

Detailed Test Objectives

I. EXPERIMENT

- A. Mineral balance (M071)
- B. Principal Coordinating Scientist: Paul C. Rambaut, Sc.D.
- C. Principal Investigator: G. Donald Whedon, M.D.
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II. PURPOSE AND BACKGROUND

- A. The purpose of this experiment is to measure the gains and losses of various metabolic constituents from the body and to measure changes in the circulating levels of several metabolites of significance in assessing nutritional status and musculoskeletal function.

Ground-based control data is required on the effect of various Skylab environmental parameters on nutrition and musculoskeletal metabolism. This is necessary in order that the effect of weightlessness, achieved in Skylab itself, may be accurately resolved from all other confounding variables. Prolonged performance of the M071 experiment under simulated Skylab conditions is also required to obtain accurate knowledge on the functioning of various items of Skylab hardware - in particular, the Skylab Food System.

III. PARTICIPANTS

- A. Three crewmembers will be required commencing 21 days prior to the chamber test, throughout the chamber test and for a period lasting for 18 days after the chamber test.

A minimum of three crewmembers is required to perform all experiment operations in order to acquire adequate statistical data.

IV. FUNCTIONAL OBJECTIVES

For every day throughout the test period, the following information is required for each crewmember:

- A. All food consumed
 - B. All water consumed
 - C. All urine excreted
 - D. All feces excreted
 - E. Three blood samples prior to chamber entry, three blood samples during chamber occupation, and samples during the period following chamber testing.
- Blood samples will be 15 ml each.

V. TEST CONDITIONS

The environmental requirements must be as similar as possible to those which will pertain in the Skylab Orbital Work Shop.

There are no crew constraints other than the requirement to record and report all fluid and nutrient intake and all metabolic excretions. The crew is also required to take blood samples.

VI. HARDWARE REQUIREMENTS

The hardware required for this experiment includes the following: Waste Management System, Skylab Food System, Specimen Mass Measuring Device, scales for body weight determination and blood sampling equipment.

The purpose of the hardware identified above is to provide adequate and controlled nutrient intake, to quantitatively collect all metabolic excreta, and to obtain mass measurements of the body, food and fecal samples.

There is no GSE other than that identified above.

There is no applicable grant.

VII. CHAMBER INTERFACES

A 6 day supply of food must be stowed within the chamber either in freezers or in ambient stowage containers.

VIII. CREW TRAINING

Two briefings of 1 hour each are required prior to the commencement of the pre-test control period. These briefings should preferably be conducted two weeks prior to commencement of this period.

IX. SCHEDULING REQUIREMENTS

This experiment will be performed every day throughout the test period at the time that physiological requirements dictate except that urine pools will be closed following

the first micturation of the day and body mass measurements will be made immediately after the first micturition of the day.

X. DATA REQUIREMENTS

The unique measurements required by this experiment are: mass measurements on food and fecal samples. All other data will be generated following analysis by the appropriate analytical facility of food, excreta, and blood.

In order to adequately interpret the M071 Mineral Balance Experiment, all other physiologically significant data should be made available to the Principal Investigator of M071. This includes, in particular, data from the M073 Experiment, Bio-Assay of Body Fluids; M078, Bone Mineral Measurement; M110, Hematology and Immunology; M092, Inflight LBNP; M131, Human Vestibular Function; M171, Metabolic Activity, and M072, Body Mass Measurement.

Data pertinent to food intake and metabolic excretion must be transmitted to the experiment on a daily basis.

XI. FDF REQUIREMENTS

XII. DEVIATIONS FROM APPROVED SKYLAB EXPERIMENT

No deviations from the approved Skylab experiment are required with the exception that blood samples will be drawn during chamber occupation.