Launch
Hair and Skin Lab
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Side effects from contact with chemicals?
(from a cream applied to the face, or products used at work)

- Prevalence: 16.4% - 80%
- Highest risk: Hairdressers

Khumalo et al. adverse effects of hairdressing: a systematic review. *Arch Dermatol* 2006
Dermatologists try to identify the cause
Allergy ‘Patch’ Tests

and advice:
avoid offending agent
treat (steroid creams, phototherapy)
Adverse effects: two sides of a coin

Allergic reaction
• Unpredictable
• Can’t avoid
  (initial reaction)

Toxic reactions
• Predictable effects
• Can/must be avoid
Reasons for changing skin colour
Remove/fade blemishes, brighten, clarify, lighten, whiten normal skin

Unintended consequences

Offending ingredients are illegal in SA yet widely available...

• Steroids
• Mercury
• Hydroquinone
Popular skin lightening creams on the SA market

Combinations of potent topical steroids, mercury and hydroquinone are common in internationally manufactured skin-lightening products: a spectroscopic study


1Divisions of Dermatology and Clinical Pharmacology, Groote Schuur Hospital, Cape Town, South Africa; and Departments of 2Geological Sciences, 6Human Biology and 5Chemistry, University of Cape Town, Cape Town, South Africa

products contained steroids - 2 steroids, mercury and hydroquinone often in combinations

Study in press...
All Hair Loss is devastating

But scarring hair loss is worse...
In auto-immune alopecia areata - chance of regrowth...

Contact irritant therapy

02/02/2010 26/08/2011
Hair straightener (relaxer) sold without neutralizing shampoo

Little girl with scarring permanent hair loss that is completely preventable...
“Brazilian keratin treatments” for water resistant straight hair up to 3 months!

What about “formaldehyde free” labels?
Elevated formaldehyde concentration in “Brazilian keratin type” hair-straightening products: A cross-sectional study

Mbulelo H. Maneli, PhD, Peter Smith, PhD, and Nonhlanhla P. Khumalo, FCDerm, PhD

Cape Town, South Africa

- Regulated at a maximum of 0.2% in cosmetics
- 6 of 7 consumer brands had formaldehyde concentration 5X the legal limit - 5 were labelled: “formaldehyde-free”

J Amer Acad Dermatol 2013
Why worry?

- Cancers of blood cells
  Formaldehyde exposure and leukemia: A new meta-analysis
  Luoping Zhang et al (2009)

- Pregnancy abnormalities
  Reproductive and developmental toxicity of formaldehyde:
  A systematic review
  Anh Duong et (2011)
Example of people falling off a cliff

Social determinants of health

Current medical model

Primary Prevention

Safety net programs and secondary prevention

Medical Care and tertiary prevention

Wait for side effects to occur or try to prevent them?
Close the gap between clinicians and scientists

• But...

• No dedicated academic department or graduate qualification in cosmetic science in the country!
First scientist...

• Dr Mbulelo Maneli

• Begged and borrowed equipment to do our first studies
Thank you for listening and helping...

Asking for Lab space
Prof Wendy Spearman

Learning about equipment
Prof Pete Smith
The 5 year journey of raising funds
Talking to anyone who would listen...

• Has made his mission identifying talented (Maths, Accounting) and poor kids for funding to study Chartered Accountancy

• A casual chat lead to my discovery of the National Skills Fund (NSF)

Mr Lwando Bantom - SAICA
2nd scientist for the HSR Lab

Dr Jennifer van Wyk PhD

Main strengths: protein structure-function relationships (protein expression, purification and crystallization techniques)

New skills: Hair mechanical testing and analytical chemistry

Unknown skills: technical drawing

One tough young lady
• finalizing equipment order/installation
• validation of the formaldehyde-in-cosmetic test
• Co-supervising a new PhD student Ms Sishi
A straight forward Lab renovation turned into a nightmare lesson in water systems

Tank dirty water in roof, low pressure, cold…

Pre-filtration and booster pump (in corridor)

Geyser and Pressure pump (below)

Water purification, thermostatic valve, flow restrictor and eye-wash station
Thank you – Plumbers Contractors and Groote Schuur team
Beautiful final product...
with a tap where water flows at 4l/min @37 degrees!
Lab upgrade that turned into a building site...
Would not have managed without discovering some best kept secrets, like a narrow tunnel that leads to incredible GROOTE hospital technical support skills...
UCT and Groote Schuur Engineering discussing technicalities of electricity, ventilation up grades...
Yaseen Parker
UCT properties

Mr Wakefield

Martin

UCT engineering and GSH electricians
Aha!

Many technical problems solved

UCT engineering and GSH electricians
Transformed chairs
All hands on deck...
Thank you GSH painters...
The painters – revamping old furniture
Kind donations of furniture

From Lung infection research team...
Improving the work environment

Malerato’s Blinds

Mariskas interia
Malerato’s Blinds
Mr Champion

Responsible for most of the paint and repair work “Mr fix-it”
Thank you for organizing access and packing for contractors...
Thank you UCT Finance for managing stressful NSF audit verification meetings...

Tracey Fourie  Mr Ramawa (NSF)
Finance – Rukshana Champion would not even look at me, day before NSF audit verification...
Thanks: to Launch organizers
Complex connections
The smile of satisfaction
Why so keen on Hair?
Elevated hair cortisol concentrations in children with adrenal insufficiency on hydrocortisone replacement therapy

G. Noppe*,†, E.F.C. van Rossum†, J. Vliegenthart*, J.W. Kopert and E.L.T. van den Akker*

Cortisol in Hair and the Metabolic Syndrome

Tobias Stalder, Clemens Kirschbaum, Nina Alexander, Stefan R. Bornstein, Wei Gao, Robert Miller, Sabine Stark, Jos A. Bosch, and Joachim E. Fischer

Assessment of HIV antiretroviral therapy adherence by measuring drug concentrations in hair among children in rural Uganda

Peter K. Olds*, Julius P. Kiwanuka*, Denis Nansera*, Yong Huang*, Peter Bacchetti*, Chengshi Jin*, Monica Gandhi* & Jessica E. Haberer*
Hair is increasingly being recognized as repository for testing in Medicine

But is all hair the same?

Some suggests that curly hair may have a higher internal lipid content than straight hair

Would that influence incorporation of lipid soluble drugs?

If that is the case how would adjust for hair curvature?

No scientifically valid way of defining hair curl
What is “European” hair?

Simplistic non-scientific classification

Asian
European
African hair
New human scientific hair classification – Loussouarn et al IJD 2007
Based on geometry measurements

- **Type I (Straight to Minimal Wave):**
  - Loose S-shaped curves

- **Type II (Open Wave):**
  - Distinct S-shaped curves with uniform wave pattern

- **Type III (Wavy):**
  - Defined, mixed curl patterns: loops to spirals; ringlets to corkscrews

- **Type IV (Curly):**
  - Defined curl with S-shapes forming into coils

- **Type V (Very Curly):**
  - Loose afro-medium coils close to the scalp

- **Type VI (Coiled):**
  - Tight afro-distinct, springy coils closer to the scalp

- **Type VII (Very Coiled):**
  - Extremely tight afro-interlocking coils and zig-zag patterns

- **Type VIII (Zig-Zag Coiled):**
Objective Hair Classification (Gold Standard)

Curl Diameter (CD) meter

Curl Index (i)

Wave number (w)
DST – Woman in Science Award (PhD student) 2014
Ms Khwezi Mkentana 3rd year PhD Student
Title: “Human Hair Characterization using geometry, biochemistry, ultra-structure and genetics.”
Ms Ntombi Sishi

• Cosmetic chemist
• Unique skills
• PhD Candidate
Kind donation of hair for experiments...
We accept all donations of virgin hair from health subjects irrespective of age...

Including traditional shaving of (healthy) babies at 1 year of age...
Please call us...
Scientist at work....
Thank you to the incredible clinical dermatology team who’ve given immeasurable support for this project.
Open to mutually beneficial multidisciplinary collaborations...

Comprehensive Hair Testing

Hair and Skin Health

Skin Toxicology Scarring alopecia

Forensic Medicine
Pharmacology
Public Health
Other...
Human hair
a historic medical repository
Thank you to... without whom we would not be celebrating today!