

# SKYLAB MEDICAL EXPERIMENT ALTITUDE TEST

## DETAILED TEST OBJECTIVE

### I. EXPERIMENT/OPERATIONAL SYSTEM

A. Title: Microbiology

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### II. PURPOSE AND BACKGROUND

#### A. Purpose of Experiment

1. Obtain and evaluate data for man and the environment which reflects the effects of the ground-based Skylab environment on infectious disease and crew health status.
2. Accumulate data relevant to the validation of assumed optimal limits for the microbial content of Skylab foods.
3. To identify non-flight mediated alterations which might be confused during the actual Skylab missions.

#### B. Justification for Experiment

The protocols devised for SMEAT and Skylab will draw heavily on the data and experience gained from Apollo missions. These studies are required to identify microbial alterations mediated by such factors as confinement, diet, restricted activity and environmental parameters which are characteristic of the Skylab environment but are not peculiar to space flight. The effects of these factors must be understood before rational interpretations of Skylab results can be made.



### III. PARTICIPANTS

#### A. Number of Crewmen Required

All three SMEAT crewmen will participate.

#### B. Function of Each Crewman

One to perform tasks and one to serve as alternate. All will submit specimens as shown under Section IV Scheduling Requirements.

### IV. FUNCTIONAL OBJECTIVES

F01 To evaluate the Skylab crew microbiology protocols

F02 Determine aggregate effects of Skylab environmental parameters on the microbiota of crewmembers

F03 To identify non-flight mediated microbial alterations not related to 0 gravity

F04 Ascertain and determine the significance of transfer of microflora between crewmembers

F05 Determine effects on immune status and competence as shown by changes in the quantity and quality of antibodies

F06 Obtain statistically significant data on the quantitative and qualitative microbial content of all Skylab food items

F07 Define the "normal" (baseline) oral and fecal flora of test subjects and observe significant changes attributable to dietary intake

F08 Observe overt effects of microflora changes on crew health and/or identify biological trend data having significance for extended duration missions

F09 Document any quantitative shifts in populations of microorganisms in Skylab food during the useable life of the food



V. TEST CONDITIONS

A. Environmental Requirements

None

B. Crew Constraints

*what are they*

1. The timelines and regimens prescribed for Skylab during the preflight, inflight and postflight mission phases should be followed.
2. The MSC approved Preflight Crew Health Stabilization and Postflight Crew Health Normalization programs will be utilized preflight and postflight.
3. Only approved Skylab food items may be consumed from T-21 through R+18.
4. Only approved Skylab personal hygiene regimens are to be utilized during the test.
5. Entire defecation shall be collected according to Section IX, Scheduling Requirements, in sterile container.
6. Each crewman shall provide two swabs of Tonsillar fossae and posterior pharynx; each immersed in 5 ml of diluent, according to Section IV, Scheduling Requirements.
7. Each crewman shall gargle and wash throat, mouth and teeth with 60 ml of diluent, and provide this washing according to Section IX, Scheduling Requirements.
8. Each crewman shall collect a 60 ml sample of midstream urine upon arising according to Section IX, Scheduling Requirements.
9. Each crewman shall provide two skin swabs of each of 7 sites; each immersed in 5 ml of diluent, according to Section IX, Scheduling



V. TEST CONDITIONS (Cont'd)

B. Crew Constraints (Cont'd)

10. Each crewman shall provide a blood sample in accordance with the blood withdrawal schedule, SMEAT Hematology Program.
11. Illness events will require the collection of additional appropriate specimens as soon as possible after the onset of illness.
12. While in chamber, the crew will be required to obtain and pass out specimen materials as outlined in Section IX, Scheduling Requirements, as soon as possible. During the pre and post chamber periods specimens will be provided to the P.I. as soon as possible.

VI. HARDWARE REQUIREMENTS

*When where How*

A. Identification and Purpose of Hardware

<u>Item</u>	<u>Purpose</u>
Specimen Containers	For the collection of biological samples generated by the crew.
Swabs	For the prescribed method of obtaining throat and skin samples.
Media	For the preservation of samples.
SkyLab Food Chiller or Equivalent	For interim storage of specimens.

B. Identification and Purpose of GSE

None



## VII. CHAMBER INTERFACES

### A. Stowage Requirements

Approximately 2 cu. ft. of space for stowage of materials for the collection of specimens is required.

### B. Special or Unique Interfaces

1. A transfer lock will be required. This lock shall have a sterilization capability and a controlled transfer procedure that ensures minimum entrance of ambient air into the chamber.
2. Additional Skylab food shall be available in order to obtain statistically significant data on the quantitative and qualitative microbial content of the Skylab food items.

This food shall be in addition to the required foods for the SMEAT chamber run.

## VIII. CREW TRAINING

Briefing and training sessions shall be in accordance with the requirements as specified in the SMEAT Crew Training Program.

## IX. SCHEDULING REQUIREMENTS

### A. Pre-Chamber

Specimen	DAY									
	T-63	T-56	T-49	T-42	T-35	T-28	T-21	T-14	T-7	T
Feces (a)	X		X		X		X		X	
Urine (b)	X		X		X		X		X	
Throat (c)	X		X		X		X		X	
Skin (d)	X		X		X		X		X	
Gargle (e)	X	X	X	X	X	X	X	X	X	
Blood (f)							X			

Contingency  
Specimens

Illness events will require the collection of additional appropriate specimens as soon as possible after the onset of illness



IX. SCHEDULING REQUIREMENTS (Cont'd)

B. In-Chamber

Specimen	DAY							
	T+7	T+14	T+21	T+28	T+35	T+42	T+49	T+56
Feces (a)	X		X		X		X	
Urine (b)	X		X		X		X	
Throat (c)	X		X		X		X	
Skin (d)	X		X		X		X	
Gargle (e)	X	X	X	X	X	X	X	X
Blood (f)		X		X		X		

Contingency  
Specimens

Illness events will require the collection of additional appropriate specimens as soon as possible after the onset of illness

C. Post Chamber

Specimen	DAY						
	R+0	R+7	R+14	R+21	R+28	R+35	R+42
Feces (a)	X		X		X		X
Urine (b)	X		X		X		X
Throat (c)	X		X		X		X
Skin (d)	X		X		X		X
Gargle (e)	X	X	X	X	X	X	X
Blood (f)	X			X			

Contingency  
Specimens

Illness events will require the collection of additional appropriate specimens as soon as possible after the onset of illness

LEGEND: (a) Collect entire defecation

(b) Collect 60 ml. midstream upon arising

(c) Two swabs of tonsillar fossae and posterior pharynx

(d) Two swabs of each of seven sites

(e) Gargle and wash throat, mouth and teeth with 60 ml of diluent

(f) Blood samples will be provided in accordance with the blood



X. DATA REQUIREMENTS

A. Experiment Measurements List

Bacteriological related measurements will be performed (by analyses) outside of the chamber to provide the following data:

1. Microbial load of each crewmember
2. Amount of microflora transfer between crewmembers
3. Changes in quantity and quality of antibodies
4. Quantitative and qualitative microbial content of food items
5. Shifts in food microorganism population
6. Changes in oral & fecal flora of crewmembers
7. Identification of microflora changes

B. Unique Measurements to SMEAT

This entire experiment and its measurements is unique to SMEAT.

C. Data from Other Experiments

None

D. Other Requirements

1. Logs

In-chamber microbiological logs are required.

2. Voice

None

3. Computer Programs

None

4. Display Requirements

None



XI. FDF REQUIREMENTS

A timeline of daily activity will be required along with in-chamber operating procedures.

XII. DEVIATIONS FROM APPROVED SKYLAB EXPERIMENT

The food study will not be performed on Skylab nor will the collection of specimens be performed, except as provisioned for by IMSS, during the inflight phases of a mission.