

Why are lipids so important for our skin?

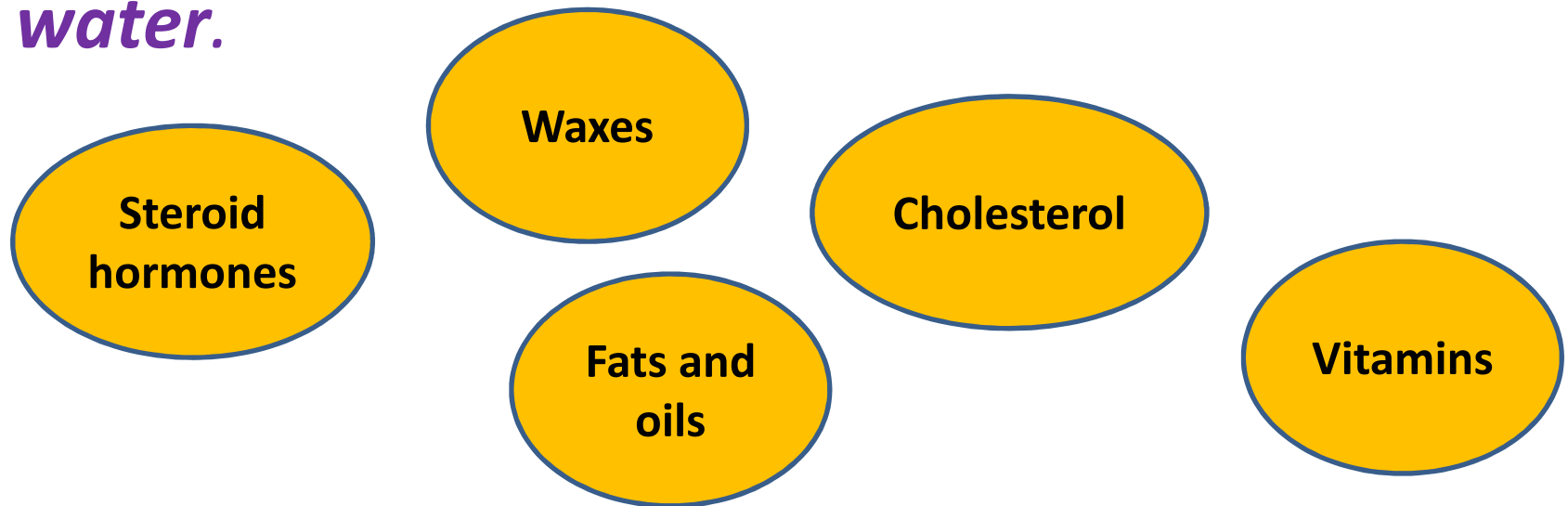


Dr Alex Kendall
The University of Manchester

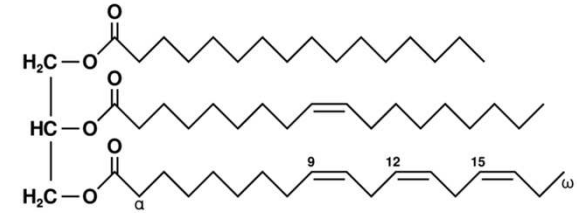
MICRA
31 October 2019

What is a lipid?

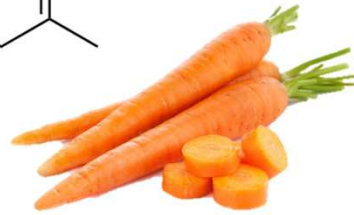
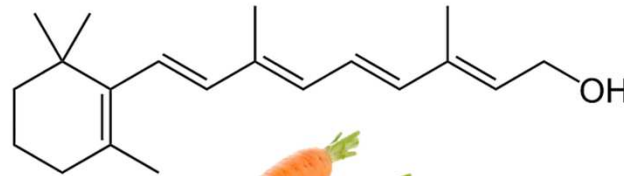
- Lipids are commonly called **fats** but they are much more than that.
- A very diverse group of substances that have a common property: ***they do not dissolve in water.***



Lipids can be obtained through our diet...



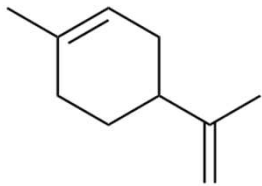
Vitamin A



Triglycerides



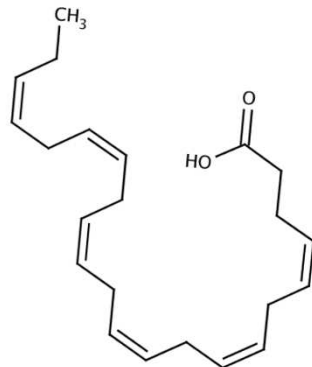
Essential oils



Limonene



Fish oils and fatty acids

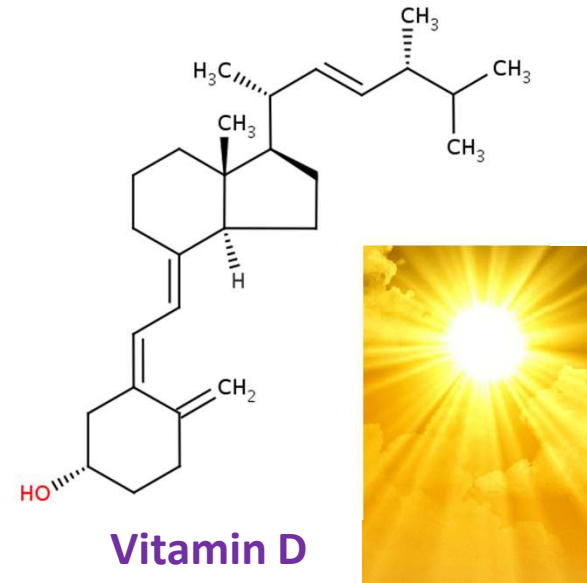
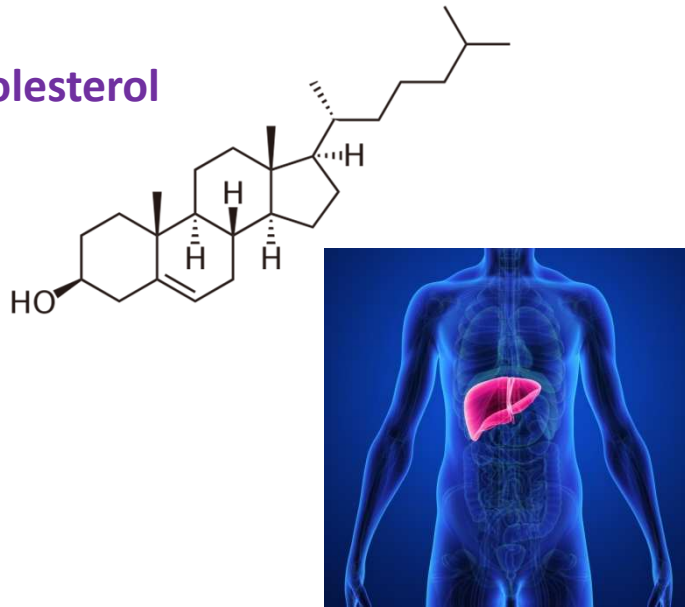


Omega-3 fatty acids

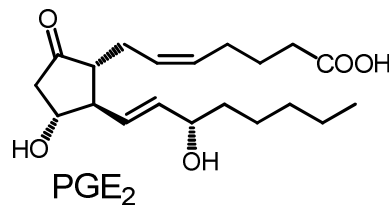


...or made by our body

Cholesterol

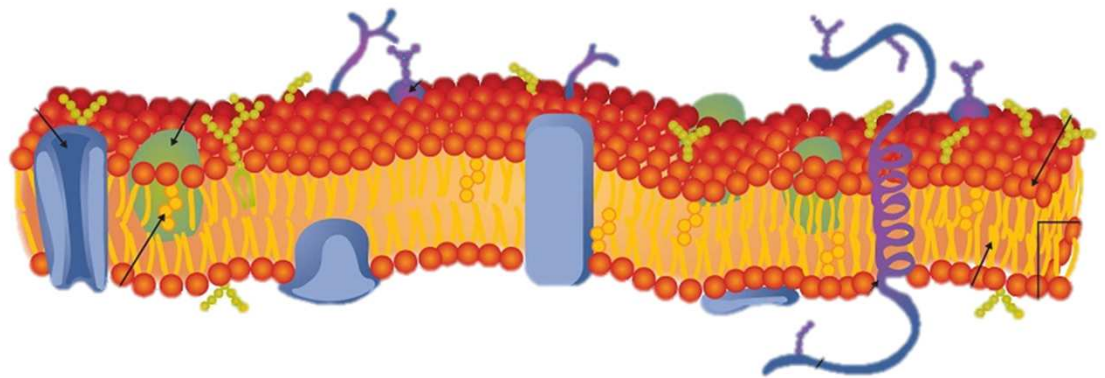
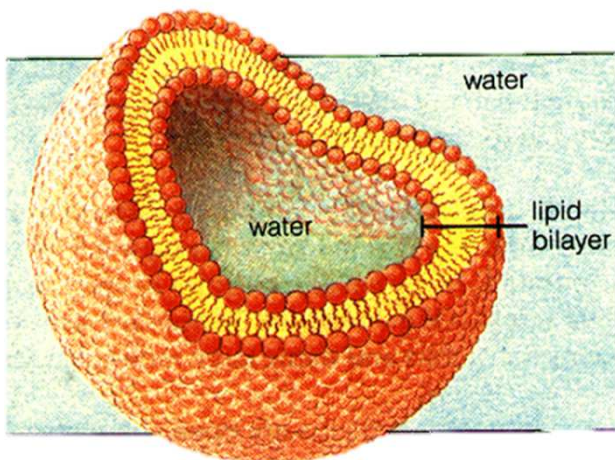


Prostaglandins

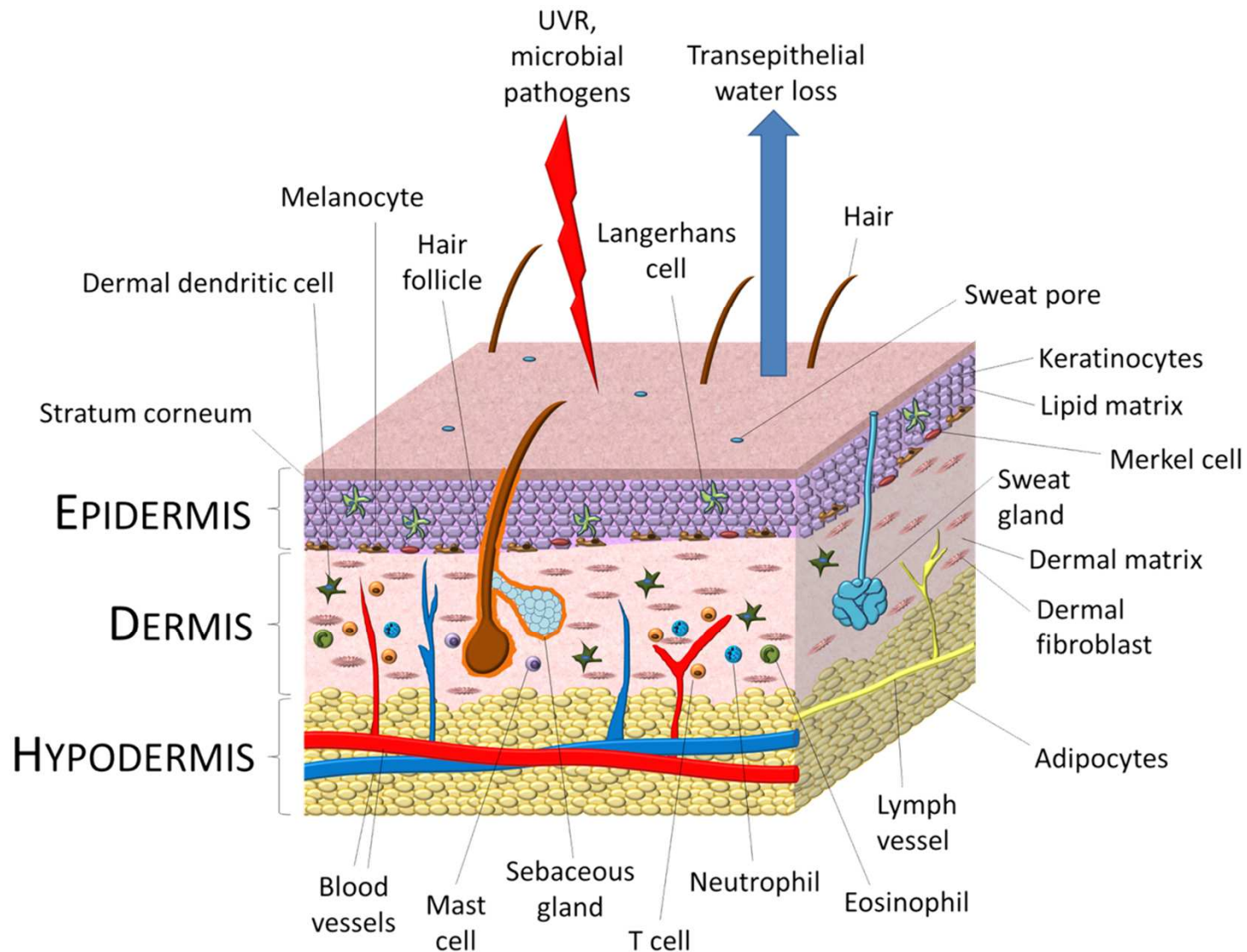


Lipids are important throughout our bodies

- Energy storage
- Cell membranes
- Cell signalling
- Inflammation



Lipids have crucial roles in skin



Skin surface lipids

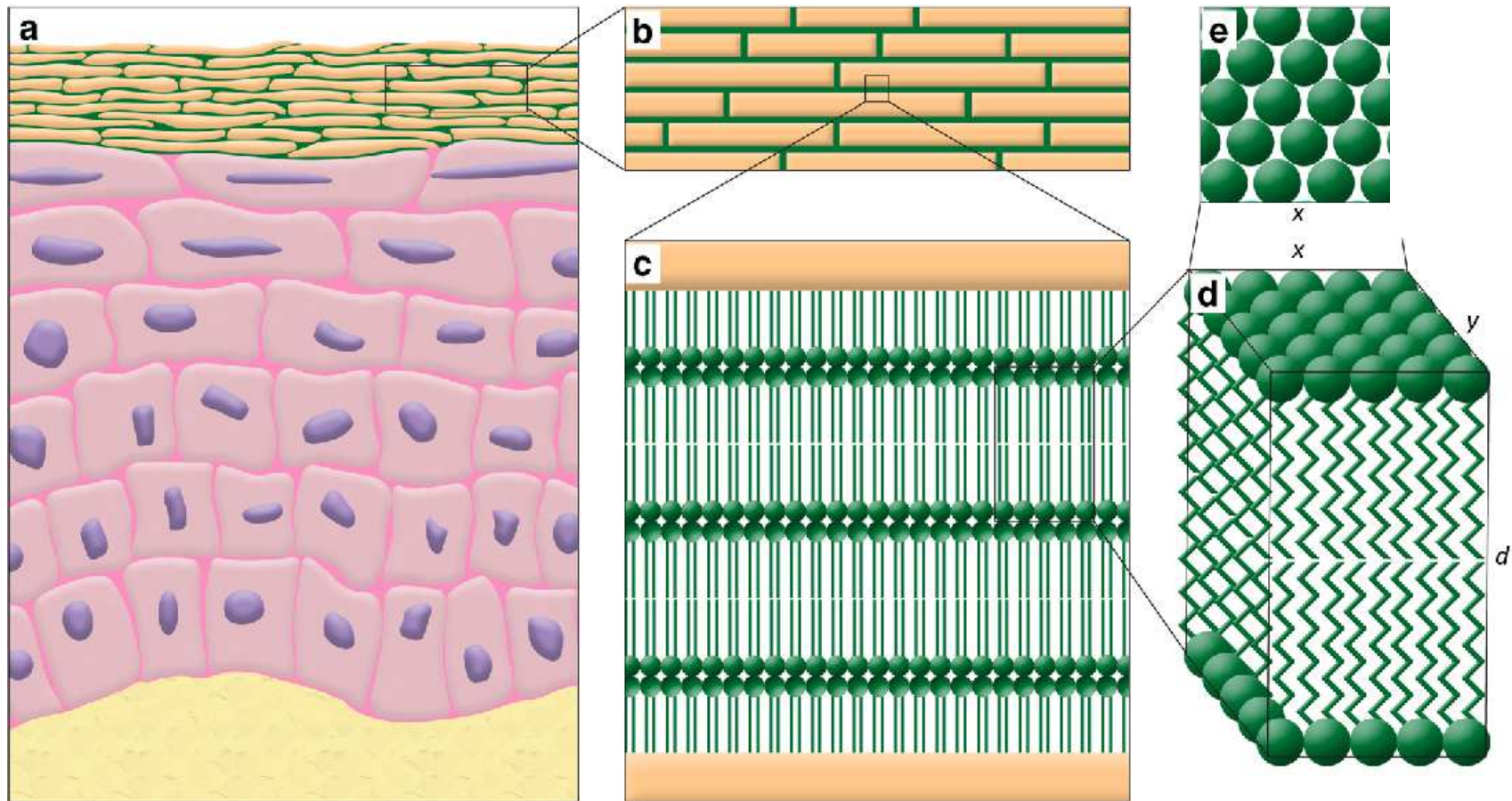
Sebum lipids coat the skin

- Waxes, triglycerides, fatty acids
- Waterproof the skin and enable terrestrial survival
- Maintain skin's pH
- Regulate the microbiome
- Protect against UV



The skin barrier

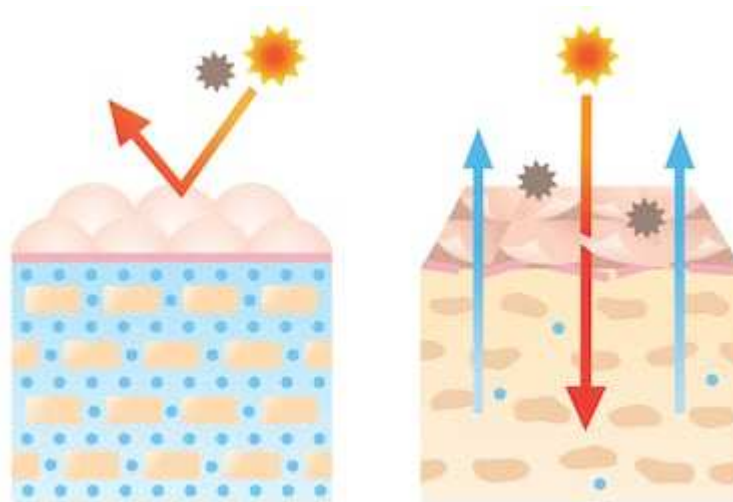
Large, complex lipids form the skin's cement



Ceramides, cholesterol, fatty acids

Ceramides

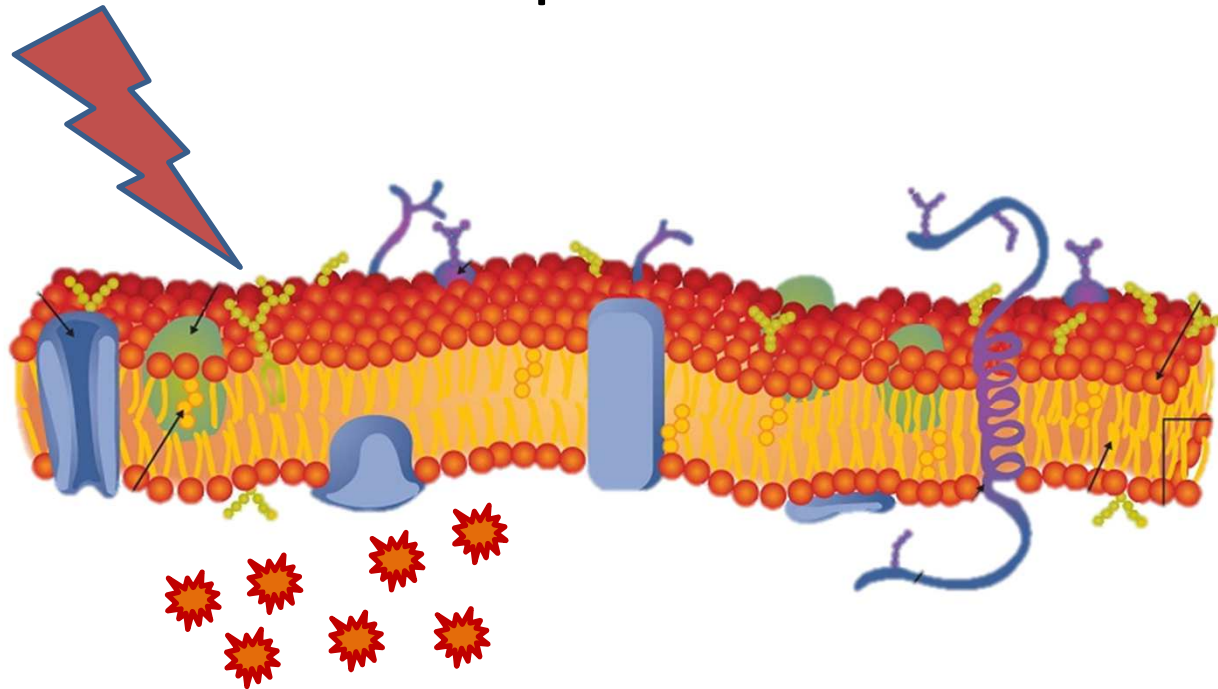
- Large, complex lipids
- Made in all cells
 - Signalling roles
- Skin has special ceramides
 - Form the barrier against water loss
- Many personal care products aim to increase ceramide levels



Inflammation

Small lipids regulate inflammation

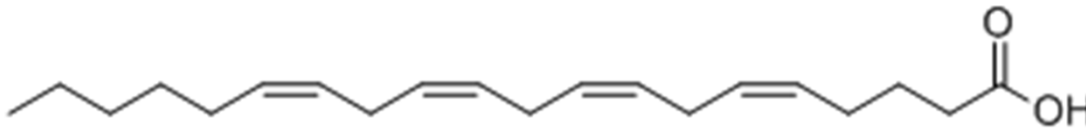
- Fatty acids in your diet are incorporated into your cells
- Cells can turn these fatty acids into an array of small bioactive compounds



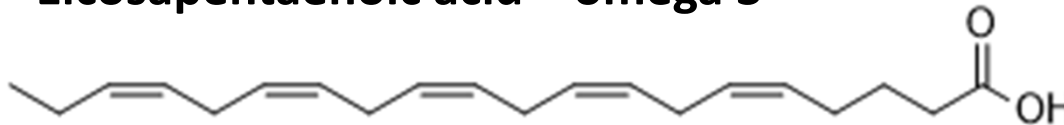
What we eat determines what lipids we make

- Polyunsaturated fatty acids
- Omega-6 and omega-3

Arachidonic acid – omega 6



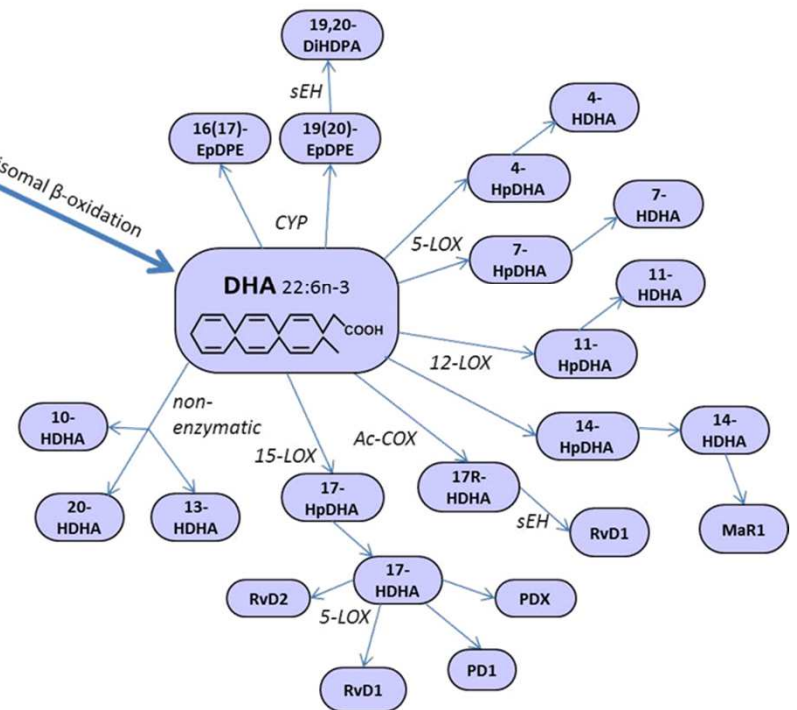
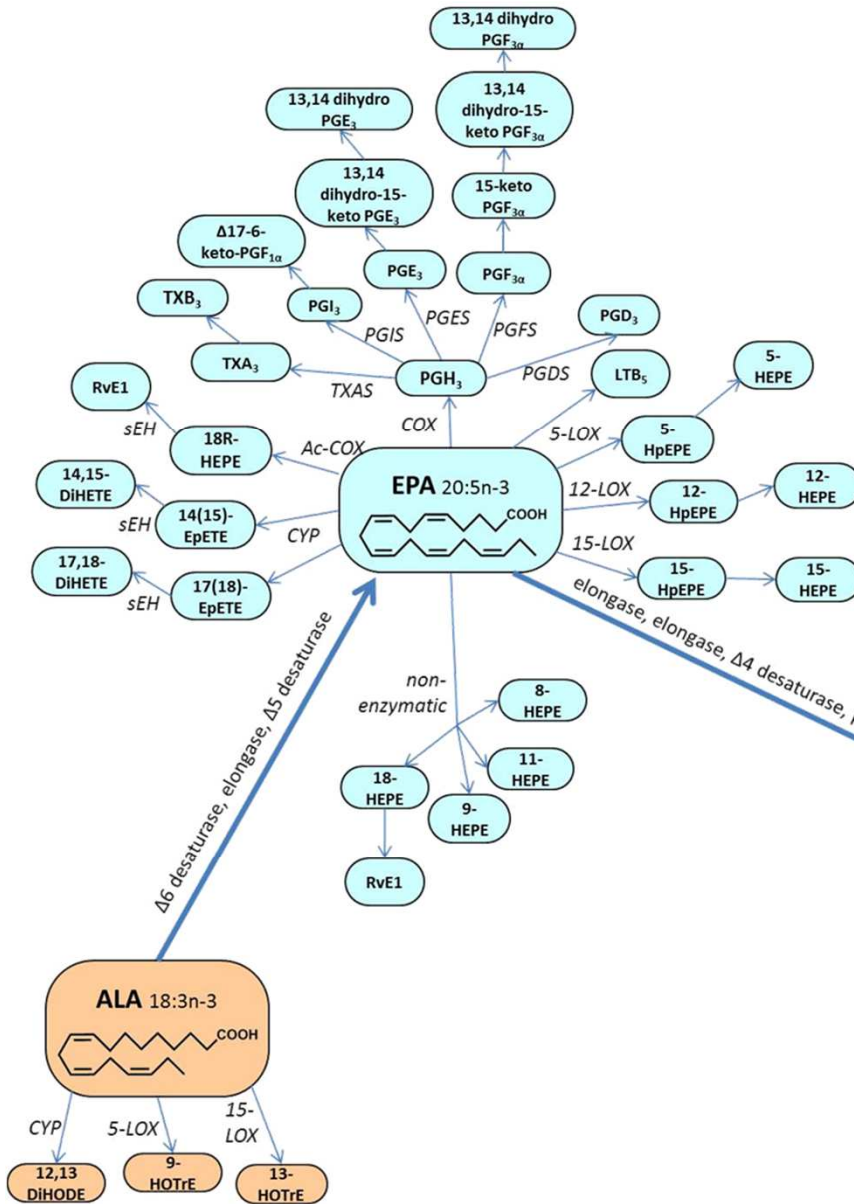
Eicosapentaenoic acid – omega 3



Omega-6 fatty acid products



Omega-3 fatty acid products



Prostaglandins regulate skin inflammation

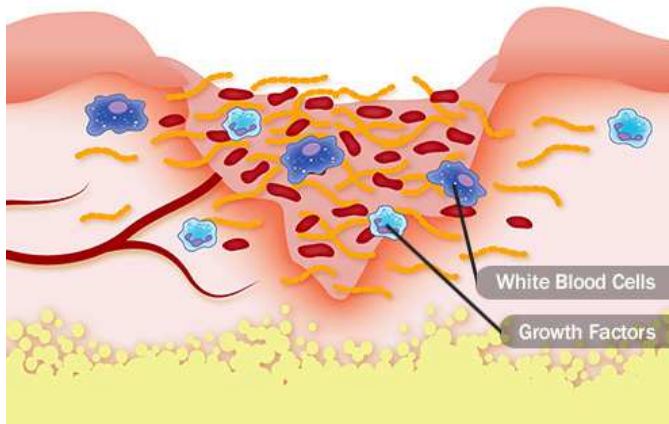
Arachidonic acid



Prostaglandins



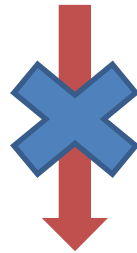
Inflammation



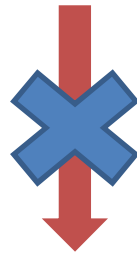
Aspirin blocks prostaglandin production



Arachidonic acid



Prostaglandins

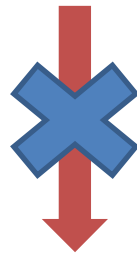


Inflammation

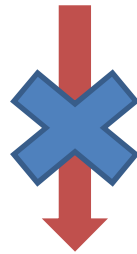
Fatty acids are then metabolised down different pathways



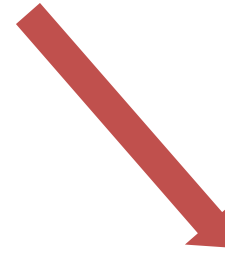
Arachidonic acid



Prostaglandins



Inflammation



Other lipids



Immune cell
response

Prostaglandins from fish oil are anti-inflammatory

Eicosapentaenoic acid



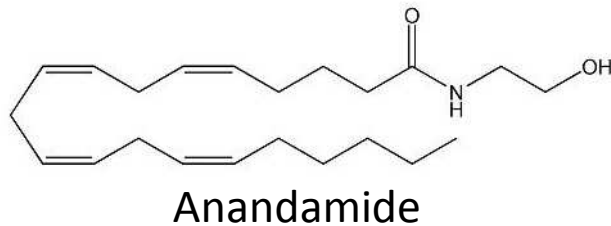
Prostaglandins



Resolution of inflammation

Endocannabinoids

- Our bodies produce natural cannabis-like compounds
- Regulate mood, appetite, energy storage, stress, pain, sleep
- Effective at suppressing skin inflammation



Lipids also contribute to skin disease

Wound healing



Psoriasis



Acne vulgaris



Sunburn



Atopic dermatitis



Irritant contact dermatitis

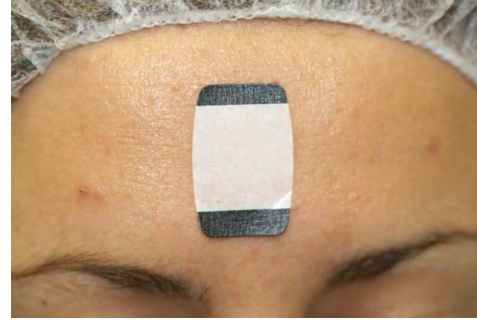


Dandruff

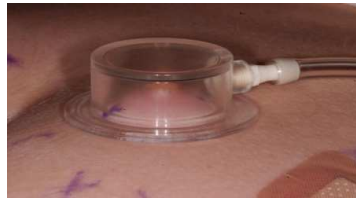


How do we study this?

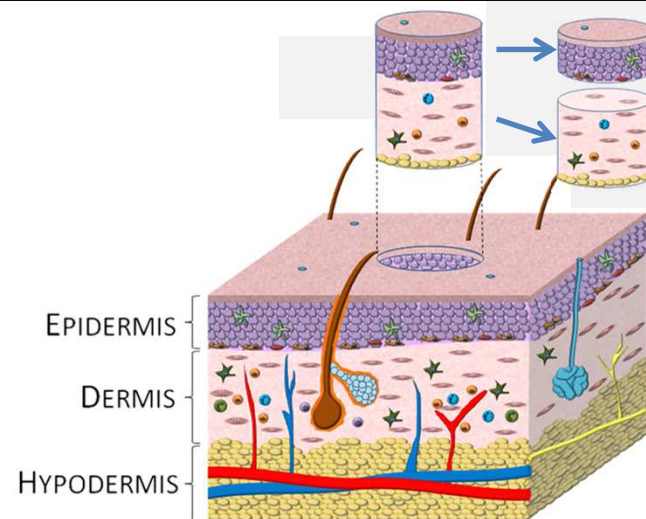
Tape strips



Suction blister fluid



Biopsies



Lipidomics

- Mass spectrometry
- Extract lipids from samples and identify and quantify hundreds of species
- Allows comparison between health and disease, changes over time, assessment of treatments



Our current project

Determining the critical relationship between human epidermal lipids and microbiota in sustaining healthy skin ageing



**Biotechnology and
Biological Sciences
Research Council**



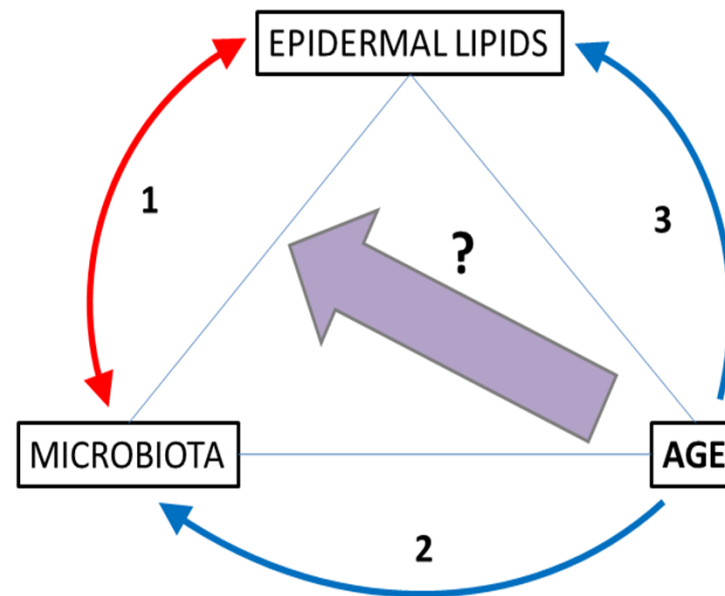
SkinBioTherapeutics

Skin changes as we age

- Skin lipids
 - Decline in production, altered lipid profile
- Skin microbiota
 - Change in total number and types of bacteria present
- Skin function
 - Thinning, loss of elasticity, more susceptible to damage

How are these changes linked?

We are trying to establish the relationship between epidermal lipids and the skin microbiome in healthy skin ageing



Project questions

- **Q1:** How do the lipid composition of the epidermis and skin function change as we age?
- **Q2:** How does ageing affect the types and numbers of microbiota at different body sites?
- **Q3:** What is the sequence of events mediating the age-related changes?

Volunteers

- Aiming to recruit 120 volunteers by June 2020
- Healthy volunteers with no skin conditions
- 60 aged 18-40
 - 30 male, 30 female
- 60 aged 70+
 - 30 male, 30 female

Sampling sites

Forehead



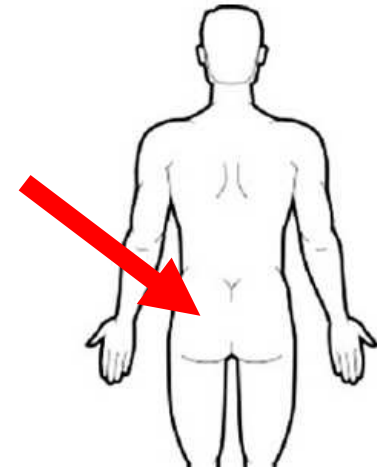
Sebaceous (oily)

Armpit



Moist

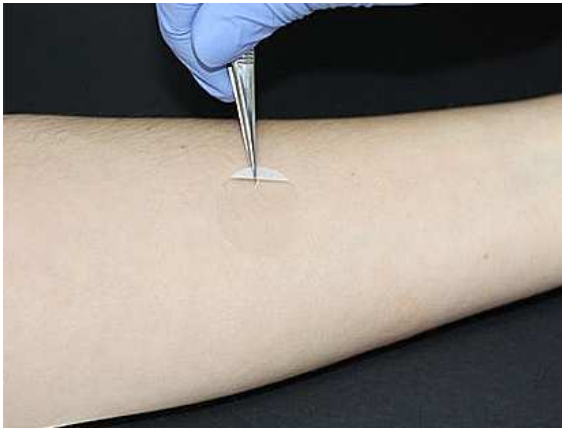
Buttock



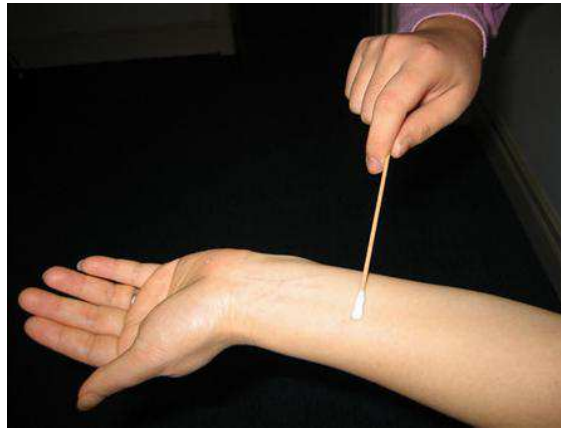
Dry, protected
from UV
damage

Samples and measurements

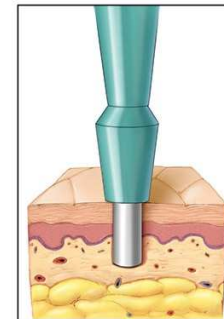
Tape strips



Swabs



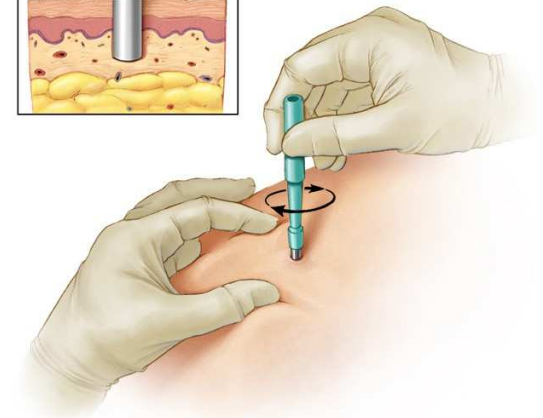
Biopsy



Skin pH



Skin water loss



Interested in volunteering?

- Single visit to Salford Royal Hospital
- Complete a food diary for 3 days before visit
- Volunteers are reimbursed for inconvenience
- For further information and contact details please come and talk to us!

Thank you!