

Frome 6176

SKYLAB MEDICAL EXPERIMENTS ALTITUDE TEST

DETAILED TEST OBJECTIVE

I. EXPERIMENT

Study to Define and Verify the Personal Oral Hygiene Requirements for Extended Manned Space Flight.

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II. PURPOSE AND BACKGROUND

a) Purpose of Experiment

1. To monitor and compare microbial population dynamics in various oral microenvironments before, during and after extended isolations in land-based space simulators, and
2. To determine clinically the effects of a space simulated environment on oral health and preexisting disease.

b) Justification.

Detectable changes in the oral microflora usually precede clinical changes and are a prerequisite to most acute and chronic oral pathoses (mucositis, dental caries and periodontal disease).

The oral cavity can serve as a portal of entry for pathogenic agents, may act as a reservoir for infectious microorganisms, and can play a prominent role in cross contamination and disease transmission.

The oral clinical examinations are essential for identifying changes in tissue integrity of both microbial and nonmicrobial origin.

III. PARTICIPANTS

The principal investigators and members of their staff will perform all procedures except where specimens have to be collected within the chamber under test environment. In flight specimens will have to be collected by a designated crewman.

IV. FUNCTIONAL OBJECTIVES

Changes in the oral microflora will be detected by the isolation and enumeration of culturable microbes from 4 intraoral specimens: residual saliva, stimulated saliva, crevicular fluid, and dental plaque. Up to 12 microbial categories will be studied from each specimen utilizing a variety of selective and differential culture media. Definitive characterization will only be performed on those microorganisms which display pronounced and/or persistent increases. Similar consideration will be given to recovery of microorganisms unique to oral microcosms.

All specimens will be collected semiweekly 14 days prior to flight, weekly during flight and semiweekly for 14 days post flight on each crewman.

Immediately upon collection, the samples will be placed in cracked ice and brought to the University of Texas Dental Science Institute, Houston, Texas for processing.

Clinical examinations including x-rays, intra-oral photographs, plaque scores, inflammation and oral health indices will be performed just prior to flight and immediately and 14 days post flight. These examinations will be carried out in the existing dental unit at M.S.C.

Details of all microbiologic and clinical procedures are described in the Technical Section of the original Contract Proposal No. BG721-8-8-450P and in subsequent Progress Reports to NASA under the title: Study to Define and Verify the Personal Oral Hygiene Requirements for Extended Manned Space Flight.

V. TEST CONDITIONS

a. Environmental Requirements

Oral specimens can be collected in a space large enough for two individuals to stand and with adequate lighting to see intraoral structures. Bench or table space will be needed to hold a specimen tray of approximately 1 square foot.

The pre and post flight clinical examinations can be performed in existing dental units at M.S.C.

b. Crew Constraints

Approximately 10 minutes per crewman will be required for each semiweekly sample collection starting 14 days prior to flight. Three of the specimens will have to be collected by a principal investigator or by a designated crewman. One specimen, stimulated saliva, is collected by each crewman chewing and expectorating for approximately 5 minutes. Weekly flight samples and semiweekly post flight samples will require the same crew constraints as the pre flight sample collections.

One oral clinical examination requiring approximately 45 minutes will be performed on each crewman within 14 days pre flight period and immediately and 14 days after chamber isolation.

VI. HARDWARE REQUIREMENTS

All hardware will be furnished by the principal investigators except for that pertaining to on site fixed dental equipment necessary for clinical examinations. The identification and purpose of this hardware has been described previously (refer to contract proposal and progress reports to NASA under title).

VII. CHAMBER INTERFACES

If in flight samples are to be collected within the chamber environment, sampling instruments, collection containers and transport or diluting media will be maintained in a tray requiring 1 square foot of chamber space.

Oral specimens need to be collected at the same hour and day each week either prior to or three hours following food and water ingestion or oral hygiene procedures. It will be necessary to remove the specimens as quickly as possible for transport and processing.

VIII. CREW TRAINING

A single 10 minute briefing will be necessary to acquaint the crew with specimen collection procedures. An additional 10 minutes will be required to instruct a designated crewman on the technic of specimen collection during flight.

IX. SCHEDULING REQUIREMENTS

a. Preflight

1. F - 14 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
2. F - 10 \pm 2 days - 10 min. sample collection at 9-10 AM.*
3. F - 7 \pm 2 days - 45 min. clinical examination.
4. F - 6 \pm 2 days - 10 min. sample collection at 9-10 AM.*
5. F - 2 \pm 1 day - 10 min. sample collection at 9-10 AM. *

b. In Flight

1. F + 7 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
2. F + 14 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*

* Samples may be collected either between 6-7 AM or 9-10 AM but the hour of sampling needs to be consistent throughout.

3. F + 21 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
4. F + 28 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
5. F + 35 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
6. F + 42 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
7. F + 49 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
8. F + 55 \pm 1 day - 10 min. sample collection at 6-7 AM or 9-10 AM.*

c. Post Flight

1. P + 1 \pm 1 day - 45 min. clinical examination.
2. P + 6 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
3. P + 10 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
4. P + 14 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
5. P + 18 \pm 2 days - 10 min. sample collection at 6-7 AM or 9-10 AM.*
6. P \pm 18 \pm 2 days - 45 min. clinical examination.

X. DATA REQUIREMENTS

All data will be cumulated and processed at the University of Texas and made available as soon as possible upon completion of all procedures.

XI. FDF REQUIREMENTS

Not applicable

XII. DEVIATIONS FROM APPROVED SKYLAB EXPERIMENT

None expected

* Samples may be collected either between 6-7 AM or 9-10 AM but the hour of sampling needs to be consistent throughout.