

CA

Dr. James W. Humphreys, Jr.  
Director of Life Sciences  
National Aeronautics and Space Administration  
Washington, D. C. 20546

Dear Jim:

In reference to your letter of December 22, 1970, regarding the space flight experiment proposal of Astronaut-Physician Donald L. Holmquest, the Center is evaluating funding a program to develop the techniques as proposed by Dr. Holmquest utilizing supporting research and technology funds. Following further definition and development of this program, a Research and Technology Objective and Plan (R T O P) will be submitted to the Office of Manned Space Flight.

Relative to your concern on coordinated medical activities at MSC, I can assure you that <sup>if</sup> the Center embarks on any medical program, it will only be done after thorough consideration and with the ~~agreement~~ <sup>approval</sup> of Center Management.

Sincerely,

Robert R. Gilruth  
Director

cc: NASA Hqs, D. D. Myers, M

CA:MJBockting:gbn 1-12-71  
Rewritten:AC:GWSAbbey:cf 1-21-71

CONCURRENCES:

CA/Dr. Slayton

DA/Dr. Berry



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
WASHINGTON, D.C. 20546

Dec 24 10 48 AM '70

REPLY TO  
ATTN OF: MM

DEC 22 1970

ACTION AC

INFO AA, AS

CC: DA, CA, CB / Holmquest

Dr. Robert R. Gilruth  
Director  
Manned Spacecraft Center  
National Aeronautics and Space Administration  
Houston, Texas 77058

Dear Bob:

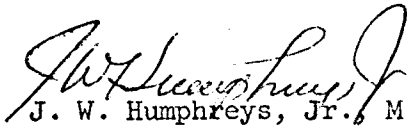
We have had the opportunity recently to review a proposal for a Space Flight Experiment submitted by Astronaut-Physician Don Holmquest. It is most gratifying to see this level of interest by one of our medical flight crew members and we desire to encourage such efforts. I am sure you agree that providing a capability for these men to continue their professional growth through the performance of quality research is a very desirable objective.

The advanced measurement technique proposed by Dr. Holmquest was one of the subjects reviewed recently by the Calcium Dynamics Panel of the National Academy of Sciences Space Medicine Committee. This Panel has not reviewed Dr. Holmquest's proposal but only the technique itself. This group concluded that the method appeared promising but had not reached the degree of maturity or refinement necessary to commit it to a space flight experiment status. In essence, the Panel recommended that the technique needs further support in a category which we in NASA would call SR&T work.

As I indicated, we would like to insure that funds are available for this type of support. At the same time, it is equally important that the work be done in a manner fully integrated with the other Life Sciences work within the Center. I am not clear what the mechanisms within MSC are for gaining such integrated actions. I do believe that all medical efforts at MSC should be under the cognizance of Dr. Berry. At the same time, I recognize that Dr. Holmquest, as well as the other astronaut-physicians, are located in Mr. Slayton's Directorate. I would appreciate your advice regarding the mechanisms to be followed for gaining the appropriate support and for assuring that all medical efforts at MSC receive proper coordination among the various directorates.

While this is a specific situation, I can envision the need for a clear statement of the procedure to be followed for similar future proposals from other astronaut-physicians as their interests are defined and approved by your Center.

Sincerely yours,



J. W. Humphreys, Jr., M.D.  
Director of Life Sciences

cc: M/Mr. Myers  
MSC-DA/Dr. Berry  
MSC-CA/Mr. Slayton



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
WASHINGTON, D.C. 20546

REPLY TO  
ATTN OF: MM

DEC 22 1970

Dr. Donald L. Holmquest  
Astronaut Office  
Manned Spacecraft Center  
National Aeronautics and Space Administration  
Houston, Texas 77058

Dear Don:

I have received additional information since my December 3 memo to you regarding the technique you plan to use in your development of the experiment "Analysis of Body Composition." I will summarize this information and propose recommendations for your future actions which reflect this new data.

The Space Medicine Committee of the National Academy of Sciences received a verbal report from the Ad Hoc Review Panel on Calcium Dynamics at the December 10 meeting in Boston. The review covered the entire area of NASA supported studies of calcium metabolism. Included in their report were comments on the measurement technique "Neutron Activation," which the Panel said appeared quite interesting and promising. They also said that the technique was still in an early phase of research and not ready for consideration for experiment definition. They felt that accuracy currently obtainable is no more than that obtained by Don Whedon on Project Gemini. They suggested that NASA or someone should pursue the development of this technique due to its promise.

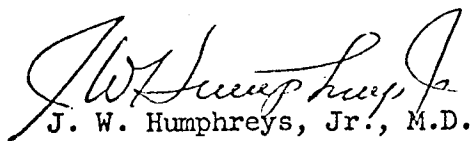
In view of the opinion of the scientific panel, I conclude that I was too optimistic in suggesting that your proposal was ready for experiment definition. Their assessment of the state of development of the "Neutron Activation" technique, indicates that your initial work should be accomplished under the NASA SR&T Program. The problem now is one of obtaining the necessary funds and the inhouse technical support that you will require for the study program.

Research projects with the SR&T Program are documented through a Research and Technology Objective and Plan (RTOP). I do not know whether the Medical Research and Operations Directorate (MR&OD) at MSC has a current RTOP which could embrace your proposed work. If they do, a finding should be made as to whether current funds can be made available by MSC to get the initial phase underway during

the remainder of the fiscal year. If not, a new RTOP reflecting what you propose to do during the remainder of the fiscal year should be prepared with MR&OD and submitted through channels to the Director of Life Sciences, NASA Headquarters, for approval. A new submission should also reflect a funds availability statement. New SR&T funding, this late in the year, will be difficult to obtain. However, if this is required, we will do our best to help you. Planning for Fiscal '72 and beyond should be made as part of the Center's annual program submission.

I realize that you have followed a tenuous and long trail to get this work underway. It is my desire that physician-astronauts have the opportunity to grow professionally as they continue in the Astronaut Program. The NASA Life Sciences Program, being mainly a research and development effort, should provide an opportunity for all of you to perform quality research as an essential part of the professional advancement program. I am using your proposed effort as a way of defining the methods for obtaining such support. I ask your patience as we work out your immediate problem since it will provide the format for all of you for the future. I am working this overall problem directly with your Center Director. I hope that these delays will prove worthwhile.

Sincerely yours,

  
J. W. Humphreys, Jr., M.D.  
Director of Life Sciences

cc: ✓ MSC-AA/Dr. Gilruth  
MSC-DA/Dr. Berry  
MSC-CA/Mr. Slayton  
ML/Mr. Schneider

DEC 3 1970

Dr. Donald L. Holmquest, M.D., Ph.D.  
Astronaut Office  
Manned Spacecraft Center  
National Aeronautics and Space Administration  
Houston, Texas 77030

Dear Don:

Enclosed is a copy of the comments from the NASA Director of Life Sciences to the Skylab Program Office (Enclosure 1) on your proposed experiment, "Analysis of Body Composition." These comments were in response to two Skylab questions:

1. Could the proposed experiment replace the presently scheduled M071 and M072 on Skylab?

2. Are there problems of this experiment meeting the Skylab schedule?

In view of the problems we summarized in our reply to Skylab, our answers to both of these questions had to be one of discouraging the Skylab crew considering the experiment as an integral part of their experiments program.

Your proposed experiment, when removed from the Skylab context, offers an interesting new approach for tackling a difficult but important space flight biomedical research area. As you know, the body mineral and metabolic changes have been observed during space flight and ground tests. Interpretation of the importance and the course of these changes have received continuing attention from the many scientific groups which review our program. The expected outcome of these changes is still considered a controversial subject. NASA must perform careful flight-related studies in this area which will answer the outstanding questions of future, long duration, weightless manned flights we to receive approval. Your proposed technique offers an interesting potential for improving the quality and simplicity of these studies. Your new ideas for upgrading your experimental proposal, which you discussed with Colonel Stanley White of my office, appear to offer additional significant improvements. I want to encourage you to continue your efforts.

Your proposed changes in the content, approach and management represent sufficiently large variations from that presently in the Experiment Implementation Plan (EIP) for us to conclude that the present EIP no longer applies and should be withdrawn. I recommended that the experiment be redrafted and submitted for consideration for support in the definition phase. The guidelines for preparing a proposal for definition by someone in NASA are unclear, therefore I am enclosing a copy of the guidelines given to universities by the NASA Office of University Affairs for them to use in preparation of such proposals (Enclosure 2). This spells out the essential content of the proposal and will apply to your proposal as well. I recommend that you also keep the EIP format and content in mind while preparing your new proposal because eventually the experiment will be required to follow this format when the definition effort progresses sufficiently to warrant submission to the NRPED for Flight Program assignment.

After preparing your proposal, it should be coordinated with the Medical Research and Operations Directorate upon whom we depend for action on all bioscience experiment efforts within MSC. Following completion of MSC actions, the proposal should be submitted to EML, Headquarters Director of Life Sciences, the Headquarters sponsoring office for bioscience experiments, for formal review and approval for support.

In redrafting the experiment, you may also wish to consider including an in-flight test program as well as the current pre- and post-flight studies. This would permit the new techniques, if it proves successful, to be considered as a replacement for the current series of metabolic and mineral balance experiments.

Sincerely yours,

ORIGINAL SIGNED BY:  
 J. W. Humphreys, Jr., M.D.  
~~Director, Space Medicine~~  
 J. W. Humphreys, Jr., M.D.  
 NASA Director of Life Sciences

Enclosures  
 cc: M10/ Mr. Holbach  
 M10-11/Dr. Harry  
 M10-CA/Dr. Hrytka  
 M1/Dr. Schneider

*See*  
 HES:Col. White:jgc:12/3/70:X20401

MM

NOV 25 1970

TO: ML/Director, Skylab Program

FROM: MM/Director, Space Medicine

SUBJECT: Comments on Proposed Medical Experiment, "Analysis of Body Composition"

My staff has reviewed the proposal, "Analysis of Body Composition," which you forwarded and has discussed the proposal further with Dr. Holmquest. The following comments resulting from these actions are submitted:

1. BACKGROUND

a. The proposal expects to undertake a pre- and post-flight analysis of calcium, phosphorous, potassium and nitrogen using a technique of neutron scintillation counting.

b. Neutron scintillation counting is a relatively new technique for measuring these elements within the body. The literature on this approach is primarily in the 1960's with emphasis toward the last half of the decade. The clinical field has been actively comparing this new method with the more traditional metabolic balance technique, as proposed in M071 on Skylab, and has not arrived at a point where one technique is accepted as a replacement for the other.

c. The proposed experiment expects to measure only the pre- and post-flight status of the chemical elements noted above. There is no proposed in-flight element of the experiment presently, although the proposal does recommend that in-flight neutron scintillation and counting should be considered for the future.

2. SPECIFIC COMMENTS

a. The limitation of the proposal to pre- and post-flight examination causes the proposal to be complementary to the M070 series of experiments rather than a replacement for them. It will provide another method for obtaining the resultant of the calcium mobilization associated with exposure to weightlessness. It will give no data on the time course of events and limited information on the premise that



calcium will be differentially mobilized from bones depending upon their activity or stimulation. The present M071 and M072 experiments propose to begin data collection to answer questions for all of this area. The proposed experiment, to achieve the current goals, would need to be carried out in-flight as well as pre- and post-flight.

b. There are several major problems with the proposed experiment that need definition and resolution before the experiment should be considered for flight program assignment. They are:

(1) Astronaut Holmquist recommends that development be undertaken to produce new neutron scintillation technique and equipment that will permit the test to be performed with the same accuracy and reliability as now in the laboratory while giving the crewmen one-half the present radiation dose. This is potentially a big and risky undertaking for a tightly scheduled program.

(2) Astronaut Holmquist is in the process of rewriting the Experiment Implementation Plan (EIP) to propose shifting the primary measurement from calcium to that of phosphorous and potassium, thereby, hoping to simplify the method. This is certainly a move to be encouraged scientifically but has not been done as yet and will require extensive ground based study to verify the approach and obtain a sufficient base to validate any flight associated results.

(3) The new EIP will also propose to change the major center of activity of this experiment from the University of Washington, Seattle, to the Houston area. This is being proposed to offset the time criticality for meeting the Skylab schedule. This change has a serious potential for becoming a problem by taking an experiment proposal from an outside scientific group and moving it into NASA. The scientific community has become quite sensitive to previous NASA actions along these lines. It will cause a delay in the onset of work due to Houston needing to build a new capability for performing the work competently. This move at a time when the scientific content and approach are also being changed bodes delay and problems for Skylab.

(4) This experiment has not been integrated or implemented with the MSC MRS&OD, the action agent at MSC for biomedical experiments as yet.

(5) The experiment has not been reviewed by an outside NASA scientific group, a prerequisite for Space Medicine recommendation of an experiment as ready for the SCIENCE.

### 3. CONCLUSION

a. It can only be concluded from the magnitude of the problems still outstanding that this experiment has not completed the definition phase sufficiently to be seriously considered for Skylab support. (Completion of definition phase, as used by the Directorate of Space Medicine, means that the specific experimental concept and/or techniques to be used in the experiment are selected and demonstrated in sufficient detail that NASA may judge the scientific merit of the experiment, understand the risk of proceeding into development, and provide sufficient cost and scheduling data to permit NASA to weigh scientific merit against the costs. Scientific merit is judged by both the NASA and an outside scientific evaluation. None of this has been completed on this experiment).

### 4. RECOMMENDATIONS

a. Skylab recommend that Dr. Holmquest undertake the rewrite, definition and subsequent development of the experiment through the normal NASA experiment development process. Skylab should not consider recommending the experiment to the NSPEB.

b. If progress in concept and definition phases is sufficient to warrant it, Skylab program schedule may entertain a proposal later to permit pre- and post-flight measurement of the crew using this technique. Costs for the measurement, at that late date, should be included in the experiment definition funding being used.

SIGNED:

J. W. Humphreys, Jr., M.D.

cc: MSC-CB/Dr. Holmquest

MMS:SCWhite:srm:11-24-70:X20401