Skin Physiology
The skin both transmits and blocks communication

1. A brief view of the anatomy
2. Sensors in the skin
3. The organ of touch
4. The language of skin
5. Barrier to the world
6. When the barrier fails
A model of the skin

Figure by MIT OpenCourseWare.
A hair follicle is a cylinder of epidermal cells that have tunneled inside the dermis.
Sensors in the skin
Free nerve endings (and Merkel cells): temperature, touch, pain

Histology photo removed due to copyright restrictions.
Meissner’s corpuscle

• lies between dermis and epidermis
• located in fingertips, palms, lips and tongue, nipples, genitals
• informs body exactly where skin is touched
Pacinian corpuscle: lies deep inside dermis; located around joints and tendons, tissue lining organs, and blood vessels. Provides instant information about how and where we move.
The Organ of Touch
Buddhist monks

Photo removed due to copyright restrictions. Two monks bowing to each other.
in France
Premature baby being comforted with fleece of lamb’s wool at Yale University Hospital to avoid deprivation of touch

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Fire-walking ceremony in Kosti, Greece. Villagers walk on white-hot beds of coals, sometimes kneel for several minutes.

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The Language of Skin
skin decoration used in Mt. Hagen, New Guinea

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Human face.
Nuba woman, Sudan used special cutting tools to retard healing and form scars.

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A woman’s back.
Meru girl, Kenya

Photo removed due to copyright restrictions.
A girl’s face.
Native of Amazon basin with lip disk

Photo removed due to copyright restrictions.
Player in traditional Chinese opera

Photo removed due to copyright restrictions.
An actor’s face being painted.
Hands of Moroccan woman painted for beauty and to protect during work

Photo removed due to copyright restrictions.
Two hands with elaborate henna design on the palms.
Photo removed due to copyright restrictions.
A man’s heavily tattooed arm.
“…fresh snow falling on Fuji’s white crown”
Tago no Ura
a traveling actress

Georges Seurat
A nervous itching disease possibly forced Napoleon to keep scratching.
Natural colors and hues
Melanin protects children from UV radiation in Australian outback

Photo removed due to copyright restrictions. Unclothed children climbing over rocks in the bright sunlight.
Absence of pigment (albinism) causes Hopi girl to squint, standing between her sisters

Photo c. 1900.
UV radiation levels

Two world maps:
(a) regions where UV radiation levels suffice for vitamin D synthesis throughout the year, insufficient for at least one month, and insufficient for most of the year
(b) predicted skin color based on UV light levels

Barrier to the World
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Thermal imaging of a child sitting on floor.

Child sitting on cold floor
Climbers risk frostbite when too long in contact with freezing surface

Photo courtesy of alextorrenegra on Flickr.
Skin pore, about 100 micron diameter

Image removed due to copyright restrictions.
Microscope photo of skin pore.
Sweat droplets on surface of skin. Sweat cools when allowed to evaporate from skin.

Photo courtesy of Cavusa on Flickr.
When the Barrier Fails: Loss and Regeneration of Skin
Marat on July 13, 1793. Stabbed in his hot tub where he used to go often to get relief from skin disease.
Jesus to leper: “Stand up and go your way”

11th century Echternach Gospels Lectionary
Trifoliate leaves of poison ivy in autumn

Photo courtesy of Mr.Mac2009 on Flickr.
 Severely burned victim heals injury by contraction and scar formation.

Photo removed due to copyright restrictions.
horses do not form large scars

Painting of horse removed due to copyright restrictions.
Meshed autograft, the patient’s own skin

Photo removed due to copyright restrictions.
MIT Artificial Skin is FDA-approved.

Used in the clinic to treat massive burns and to “resurface” scarred skin.

1. Bilayer is grafted.

2. Silicone layer removed after 15 days, revealing new dermis.

3. Patient’s epidermal graft (no dermis) covers the new dermis.
Conclusion: The heaviest organ also turns out to be quite complex