
Solar Safe
NASA's Initiative to Promote Skin
Cancer Awareness and Safety

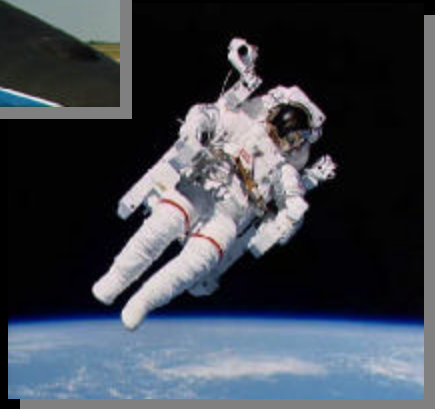
NASA Medical Care

Underwater...

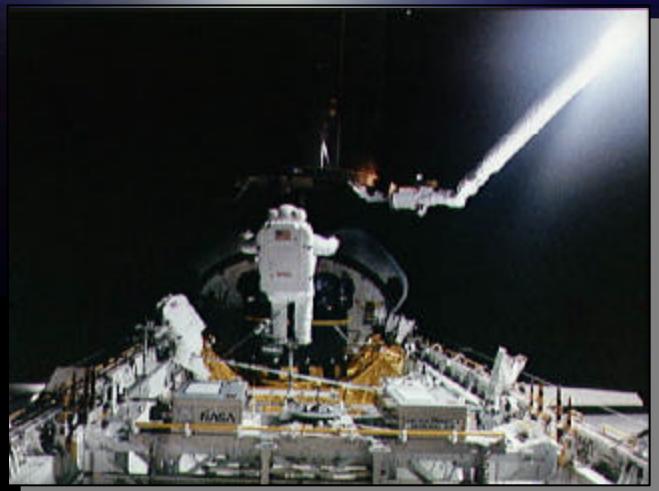
..on the ground...

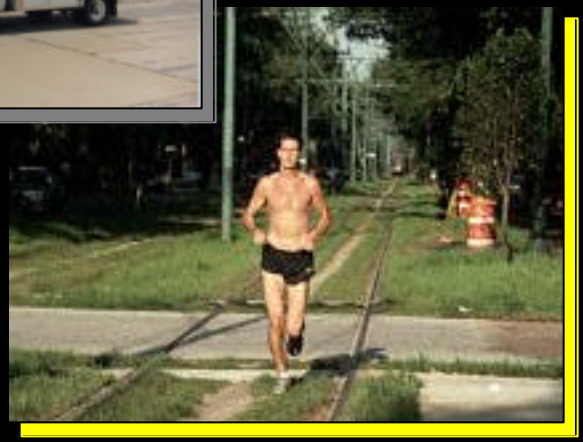
...through the air...

…and into space

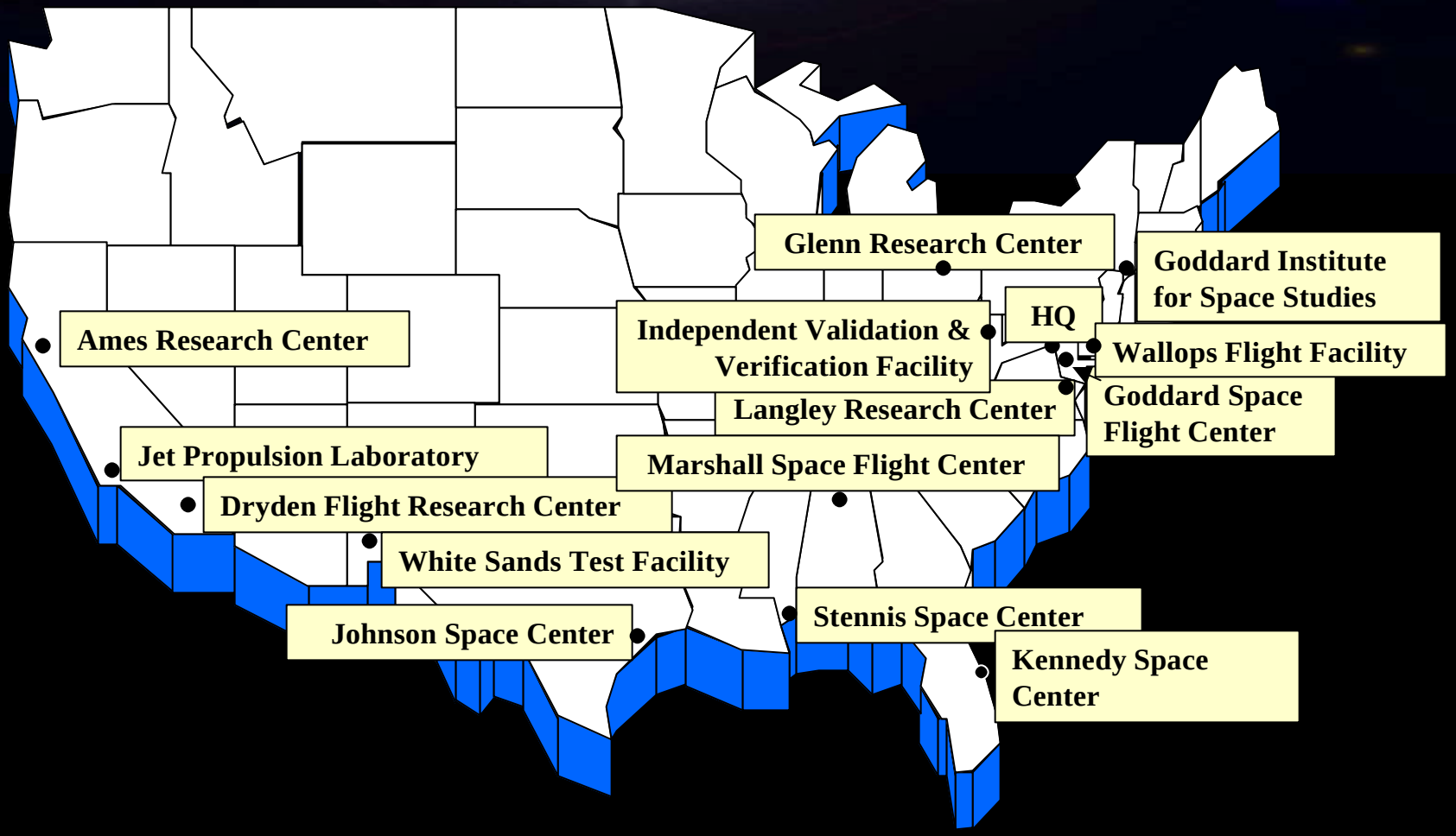


Hazardous Exposures



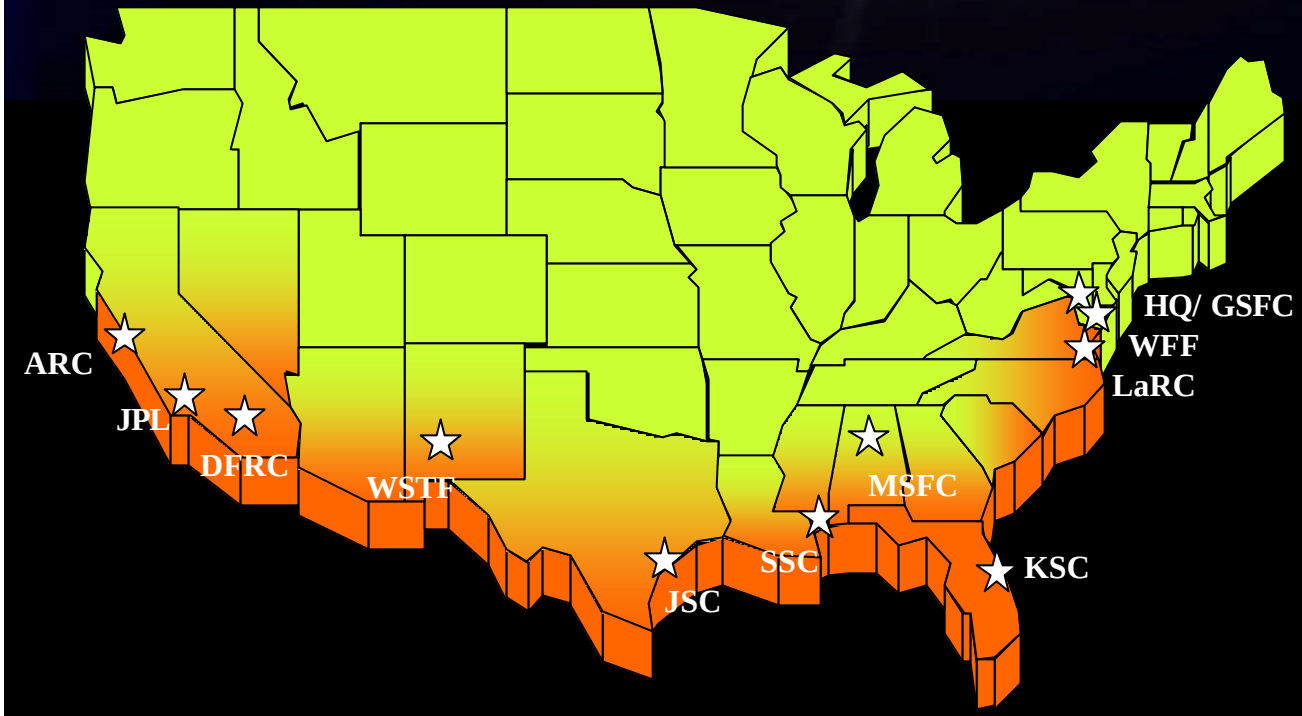


On the Ground: NASA Centers



Skin Cancer Risk Factors

- Location (Sunbelt)



…and also…

- Complexion
- Previous sunburn
- Family history of skin cancer

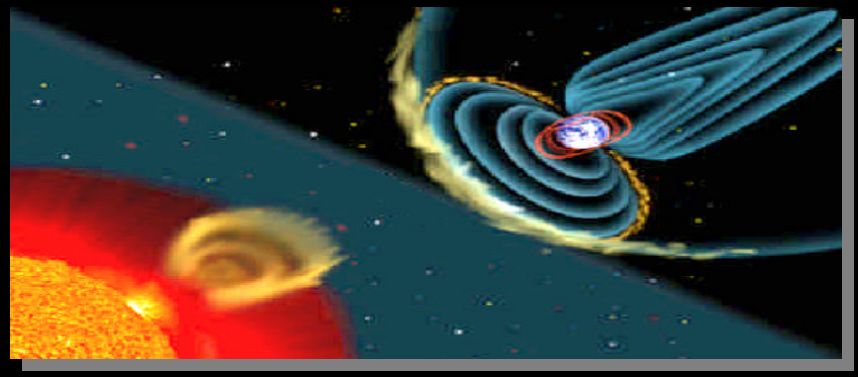
Space Radiation

- Sources
  - Galactic cosmic radiation
  - Solar particle events
- Risk
  - Cataracts
  - Cancer
  - Chromosomal mutation
- Correlation between health and radiation exposure during space flight objective of NASA Space Radiation Health Program
- Comparison with terrestrial exposures:
  - One x-ray: 0.1 mGy (=0.1mSv)
  - Natural background: 2 mSv/yr

- Previous exposure levels[1]

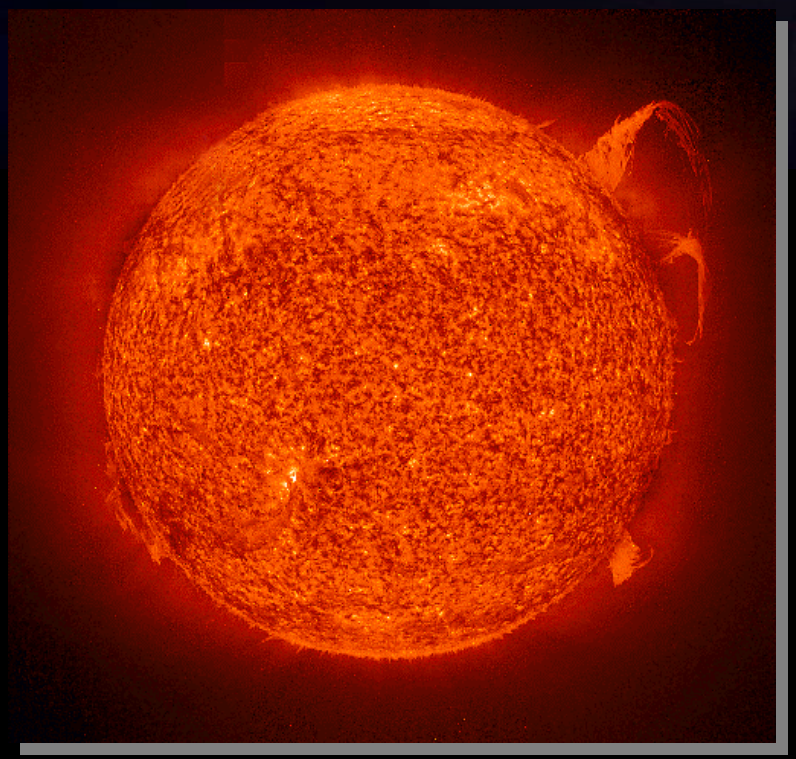
Mission	Duration (days)	Mission dose (mGy)	Daily dose (mGy/d)
Skylab 2	28	15.96	0.54+0.3
Skylab 3	59	38.35	0.65+0.5
Skylab 4	90	77.4	0.86+0.9

Mission	Duration (days)	Altitude(km)	Proton equivalent dose rate, mSv/d	Neutron equivalent dose rate, mSv/d
STS-4	7.0	297	0.54	0.22
STS-5	5.1	297	0.043	0.023
STS-6	5.0	284	0.048	0.013
STS-31	5.0	617	1.66	0.188



[1]D.E. Robbins et al., "Ionizing Radiation." In *Space Biology & Medicine*, A. E. Nicogossian, S. Mohler, O. Gazenko, and A. Grigoriev (eds.). AIAA, 1996.

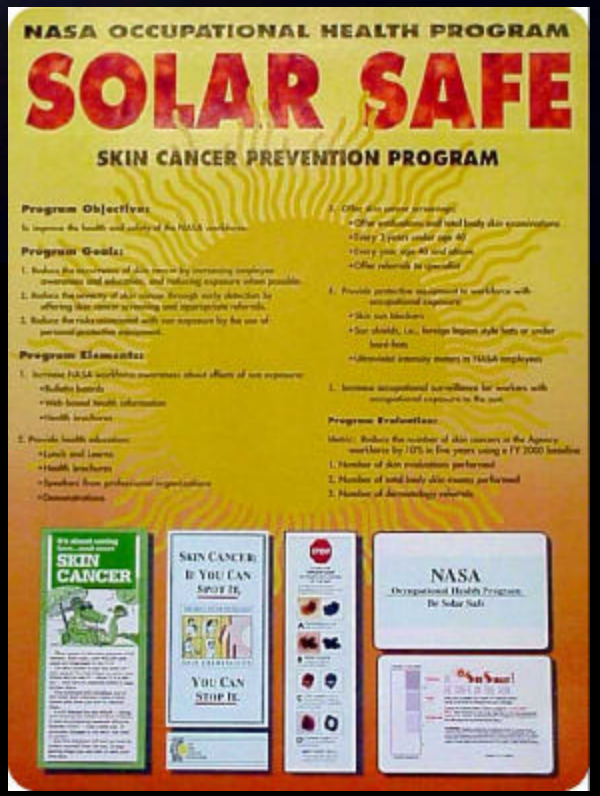
Previous Sun Protection Measures



- ALARA operational concept: As Low As Reasonably Achievable
- Reduction approaches
  - Avoid exposure
  - Reduce exposure time
  - Shield
  - Reduce exposed area

Solar Safe

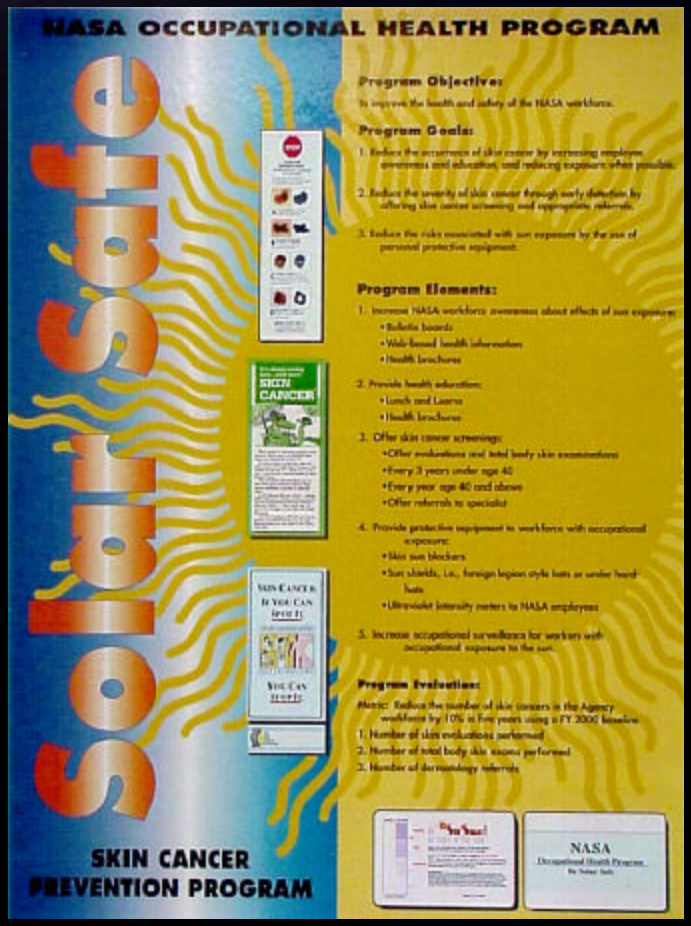
- Created in response to concern for employees' increased risk of excessive and prolonged sun exposure
- Focuses on reducing risks, early detection, and skin cancer education



Goal: Solar Safe will reduce the number of skin cancers in the next five years by 10%

Multifaceted Approach

- Awareness & education
- Administrative controls
- Personal protection
- Medical surveillance
- Metrics



Awareness & Education

Solar Safe will educate NASA personnel about...

- The threat of skin cancer
- Effects of sun exposure
  - Non-cancerous (aging, cataracts, etc.)
  - Cancerous
- Proper clothing, UV index, and use of sunscreen
- Self-examination, types, and diagnosis of skin cancer

...while leveraging the experience of other organizations to maximize effectiveness

THE MELANOMA RESEARCH FOUNDATION
A Non-Profit Organization Founded by Patients and Their Families

AAD 1938 American Academy of Dermatology

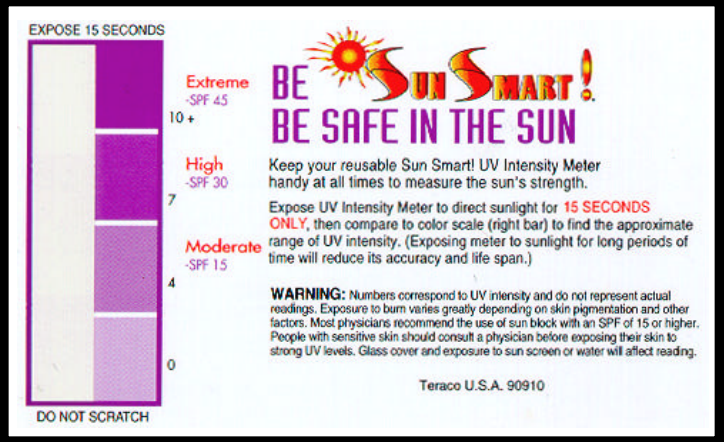
AMERICAN CANCER SOCIETY
Hope. Progress. Answers.

NATIONAL CANCER INSTITUTE

Administrative Controls

Centers and component organizations will...

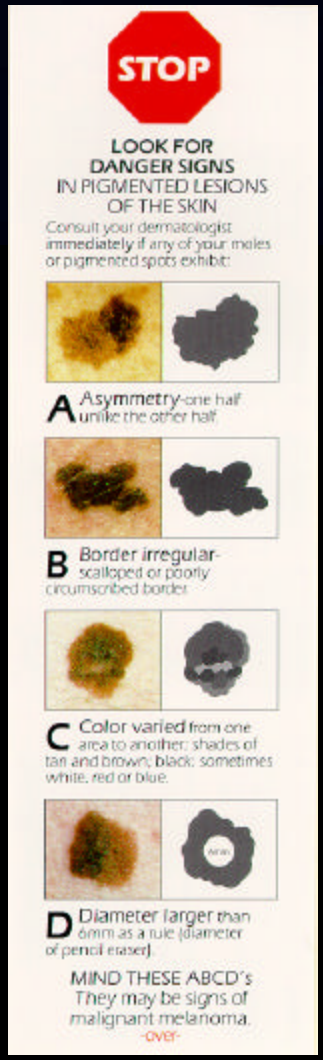
- Evaluate feasibility of limiting outside work during prime solar exposure without affecting mission, cost-efficiency, or safety
- Encourage flexibility in timing of outside fitness activity (e.g. jogging)
- Incorporate UV index information
  - Individual UV badges
  - Local weather information



Personal Protection

The Solar Safe program encourages Centers and employees to...

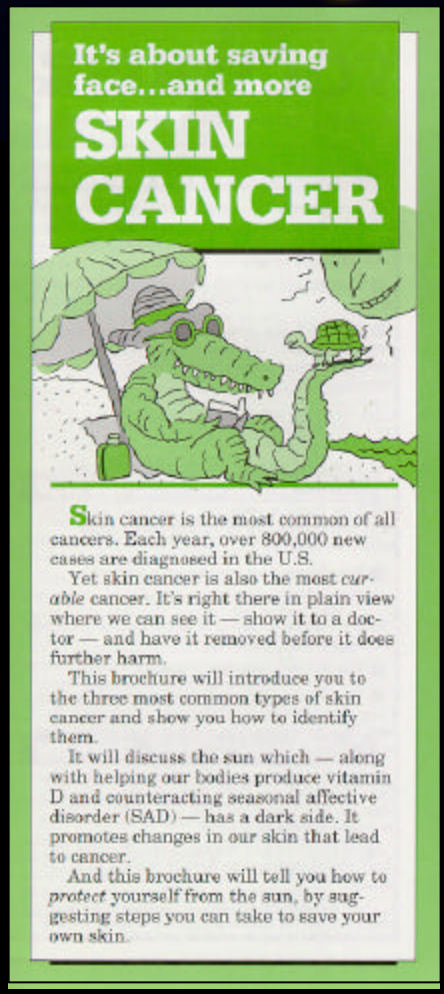
- Consider canopies or other methods of safe solar shading
- Provide sun screen to those occupationally exposed
- Plan for proper protective clothing and skin coverage both on and off site, during work and free time
  - Sunshields or “foreign legion” style hat (wide brim)
  - Sunblock/ sunscreen on exposed skin and under lightweight, light-colored, loosely-woven clothing
- Promote cultural change
  - Discourage weekend/vacation tanning
  - Wear hat outdoors



Medical Surveillance

NASA medical personnel contribute to skin cancer awareness by...

- Incorporating skin cancer screening and education into regular clinic visits
  - Offer skin cancer information
  - Train clinic physicians in screening and recognition
- Offering periodic or annual “Total Body Examinations” to screen for skin cancers
  - Detection of malignant melanoma 2-6 times more likely with TBE
  - Yearly for employees 40 years or older; every three years for employees younger than 40
- Referring suspicious lesions to skin or cancer specialists
  - Improve ease of referrals



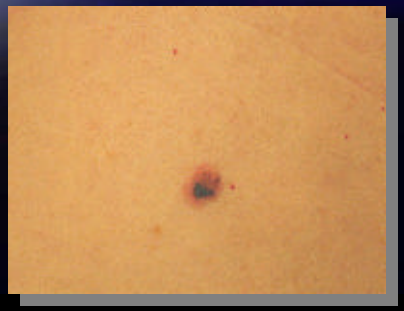
Metrics

- Number of total body skin examinations performed
- Number of referrals made for possible skin cancer
- Number of skin cancers detected

Solar Safe in Action: JSC

JSC Teledermatology Clinic

- February 2000 kickoff
- 12 patients screened (through Mar 31,2000)
  - 4 of 12 had suspicious lesions (33%)
  - 1 suspected malignant melonoma (clinical diagnosis, biopsy pending)
  - 1 suspected squamous cell carcinoma (clinical diagnosis, biopsy recommended)



Biopsy pending *probable malignant melanoma*

Biopsy pending

Biopsy recommended *probable squamous cell carcinoma*

Where We Are Today

- Solar Safe planning complete 1999
- Solar Safe plan kicked off March 2000
- HQ support for initial efforts at all Centers in progress
- Implementation of total body screenings in progress
- Enhancement of outdoor shading and flexible outdoor activity hours TBD