have been carefully selected to assist in accomplishing the major objective of the Apollo Applications Program, namely, to demonstrate man's capability for extended space missions. The necessity of conducting these experiments on the 28- and 56-day manned AAP missions have been reviewed and endorsed by NASA management and by outside medical advisory groups. The specific implementation procedures for these experiments are not firmly established in every detail at this point in time; they are being continuously reviewed in an effort to obtain the most meaningful scientific data possible, consonant with sound operational procedures. The principal coordinating scientist for these experiments, Dr. Paul Rambaut, serves as a team leader and a focal point for collating the requirements and concerns of the scientific investigators, the capabilities of the hardware available to implement the experiments, and the requirements and concerns of the crewmembers who must serve as experimental data gatherers and subjects in the conduct of these inflight studies. Your assistance is essential to the success of these studies, which in turn will have vital bearing on future course of our manned space flight program. It is requested therefore that you appoint a representative authorized to speak for your Directorate to work with Dr. Rambaut toward a satisfactory solution of the issues that you have raised in your memorandum. It is of paramount importance that you recognize these experiments as a major objective of the Apollo Applications Program and assist the other interested MSC elements in achieving as a feasible, worthwhile end product, an experimental design that is scientifically sound and operationally satisfactory.

Charles A. Berry M. D.

Charles A. Berry, M. D.

Enclosure
Memo DC/11/M39/69