



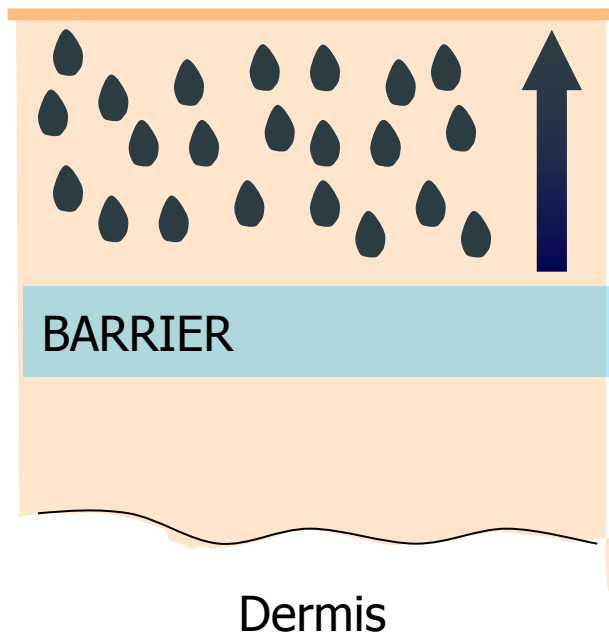
# Instrumentation for Measurement of Dermal Toxicity

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# Instrumentation for measurement of dermal toxicity

- ▶ Hydration measurement
- ▶ Transepidermal water loss measurement
- ▶ Colour measurement
- ▶ pH
- ▶ Microcirculation mapping
- ▶ General considerations

# Hydration



- ▶ Stratum Corneum (SC) Hydration
- ▶ Water gradient in SC
- ▶ Influences:
  - ▶ Barrier function
  - ▶ Mechanical properties
  - ▶ Drug penetration

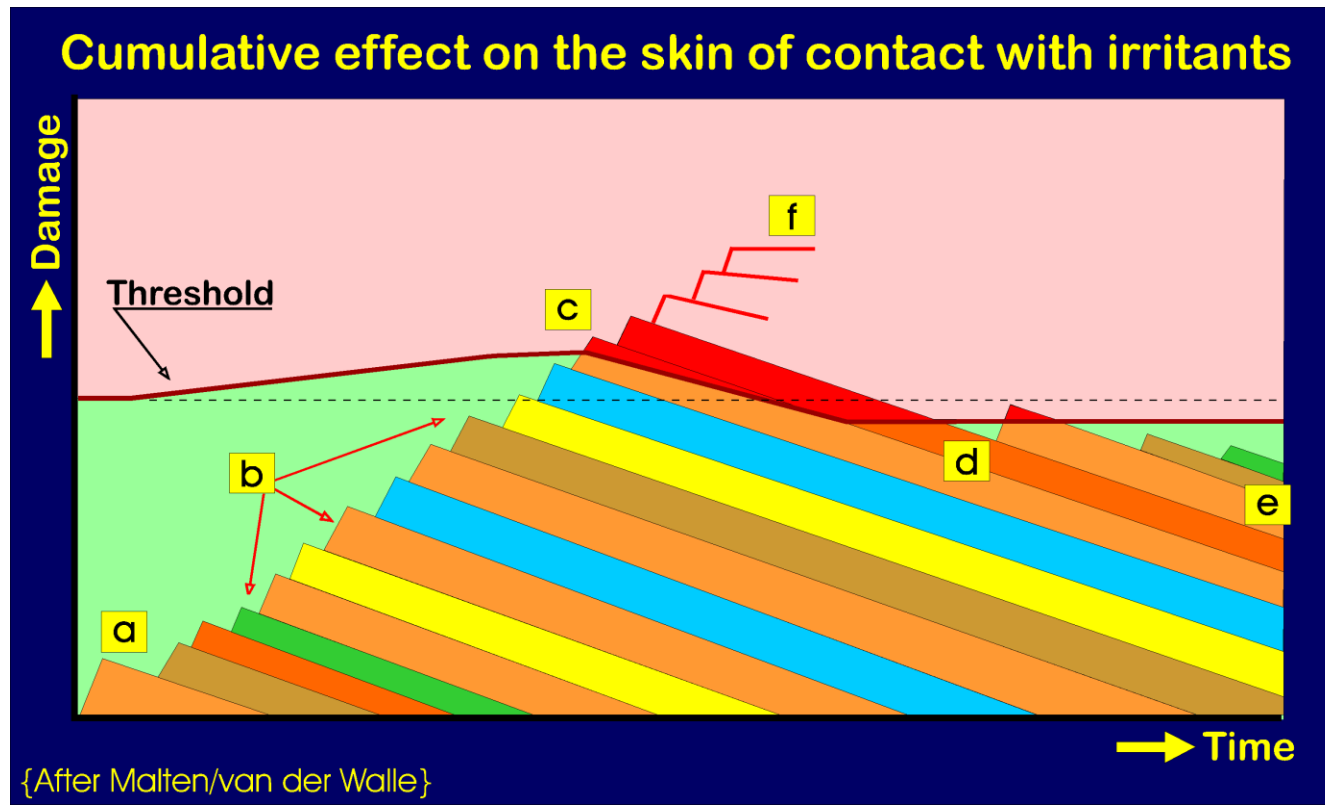
# Why Measure Hydration?

- ▶ Characterisation of normal skin
- ▶ Characterisation of pathologic skin
  - ▶ Actinic aged skin
  - ▶ Dry Scaly Lesions
  - ▶ Irritated skin conditions
- ▶ Assessment of product efficacy

# Pathologic Skin

- ▶ Psoriasis ~ Eczematous dermatitis ~ Atopic dermatitis
  - ▶ Show lower values than normal skin
- ▶ Skin Irritation
  - ▶ Both acute and chronic irritation
  - ▶ Decrease in hydration
  - ▶ Removal of surface lipids
  - ▶ Removal of water-holding substances

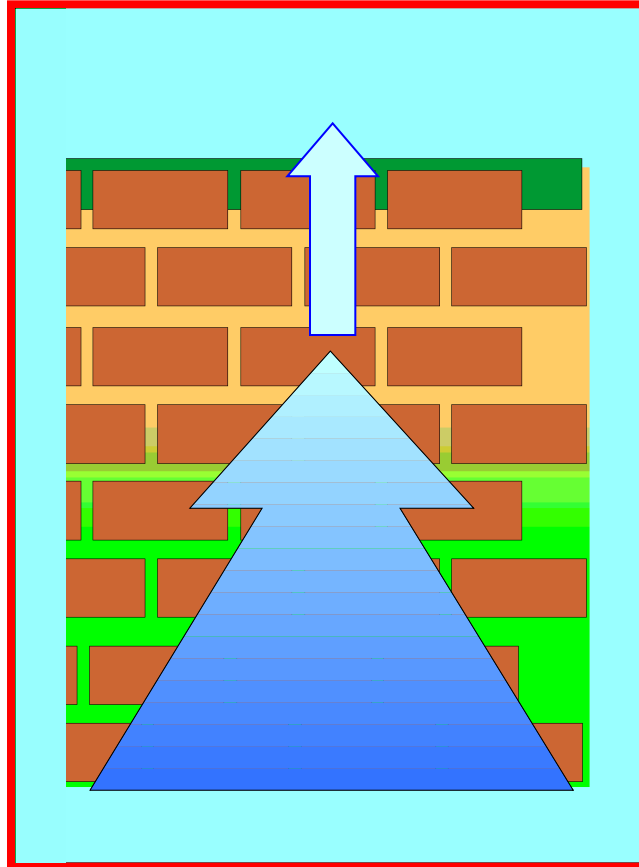
# Importance of Skin Hydration



# Methods for Hydration Measurement

- ▶ Electrical Methods
  - ▶ Capacitance
  - ▶ Conductance
  - ▶ Impedence
- ▶ Optothermal Transient Emission Radiometry (OTTER)

# Transepidermal Water Loss (TEWL)



- ▶ Water passes through the skin
- ▶ Not sweat
- ▶ Evaporates off surface
- ▶ Passes through barrier



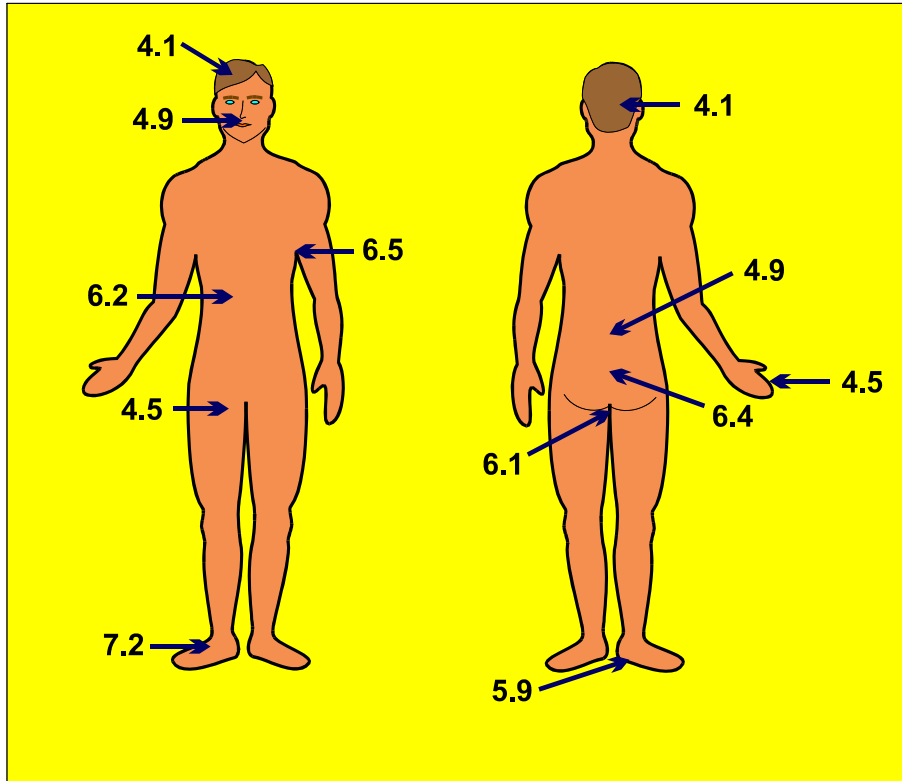
# Why Measure TEWL?

- ▶ Characterise barrier function
  - ▶ Normal
  - ▶ Pathological
- ▶ Predictive irritancy testing
- ▶ Efficacy of therapeutic therapies

# Transepidermal Water Loss (TEWL) Measurement Methods

- ▶ Open Chamber
  - ▶ Tewameter (Courage & Khazaka)
  - ▶ Dermlab (Cortex Technologies)
- ▶ Vapour Accumulation Closed Chamber
  - ▶ Vapometer (Delfin Technologies)
- ▶ Ventilated Closed Chamber
  - ▶ SK1000 (Skinos)
- ▶ Condenser Chamber
  - ▶ Aquaflux (Biox)

# pH



- ▶ Skin surface is acidic
- ▶ Acid Mantle
- ▶ Protective function
- ▶ Microflora

# Methods for Measuring pH

## ▶ pH meters

- ▶ Skin pHmeter PH905 (Courage& Khazaka electronic)
- ▶ 827pH Lab (Metrohm Ltd.)
- ▶ Any commercial portable pH meter with planar electrode

# Colour



- ▶ Skin pigmentation
  - ▶ Melanin
  - ▶ Erythema
- ▶ Blood perfusion
- ▶ Desquamation

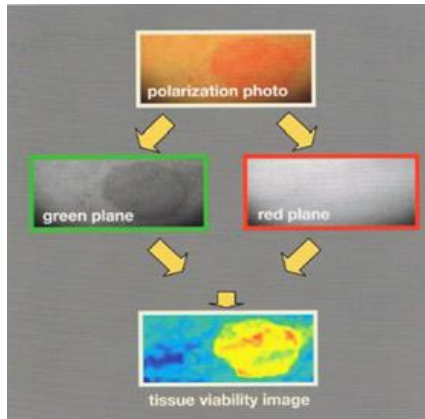
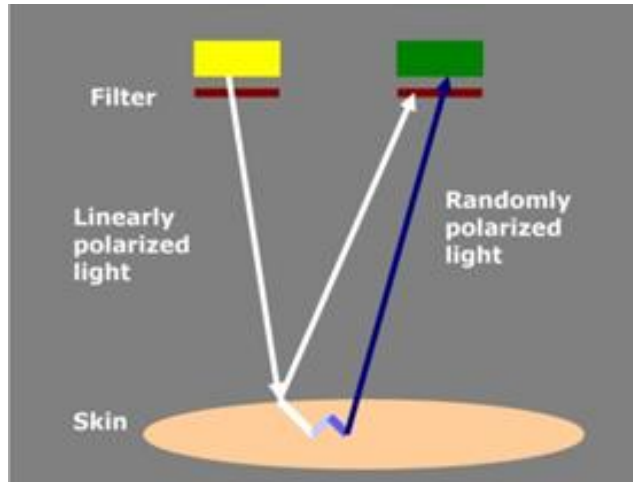
# Why Measure Colour?

- ▶ Quantitative
- ▶ Objective
- ▶ Continuous
- ▶ Clinical disease
- ▶ Irritant dermatitis studies
- ▶ Vasoconstriction test
- ▶ Phototype ~ Photosensitivity
- ▶ Pigmentation changes due to treatments

# Colour Measurement Methods

- ▶ Spectrometers
  - ▶ Mexameter MX18 (Courage & Khazaka)
  - ▶ DermaSpectrometer (Cortex Technologies)
  - ▶ Erytema Meter (Dia-Stron Ltd.)
  - ▶ TiVi 700 (Wheelsbridge)
- ▶ Colorimeters
  - ▶ SkinColorCatch (Delfin Technologies)
  - ▶ Chromameter (Minolta)
  - ▶ Micro Color (Dr Lange GmbH)
  - ▶ Skin Colorimeter CL400 (Courage & Khazaka)

# Microcirculation Mapping



- ▶ Polarised Light Spectroscopy
- ▶ Photograph made of skin area
- ▶ Image produced with blood perfusion
- ▶ Quick
- ▶ Video capture also possible
- ▶ Can also be used for other parameters

Acknowledgement to Wheelsbridge



# Measurement Availability

- ▶ Tissue viability Imager TiVi 700 (Wheelsbridge)
- ▶ TiVi8000 (Wheelsbridge)



# Any Questions