Skin And Brain
In 5 Dimensions

(Where is the Cosmetic Industry going?)

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Skincare science faces a paradigm shift

The market needs new language

The science is neurocosmetic, because the Brain is intricately involved in the skin benefits obtained from a cosmetic.

Testing (and measuring) of emotions is on the rise

Formulation and sensory analysis will take precedence over "biological activities"

Regulations about claims will need to integrate these new aspects
Active Ingredients?

Yes, but…

> 400 « anti-age/anti-wrinkle » Actives at In-Cosmetics 2014

We have done quite everything we can do on the skin

Do we really need another plant extract that

« decreases crow’s feet

by ≈20% in 2 months » (on a panel of 20 people) »?
A less than exciting example…
(1 out of 77 « Anti-Age » launches in 2014!)

XXX™ is a unique combination of exotic berries from the … country, specially selected to nourish and moisturize young skin for a radiant and healthy look.

XXX™ is an immediately effective and long-lasting free radical scavenger.

It stimulates hyaluronic acid synthesis providing short and long term hydration.

After 2 hours, XXX™ provides 4x more hydration than the placebo.
Suggestive advertisements...
The Future? e.g.
« Improve your self-esteem by 100%! »

Does everyone think you are beautiful... BUT YOU?
We are not the ones we see in the mirror.

We are the ones who shine in the perception by our fellows.

(Beauty is in the eye of the beholder)
80% of the input into our brain is VISUAL


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Straight lines?
Beauty is but the promise of happiness. *Stendhal*
Terms of Wellness:

- Happiness
- Relaxation
- No stress
- No Pain
- …

« Happiness = Well-Being? »

Your skin is never as radiant as when you are happy!
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The Brain and the Skin: Neurocosmetics

- Embryological « brothers » (Prof. Misery, France):

- *In utero*, both skin cells and brain cells develop from the same kind of embryonic tissue, called ectoderm.

- Influence of **stress** on skin has been known for some time

But what about **happiness**?
Skin is our greatest sensory organ

Constant and immediate interactions via nerve endings in the epidermis and nerve signals from the brain to the skin:

- Heat, pain, irritation, sense of touch, even via vellum hair:
  from skin > brain

- Fear, embarassment/shame, anger, joy:
  > from brain > skin

- Neuropeptides and hormones are found both in the skin and in the brain
Skin is our greatest sensory organ
Brain and Skin: two-way communication

Disque de Merkel
Corpuscule de Meissner
Corpuscule de Ruffini
Corpuscule de Pacini
Epidermis
Dermis
WHY are we here today?

• Egyptians: « would not be caught dead without it »!

• “Curls, makeup, cosmetics, greasepaint, and teeth you could buy, and with the same money you could have even purchased a new face.” (Lucilius, 2nd ct BC):

• ‘A woman without paint is like food without salt’
  – Plautus (254 BC – 184 BC)

• ‘A woman without perfume has no future’
  – P. Valéry (or Coco Chanel?)
Cosmetics is about:

- Luxury
- Pleasure
- Well being
- Imagery

Feeling/Looking YOUNG!
And about:

- Marketing concepts
- Exotism
- Self esteem
- Fashion trends

As it really always has been...
What is Health?

An absence of disease?

« Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. »: WHO definition of 1948

But: What is Well-Being?

An absence of unpleasant feelings?

Evidence for the independence of positive and negative well-being: Implications for quality of life assessment
Hedonics? The study of pleasure

An Introduction to the Principles of Morals and Legislation, London, 1789, chapt. 4

All of man's life is a search for pleasure, a shunning of pain

'felicific calculus':

« unit of pleasure » = f (intensity, duration, etc.).

As Lord Kelvin said:
to measure is to know.
How can a cosmetic product improve Well-Being?

Physical means?

Chemical/biochemical mechanisms?

Psychological elements?

All three together?

And which of those can we measure?

Your skin is never as radiant as when you are happy!
Is it possible to measure Well-Being as “positive emotions”?

Yes, because EMOTIONS:

- Influence our decisions (conscious and unconscious)
- Impact our motivation and behavior
- Determine our preferences
- Generate **Expressions** and **Humoral reactions**
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Methods for measuring «Well being»

**Physical:**
- Lie detector
- Neurometer
- Mydriasis
- Electromyography
- Heart beat and respiration frequency
- Posture
- Prosody

**Mental:**
- Self evaluation-MCQ
- Stroop test
- Vigilance tests
- Sleep analysis
- Other?

**Biochemical:**
- fMRI
- PET scan
- Cortisol / saliva
- DHEA, α-amylase, IgA
Physical AND psychological aggressions from the environnement induce more or less significant neurobiological reactions in the skin (redness, paleness, pain, itching, sweat, muscular contraction…).

NATAH, a derivative of the natural dipeptide Kyotorphine helps the skin to decrease these reactions via :
- synthesis of substances that are implicated in well-being and happiness (beta-endorphines)
- modulation of the perception of unpleasant sensations
Emotions induce a neurovegetative activation via the autonomous nervous system which regulates sweat glands’ activity.
« Lie detector » test: Sensorial relaxation

Measurement of Ohmic Duration Response

Stress with sandpaper
Electrical Current Perception Threshold (CPT).

Hyperexcitability of nerves endings (Aβ) increases with age.

A threshold increase indicates a reduction of this unpleasant excitability, i.e. an improved state of wellness...
STUDY OF MYDRIASIS:
Signs of emotional response

Variation of pupilla diameter as a function of zones of interest

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Thermography: related to cutaneous blood flow (blushing...)

Evolution of facial skin temperature under stress
PROSODY
Analysis of the acoustic signal of subject’s voice
= f(emotional state)

Parameters:
- fundamental frequency
- intensity

BEFORE treatment

AFTER treatment
Posture analysis

- Analysis according to common ethological methodology (Lehner, 1998):

- An ethogram is a catalogue or inventory of all behaviours or actions exhibited by an individual.

- e.g. Measurement of the angular variation between vertebral and shoulder axes.
Biochemical methods

- Functional Magnetic Resonance Imaging (fMRI): glucose/oxygen metabolism

- PET scan (Positron Emission Tomography): essentially for every accessible molecule, but radioactivity injected…
Cortisol in Saliva

Positive and quasi linear correlation of cortisol level with stress vs. relaxation

Many other markers are being developed: DHEA, enzymes…
## Prof. Bradley’s WBQ

### Well-being Questionnaire (W-BQ28)

Please circle a number on each of the following scales to indicate how often you feel each phrase has applied to you in the past few weeks:

<table>
<thead>
<tr>
<th>1. I have crying spells or feel like it</th>
<th>All the time</th>
<th>Often</th>
<th>Sometimes</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

| 2. I feel downhearted and blue         | 3            | 2     | 1         | 0          |

| 3. I feel afraid for no reason at all  | 3            | 2     | 1         | 0          |

| 4. I get upset easily or feel panicky  | 3            | 2     | 1         | 0          |
SLEEP ANALYSIS

But also:
Diary: waking/sleeping/fatigue/sleepiness
Epworth Sleepness Scale
Pichot Fatigue Scale
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Back to the Future

New Focus:

- « proven Activity »
- + Sensorial
- + proven Well-Being

...to seduce the consumer of the future
The next trend of « active » ingredients? « Sens-Actives »?

We can « feel » them!

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Active sensorial ingredient?

Lecigel™ A new way to formulate...

Mastering the formulation by combining sensoriality and efficacy in a single ingredient!

More than a gelling agent...

Sophisticates skin feel

Enjoy the unique phospholipid touch!
The softness and lightness of phospholipids for a cool blow.
• Cool effect  • High slippery • Non-tacky
• Soft skin feel • Non-greasy

...an efficacy enhancer!

Hydrates skin

Make the formula base become 100% active!
The formed protective film improves skin hydration.

Boosts penetration

Get better and faster clinical results!
Bioavailability of active ingredients is optimized to guarantee a maximum efficacy.

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Sensory profile

<table>
<thead>
<tr>
<th></th>
<th>Picking</th>
<th>Slipping</th>
<th>Cooling</th>
<th>Penetration</th>
<th>Softness</th>
<th>Greatness</th>
<th>Spreadability</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Assessors gel with 1.75% Lecigel™ evaluated by an expert panel.

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Skin Hydration

(Clinometry)

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>1h</th>
<th>4h</th>
<th>8h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard error (SEM)</td>
<td>5%</td>
<td>12%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Gel with 2% Lecigel™ tested on legs of 50 volunteers with dry skin

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Diffusion of active molecules in human skin after 24h

(Fraunhofer cell method)

<table>
<thead>
<tr>
<th>Reservoir in stratum corneum (will continue to diffuse to become bioavailable later)</th>
<th>Total bioavailable in other skin layers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexapeptide in water  Hexapeptide formulated in a gel with 2% Lecigel™</td>
<td></td>
</tr>
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Cosmetics and Well-Being

- Why are cosmetic products considered (and regulated) as being related to Public Health issues (BGA, Afssaps, FDA, KFDA, MHW…)?
- « Look good – feel better »: Just an idea?
- CEW Beauty centers
- Lip stick index…
A tricky question:

Does a cosmetic product which induces/increases Well-Being (however measured) become a drug?

• E.g. decrease in cortisol secretion in saliva after use of a « soothing » cream or applying make-up

• Changes in brain glucose metabolism as a consequence of « aromatherapy » (better: « smelling a perfume composition »)
OVERLAPS

Cosmetic

Medical device

Food supplement

Biocidal product

Medicinal product
Conclusion #1

The analysis of Hedonistic processes in cosmetic research must be carried out in pluridisciplinary manner.

We must take an HOLISTIC approach of cosmetic effects which accepts the individual in her globality, BEYOND THE SKIN!

Cosmetic use is a holistic hedonistic experience for the consumer, from purchase to blog…

Appealing to all FIVE senses
Conclusion #2

Body and Mind are no more radically opposed or separate:

I do not HAVE a body I AM a body!
Thank you for your attention!

Questions?

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