



Does geographic ancestry influence how skin ages?

Abigail K Langton PhD Centre for Dermatology Research The University of Manchester



University Teaching Hospital

Manchester Institute for Collaborative Research on Ageing (MICRA) 11th March 2016 Skin pigmentation is perhaps the most obvious example of diversity in human populations.



Human skin, regardless of colour, plays a vital role in protecting us from the environment and preventing excessive water loss.



- The majority of the world's population consists of people with highlypigmented skin;
- Despite this, fundamental skin biology research has primarily focussed on white Caucasian skin.

Mechanisms of skin ageing



Human skin ageing appears to be the product of two biological processes:

- 1. The passage of time or intrinsic skin ageing; &
- 2. Exposure to environmental influences or extrinsic skin ageing.

The major extrinsic insults include chronic exposure to solar ultraviolet radiation (photoageing), smoking and pollution.

Clinical manifestations of skin ageing



Image from Watson & Griffiths, 2005

Intrinsic Ageing	Photoageing
Fine wrinkling	Coarse wrinkling
Smooth texture	Roughened texture
Clear complexion	Sallow complexion
Uniform pigmentation	Mottled pigmentation
Gradual loss of elasticity	Marked loss of elasticity and recoil

- Photoageing is caused by chronic UVR exposure superimposed onto a background of intrinsic ageing;
- Unlike sunburn and suntan, which manifest within hours and days, respectively, after a sufficient exposure to UV light, photoageing develops gradually over decades;
- Chronic sun exposure is estimated to be responsible for around 80% of the effects of facial skin ageing.











There appears to be variation in how skin ages when individuals of different geographic ancestry are compared.



Individuals with lightly-pigmented skin are more susceptible to solar UV-induced skin damage than individuals with highly-pigmented skin.

"Suitable for all ethnicities"



- This phase is a common marketing tool for cosmetic companies;
- Should we be aiming to create "personalised cosmetics" that target the consumer with regard to both their age and geographic ancestry?

The structure of the skin



- Human skin consists of two distinct anatomical regions: a superficial cellrich compartment, the epidermis and a deeper extracellular matrix (ECM)rich compartment, the dermis.
- The dermal–epidermal junction (DEJ) marks the interface between the epidermis and dermis;
- Rete ridges strengthen the connection between the two compartments, providing strong adhesion and mechanical support.

Dermal extracellular matrix



Changes in the abundance or arrangement of these components can cause changes to the structure and function of the skin.

Aside from the lack of skin pigment, is the assumption that skin is structurally and functionally the same – regardless of geographic ancestry – correct?



n = 7; 19-27 yrs,

- Caucasians; n = 7; 18-29 yrs,
- Far-East Asians;
- African/African-Caribbeans; n = 7; 18-28 yrs,
- 6mm punch biopsy from photoprotected buttock.

The epidermis of African skin is thicker, with deeper rete ridges and a more convoluted DEJ than Caucasian and Far-East Asian skin



The protein composition of the DEJ is collagen VII-poor in African and Far-East Asian skin compared to Caucasians



The dermis of African skin is enriched in fibrillar collagen I compared to Caucasians



The dermis of African skin is enriched in fibrillar collagen III compared to Caucasians



The dermis of African skin is elastin-poor compared to Caucasians



African dermis is abundant in both fibrillin-rich microfibrils and fibulin-5 compared to Caucasian and Far-East Asian skin



Conclusions

- Fundamental differences exist in skin structure and composition in individuals of diverse geographical ancestry;
- These differences are likely to impact on the primary functions of skin, which are to resist the pressures of UVR, mechanical stress and the propensity for injury and infection;
- Cosmetic products should be targeting consumers based on their geographic ancestry;
- Further research into the clinical consequences of these differences in ageing is warranted.

Geographical ancestry and skin ageing

- Obvious differences in the appearance of skin in aged individuals of different geographic ancestry;
- In black African skin, ageing appears to manifest at a slower rate and with less of the coarse wrinkling as is apparent in Caucasians.
- We have now started a collaboration with colleagues based in the USA (Johns Hopkins Medical School) to assess the changes in epidermal structure and dermal composition of aged skin from both sun-protected and sun-exposed body sites.





Photoaged Forearm











Caucasian





How is your skin ageing?

Healthy volunteers aged 18 years or over required for skin research studies

You will be paid up to £150 for your time and inconvenience

If you are interested in taking part please contact:

Abigail on 0161 306 0681 abigail.langton@manchester.ac.uk









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Dr Rachel Watson Dr Michael Sherratt Professor Chris Griffiths

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