Table of Contents

Personal Care Spectator

Table of Contents

Memories of a Cosmetically Disturbed Mind

Table of Contents

Release 6

Chapter 31

The Power of Suggestion

Did you ever have one of those watches that stopped running and that with the help of Uri Geller continued its useful life? Did you ever see your spoons being bent by psychic power alone? Or are you one of these down-to-earth cosmetic scientists that believe nothing else but hard facts, supported by a thorough and full statistical analysis of your data? And what does this all have to do with cosmetic science anyway? Wait and be amazed.

As the Chair of the Scientific Committee of the 2007 IFSCC Conference to be held from September 24-26, 2007, in Amsterdam, Netherlands, I have been looking to find a somewhat unusual key-note lecturer that could open the conference for us. The theme of the conference is "Building on Water" but the opening lecturer should provide an unorthodox yet somewhat amusing look on cosmetic science. In this way, I became aware of the work of Prof. Richard Wiseman, a psychologist who started his working life as a professional magician and currently holds Britain's only Professorship in the Public Understanding of Magicians.

Magicians are interested in ways they can get people to believe things that are not there. After all, that's why they are also called illusionists. Richard was one of the country's youngest

There are many people that do not believe at all (the efficacy of) cosmetic products. But there are also people that sincerely do.

members of the famous Magic Circle. Later in his life as a research scientist, he focused his attention on deception, luck and the paranormal. And because one part of the general public thinks that cosmetics is nothing but hope in a bottle, whereas the other part cannot imagine a single day of their lives without them, I thought it a good idea to explore his work on deception and lie detection a bit closer. This could be a frightening experience. Would I find the impostor hoist by his own petard? With the same excitement as you experienced when you held your broken watch in front of the TV during a televised show of Uri Geller, I started reading an article by Richard Wiseman and Emma Greening in the British Journal of Psychology titled, "It's still bending: Verbal suggestion and alleged psychokinetic ability" (*Br. J. Psychol.,* 96 (2005) 115-127).

In this paper, Richard and Emma explain the importance of suggestion on our perception of reality. Imagine Uri Geller has just been bending a spoon he held in his hand by thought alone (a process known in the psychology trade as PKMB, psychokinetic metal bending). He then puts it down on the table and says, "Look, it is still bending!" and, as if by magic, many spectators really see it continue to bend. But is this evidence of genuine psychic ability or not? Richard and Emma devised a clever video experiment that basically investigated this combined with questionnaires which assessed whether the subjects believed in the paranormal or not. The video that every subject saw was the same, showing an interviewer (who in reality was a professional magician) picking up a key and apparently using his psychokinetic ability in a convincing way to place a 25-degree bend in its stem (in reality this bend was achieved by sleight of hand). The interviewer then placed the key back on the table and the videotape ended with a 60-second close-up shot of the bent key. This shot was completely stationary and the key did not continue to bend.

The soundtracks of the tape, however, were different. Half the number of subjects was told by the interviewer that the key continued to bend whereas the others were not. In questionnaires, they were subsequently asked whether they saw the key still bending and how certain they were of what they saw. There were also asked to describe in detail the content of the video.

The outcome was unexpected. Whether you believed in the paranormal or not had absolutely no influence on whether or not you saw the key still bending. However, a significantly larger proportion of the people that were told that the key was still bending (39%) actually saw it bending and they were all pretty sure about it too. Strangely enough, most of these people hardly remembered being told this (12.5%), whereas those that did not see the key still bending remembered that they were told that it would do so (75%). Most of the people that were not told that the key was still bending did also not see this (96%) but they were less sure about it than the people in the other group. Because they did not receive the suggestion of the continued bending, they also did not report this when describing the content of the video.

As usual, you now ask your question what this all has got to do with cosmetic science. I described above that there are many people that do not believe at all in (the efficacy of) cosmetic products. But there are also people that sincerely do. This you can compare to those that do not and those that do believe in the paranormal, respectively. This does not seem to make any difference for your perception whether a product works or not. But the work of Richard Wiseman and Emma Greening does point out the importance of verbal messages in advertising. You can show clinical pictures of the efficacy of a cosmetic product (the initial bending of the key) but being told that it does work after or while you are being shown the evidence (named a PKMB after effect by psychologists) will positively influence the perception of product efficacy. Not only that, people that are receiving the verbal message suggest that their cosmetic product does work are also much more convinced that the product they use does indeed work. It works like magic!

I am sure that Wiseman and Greening will have serious objections against me bending their clever experiments and results to the cosmetic world. There are big differences of course. We watch and listen to cosmetic advertising (comparable to watching their videotape) but then still need to go out and buy the product, apply it and wait for a period of sometimes weeks before we can notice an effect. But in the meantime, the advertising message is repeated and repeated,

over and over again, reinforcing the message of verbal suggestion like a mantra. I will invite Prof. Wiseman to come and open our IFSCC Conference in 2007 in Amsterdam. That will be his opportunity to set the matter straight as if by magic. And straight is what we would like this matter to be for our cosmetic industry. I am hoping that with a little bit of luck, he will bend over backwards to set the matter straight for us. Wouldn't that be magic?

Post-publication note: Prof. Wiseman kindly declined my invitation, and I invited Dr. Michael Shermer, president of the Skeptic Society in the United States instead. His baloney detection kit applied to cosmetic science is discussed at the end of this book.

Modified from a column "The power of suggestion" previously published in SPC, July 2006

Chapter 32

What You Say is What You Get...

Thirty-seven has always been my lucky number since I chose it in a raffle and it allowed me to meet Queen Juliana of The Netherlands. Of course, it had the same probability as any other of the 39 numbers I could have chosen but every National Lottery ticket since then has seen me pick number 37. Needless to say that I have never been lucky since (in the lottery at least). My belief in my lucky number is a typical example of folk science. Something has worked in the past and therefore it will always work, even if contradicted by facts. We are pretty much *au fait* with basic forces such as gravity and speed, although the question "What weighs more, a kilogram of feathers or a kilogram of lead?" continues to fool every young generation. There is an abundance of similar examples in the history of science: we believed that the earth was flat as well as the center of the universe, that there was a vital force flowing through all living things, which in their functional design were believed to have been created from nothing by an intelligent designer. The reason why folk science, according to Michael Shermer, so often gets it wrong is that we evolved in an environment radically different from the one we now live in. "Our senses are geared for perceiving objects of middling size, between, say, ants and mountains,

However, if we are too economical with the truth, we should not be surprised that others play the same tricks on us.

not bacteria, molecules and atoms on one end of the scale and stars and galaxies on the other end. We live a scant three score and 10 years, far too short a time to witness evolution, continental drift or long-term environmental changes" (Michael Shermer, *Folk Science*, Scientific American, August 2006).

All fine, but what has folk science got to do with cosmetic science? My answer is the same as always: quite a lot actually! In cosmetic science, we are also dealing with molecules, atoms and complicated interactions of physical entities with biological systems. We embrace nanotechnology, whereas the attractions of femtotechnology are lurking around the corner. Right now, the dimensions of a molecule are limiting further miniaturization of our technologies but I am convinced that the application of quantum physics will enter into cosmetics within the next two decades or so. Therefore, cosmetic science is following traditional mainstream science and logical thinking dictates that it should therefore also suffer from the misconceptions of folk science. Does it?

If so, cosmetic scientists should feel that they understand issues relating to skin and hair care that the general public does not understand. In previous columns, I have already given you my opinion on some of the benefits of naturals in cosmetics, the fact that perception always wins from reality. Actually, all topics I wrote about so far deal to some extent with a personal frustration that cosmetic science does not matter at all to the consumer, as they simply know things better anyway. In April 2006, I was participating in a debate about the perceived benefits of naturals that was being held as part of the Perspectives in Percutaneous Penetration conference. It was a truly silly debate as all involved were scientists that knew that there was no scientific argument for the natural origin of a material being a guarantee for a better performance or safety profile. We were trying to convince ourselves of things we already knew anyway. Who was lacking in this debate was your and my mother-in-law, that person in our personal environment that (hardly) listens to our scientific arguments and then discards it by saying that they simply know. In the same way as they simply knew that the world was flat and the sun circling the earth.

Where does my mother-in-law get her information (I can't call it wisdom) from? I see it every Sunday when I visit my in-laws with my family. Today, she gave me a leaflet of the 2nd edition of "Mooi" (Dutch for Beautiful), a "Guide for Beauty without Poison" kindly provided to the general public by Greenpeace. They write that "wrinkles disappear in five days, that nails dry within one minute, that we color our hair naturally blond and that we kiss with sensually shining lips. The producers of cosmetic products deserve our eternal gratitude: we remain forever young, beautiful and radiant!" The next paragraph continues: "But one thing the producers of beauty fail to tell us: that the cream that rubs in so nicely and the perfume that smells so great is partially thanks to toxic substances. Chemical entities that can be harmful for the environment and your health. Also of that of your (unborn) child."

This really got us interested, so my mother-in-law and I continued reading. Greenpeace writes: "Phthalates are notorious as plasticizers in plastics (PVC). But the phthalate DEP for instance, is also being used as solvent and fixing aid in cosmetics. Phthalates can disturb the hormone balance and are potential carcinogens. Greenpeace previously encountered these chemicals in blood of adults and in the umbilical cord of newborns." The "Guide for Beauty without Poison" subsequently identifies companies that have replaced (receiving a green light), are busy replacing (amber) and are not intending (red) to replace chemicals from a list of 20 harmful compounds. And then my mother-in-law showed me her preferred antiaging cream and asked me if by any chance DEP was present in her product "somewhere hidden amongst these completely incomprehensible names." Luckily it was not and therefore the discussion what she would have done if it had was purely theoretical.

But I had to explain her a few things. Many phthalates are indeed carcinogenic but not all are. The "all cows are animals but not all animals are cows" comparison did its usual trick. Everything written by Greenpeace was correct, phthalates *may* be carcinogenic and they *may* disturb the hormone balance. But they did not say that this was also the case for diethyl phthalate (DEP). They did not even say whether DEP was on their list of 20 harmful chemicals! But the take-

home message was delivered. My mother-in-law asked me whether DEP was in her product. Nothing more was being said by Greenpeace about DEP, which is indeed used in perfumes and pharmaceutical preparations. Harmful effects have been described for dibutyl phthalate and chain lengths longer than C_4. The SCCP does not have new data that would justify a decision to retract its positive recommendation concerning the use of DEP in cosmetics. However, some cosmetic producers decided to replace it with more costly alternatives like isopropyl myristate and benzyl benzoate to avoid negative PR and in doing so received the green light from Greenpeace.

Is such manipulation of public opinion by Greenpeace bad? The similarities between Greenpeace and the cosmetic industry are striking. Greenpeace states a couple of facts about phthalates and mentions DEP that is subsequently suggested to be harmful by implication. If even the weapon industry is not interested in killing its own clientele, why would the cosmetic industry have a vested interest in reducing its market size by deliberately harming its consumers? But similarly to Greenpeace, our own beloved industry does very often take a couple of self-standing facts and by implication suggests all kind of miracles to happen. Cosmetic scientists are not that different from environmental activists! We are also not objective. Attend an IFSCC Congress if you are not yet convinced that cosmetic science is also about getting your name in the spot lights. Citation counting—it's worse than the Oscars! Those who play at bowls must look out for rubbers!

Where does that leave us? Be true to cosmetic science but do not oversell. Correct your mother-in-law when she asks you a question. Be prepared to explain the logical till death do us part. Someone needs to do it, we all need to do this but I also realize that it will be all in vain. There will always be more mother-in-laws whose sons and daughters did not marry a cosmetic scientist! They will listen to the folk science of both Greenpeace and our industry's advertisements. But this did not stop Copernicus telling the world that the earth circled the sun instead of the other way round. However, if we are too economical with the truth, we should not be surprised that others

play the same tricks on us. Wysiwyg does not only mean “what you see is what you get”, but also “what you say is what you get”!

Modified from a column “What you say is what you get” previously published in *SPC*, November 2006

Chapter 33

Close to the Borderline...

Finally, it happened. My good friend and colleague on the IFSCC Presidium Gavin Greenoak, president of the Australian Photobiology Testing Facility in Sydney, Australia, invited me to take part in a public debate on whether perception is reality in the context of our cosmetic industry. The Debate was to take place twice in March 2007, with its maiden voyage at the 8th ASCS meeting in Singapore followed by an appearance at the ASCC meeting in Wollongong, Australia, a few weeks later. I secretly hoped that Gavin would opt for playing the role of the Realist, allowing me to take the part of the Perceptionist. So, I was delighted when he indeed wanted to be the Realist which gave me the perception that I had already won the Debate before it even started.

But then, where do you start in pointing out that there is nothing more in our industry than illusion and perception? Of course, the truth is somewhere in the middle but I was supposed to portray a rather one-sided view to make my point. This was to be done in the form of an introduction on my reasons why I believed cosmetics to be nothing more than perception whereas Gavin would then follow with an introduction outlining the opposite.

But then, where do you start in pointing out that there is nothing more in our industry than illusion and perception?

A difficulty of a Debate like this is that there may be big consequences. What happens if the media find out about it and publish, completely out of context, that our industry now openly admits that we sell nothing more than hope in a bottle? We had to craft this very carefully but with so many thousands of miles between Australia and the Netherlands, it was difficult to resolve this over a few drinks in the bar. We sent across some e-mails but one thing was clear, the Debate in Singapore would truly be a maiden voyage and none of us knew what would come or how well it would go.

I was given the first shot and first asked Gavin and the audience rhetorically what they thought of President Bush. The next question was how well they actually knew him as an individual or his policies, to which the answer simply had to be not a lot, but most of us have a strong opinion about him nevertheless. Perception rules! In science, things are not different. There are three levels of science, normal science, borderland science and non-science also known as nonsense. I mentioned Big Bang cosmology as an example of normal science but could also have mentioned quantum mechanics, evolution or plate tectonics. SETI (Search for Extraterrestrial Intelligence), hypnosis and acupuncture are examples of borderland science whereas alien abductions, Big Foot and UFO's clearly belong in the category of non-science. According to Michael Shermer, in his 2001 book, *The Borderlands of Science: Where Sense Meets Nonsense*, SETI is considered to be a borderland science and not a pseudoscience because it is not claiming to have found anything (or anyone) yet, it is conducted by professional scientists who publish their findings in peer-reviewed journals, it policies its own claims and does not hesitate to debunk the occasional signals found in the data and, finally, it fits in our understanding of the history and structure of the cosmos and the evolution of life. But SETI is also not a normal science because its central theme has yet to surface as reality. Thus far no aliens have phoned in yet. UFOlogy, by contrast, is non-science and sometimes pseudoscience as its proponents do not play by the rules of science, do not publish in peer-reviewed journals, ignore the 90-95% of sightings that are fully explicable, focus on anomalies, are not self-policing, and

depend heavily on conspiratorial theorizing about government cover-ups, hidden spacecraft, and aliens holed up in Nevada caves.

The next question then was where cosmetic science stands. Is it normal science, borderland science or non-science? Are we professional scientists? Are we *all* professional scientists? Do we publish in peer-reviewed journals? Do we *all* publish in peer-reviewed journals? Are we trying to discover ways to test our theories? Are we *all* trying to discover ways to test our theories? The repetition of questions makes it clear that, of course, you and I can answer yes to the first of all the above repeat questions but that all we know of plenty of colleagues in our industry that would not be able to answer in a positive manner. They are the ones doing commercial science where the objective is to find out how good your "thing" is relative to benchmark or to nothing. You and I, on the other hand, do normal science that is done for finding out how "things" work and to test or deny our hypotheses. When you evaluate the last cosmetic conference or congress you went to, you will probably agree with me that by far the majority of cosmetic science is more observational than explanatory, severely suffering from confirmation bias, and most prominently done to prove a point rather than to disprove a point. No wonder that when you listen to yet another new raw material introduction you are looking for holes that you can poke in their stories rather than really paying attention to the novel benefits and opportunities of that new chemical. Or even worse, that you need to repeat all the work as the supplier of the information (and the ingredient) cannot be trusted. After all, his or her story is so fantastic every time.

In case you agree with me that cosmetic science unfortunately is at best borderland science, the next question to address is what difference this does make? The consequence of this is that other professional scientists see cosmetic science as second class science, or refuse to even consider it a science. We have difficulties getting cosmetic science journals like the *IFSCC Magazine* and the *International Journal of Cosmetic Science* accepted by Medline. An argument that was made during the PR Debate in Singapore was that cosmetic science borrows from everywhere else, physics, biology, dermatology,

psychology, etc., and therefore cannot be a self-standing normal science but I cannot imagine dermatology without biochemistry and physiology or physics without mathematics or biology without chemistry. Dermatologists are realizing that we, cosmetic scientists, know a lot more about skin hydration and formulations than they do and some are willing to learn whereas others pull up their noses, treating us second class scientists.

What is probably worse is that the general public agrees with the majority of other scientists that our science is not good enough. We promise a lot but we are also legally forced to have evidence for any claim we make. Our marketing colleagues know how to beautifully craft our findings into words (or if we are not careful they force us to find the evidence for their beautiful words without any sense for reality) but who is to blame for reading too much into our words or to say it differently, to read what is not written? Who is suffering from perception here?

Without perception there is no reality and without reality there is no perception. It seems that they are different yet intertwined as yin and yang. They do exist individually but cannot do without each other. But in cosmetic science, we need to get the balance right, but the balance is at a different place for all of us. Who is right and who is wrong? That is really determined by perception.

Modified from a column "Close to the borderline" previously published in *SPC*, April 2007

Chapter 34

Nutraceuticals and Nanoparticles...

Not the most logical combination of topics for my very first e-newsletter column, but life is full of surprises. Its abbreviation, N.N., stands for anonymous (at least in the Netherlands) and that actually is a thing that unites these two subjects. Public awareness, also known as perception, and what the reality is or could be. Let me explain.

Nutraceuticals is a new category of products that feed and nourish the skin from the inside out. Not a cosmetic that you apply to the area that needs it most, but a cosmetic that you eat. When I asked my wife today what a nutraceutical was, she could not tell me. Nutraceuticals are anonymous. When I explained to her what it was, she was not totally convinced about the world's latest need for nutraceuticals. I did explain to her that our skin needs specific building blocks like, e.g., linoleic acid and linolenic acid that our bodies cannot make themselves and that they are therefore called essential. "But why not apply them in a cream? Why eat them?" is what she asked. That really got me thinking. Why eat and not apply them topically?

Nanoparticles have great potential as a delivery device, a sensory clue, a reservoir for targeted and controlled and event-controlled delivery to name a few.

Of course, there is a beautiful link with essential nutrients in food. Eat your skin healthy! But I also remember having done skin penetration

experiments in which you would only get roughly 1% of a dosed amount into the skin. Would eating be better? To answer my wife's question, I had to do some calculations. Normally, cosmetics are applied at a rate of 1 mg/cm^2. Typical levels of linoleic acid in a cream would be maximally 1%, which corresponds to 1 g/100 g cream, or 10 mg/g cream. Normally only 1 mg of cream is applied per square centimeter, so 10 µg of linoleic acid is applied. As only 1% penetrates, this corresponds to 0.1 µg or 100 ng penetrating into the skin per square centimeter from a single dose. Is this better than eating the essential nutrient? A typical product form for nutraceuticals, if I may believe advertisements on Dutch television, is yoghurt that is sold in small pots.

According to certain advertisements, every great-looking woman is bound to suffer from constipation which will make her feel (and God forbid, look) like a balloon. Despite her shining beauty, she has a tough life but help is nearby. She eats a pot of yogurt every day containing a strain of beneficial bacteria and 14 days later, she will feel flat and beautiful again. Finally, she can even have a rest in the restroom again. But let's assume for a moment that we already have yoghurt on the market containing the skin-essential molecules linoleic and/or linolenic acid. As the daily volumes of yoghurt consumed are bigger than that of a cosmetic cream, its dose has been reduced to 0.1%, but with a 125 mL pot, still 125 mg enters her body if we assume a specific density of 1 g/mL. Uptake of essential elements from food is much higher than that percutaneously absorbed, and I assume 50% but it could be higher, much higher. That would mean that 62.5 mg of linoleic acid penetrates into the bloodstream. If only 10% of that goes to the skin and the typical adult body is 1.8 m^2 in surface area, this would equate to a level of 6.25 mg/18,000 cm^2, which is 0.35 µg/cm^2. In the same order of magnitude as we found in the skin following topical application. But of course, I had to make made quite a few assumptions, but even in the best case scenario (100% uptake into the body, and 100% ends up in the skin) the answer is still only 6.9 µg/cm^2. Around 70-fold more than delivered via the topical route from a non-optimized skin care formulation. If I apply my Formulating for Efficacy concept to linoleic acid and get its

penetration up to 50%, the topical application is winning again from the best possible nutraceutical product by a factor of 7! Of course, you could then increase the level of linoleic acid to 1% in the yoghurt again in an attempt to beat the cream, but I think this example shows that if you apply your chemical to where it is needed most in combination with Formulating for Efficacy, you have a higher probability of success and that "targeted application" works to your benefit. Topically applying a formulation is a form of targeted delivery.

And nanoparticles are all about delivery, aren't they? They have become a bit of hype and every marketer wants to be able to claim the four letters "nano" somewhere on his or her bottle. And for good reasons, by the way, as these little things have really shown that size does matter. They are small but their actions are large, if not immense. They seem to be able to do everything. But unlike nutraceuticals, they are not completely unknown to the public at large. Media have indicated that they are dangerous and should be handled with care. They have shown to penetrate skin (of course, otherwise they wouldn't work, would they?), but the risks are actually minimal. A solid penetrates at a rate 10,000-fold slower than a dissolved molecule. So, what is the risk? Prof. Dr. Jürgen Lademann (Charité University, Berlin, Germany) spoke at the "Trailblazing the Skin Frontier" Workshop, held at George Washington University in Washington, DC, from August 11-13, 2007. He and his colleagues showed that 5 µm diameter nanoparticles penetrate preferentially into the infundibulum, the small gap between the hair shaft and the inwardly curving skin. This means that titanium dioxide or zinc oxide of the same proportions should also, to some extent, penetrate the skin. But, as the consumer watchdog programs want us to believe, is this a reason to not use particulate sunscreens? Does this not remind you of a similar situation a few years ago when we were told not to use organic sunfilters because of their estrogenic activity? As Prof. Lademann said, it is much, really much more dangerous not to use a sunscreen than to have these minute amounts of titanium dioxide or zinc oxide penetrating into your body.

Both topics, nutraceuticals and nanoparticles, have a great future ahead of them. In the case of nutraceuticals, long-term clinical

studies will have to show their benefit. And these won't be as easy as 'we' have it in topical cosmetics. We tend to do our work in this way: on one arm we apply the product with the nutraceutical activity; on the other one we apply a placebo or no product at all. Every subject acts as his or her own control. These so-called paired comparisons mean that you require fewer subjects to show a statistically significant difference. But this will not be possible with nutraceuticals. If you eat the active ingredient, then it may or may not end up in the skin. If it does, it goes everywhere and treats the skin everywhere. Clinical trials demonstrating the benefit of nutraceuticals are therefore more complicated than most other cosmetic trials. And whereas any improvement on a site where a product has been applied topically is immediately assumed to be caused by this product (after all, it makes sense, doesn't it?), our friends in the nutraceutical arena have all appearances against them, even if the skin appearance is excellent. How do you conclusively show that the observed skin improvement was caused by eating a product? For the moment being, I remain skeptic, not about the technical side, but about the capabilities to convince the consumer. Nanoparticles, however, is a new subject area that offers great opportunities. They have great potential as a delivery device, a sensory clue, a reservoir for targeted and controlled and event-controlled delivery to name a few.

In short, this may have been my first column on these issues for e-newsletter, but I am certain that there will plenty more to report in a year's time on both subjects. Just stay tuned!

Modified from a column "Neutraceuticals and nanoparticles" previously published in *Cosmetics & Toiletries* magazine's Newsletter, August 29, 2007

Chapter 35

Alternative Testing or Testing Alternatives?

Picture this: I am driving in a taxi somewhere in the world (you will see why I cannot reveal where I was) with a female colleague of our industry. After a whole day of cosmetic claim substantiation work, she asks me an intriguing question, "Tell me, Johann, how would you measure breast firming?" The only thing I immediately knew was that the obvious response was not the politically correct one. I clinched my fists and let my brain do some work. One thing was obvious; this lady was after an alternative test method. A hilarious discussion followed on how you could lower your breast into a cup (or container depending on cup size) filled with water and measure the quantity of spilt water before and after having applied the firming product. This simply had to be an appropriate albeit very Dutch method of measuring breast firming as according to my dictionary, the Dutch word for bosom ("boezem") also means a 'system of reservoirs for superfluous polder-water'.

Our cosmetic world needs testing alternatives because doing the logical thing is too painful, too embarrassing, too dangerous, too difficult or in this case politically incorrect. Especially in toxicology, the need for alternative

Instead of spending all that time, money and effort on finding a replacement for an animal test, should we not calibrate it against true human in vivo skin irrtancy data?

testing is enormous. Actually, there is a need for testing alternatives for test alternatives, as animal testing is after all, already an alternative for human testing. The Draize test is a beautiful example thereof. This is a test in which 0.5 mL or 0.5g of a test chemical or test product is applied to a small area of shaved skin of albino rabbits for up to 4 hours. The production of an irritant response (erythema and edema formation) is measured by visual inspection of the skin at 1, 24, 48 and 72 hours, respectively, after patch removal. But, as every child can understand, such testing brings suffering and this is perceived differently now than when the test was developed more than 60 years ago (see Draize, J.H., Woodard, G., and Calvery, H.O., Methods for the study of irritation and toxicity of substances applied topically to the skin and mucous membranes, *J. Pharmacol. Exper. Therap.*, 82 (1944) 377-390).

Alternative tests have therefore been developed and some of them have now been accepted as alternative test methods. Julia Fentem of Unilever's Safety & Environmental Assurance Centre (SEAC) writes in *ATLA* 30, Supplement 2, 61-67, 2002, that "In February 2000, the European Union (EU) Member States approved the first replacement alternative (*in vitro*) methods to be mandated for use in regulatory toxicity testing. *In vitro* tests for skin corrosion (the rat skin trans-cutaneous electrical resistance [TER] method and tests employing human skin models) and phototoxicity (the 3T3 neutral red uptake [NRU] phototoxicity test) have both been shown unequivocally to be reliable and relevant, in extensive pre-validation and formal validation studies conducted under the auspices of ECVAM." So, these tests for skin corrosion and phototoxicity have been on the market for a while. Rich Ulmer, President and CEO of InVitro International, Irvine, CA, writes in a *Letter to the Editor* of *Cosmetics & Toiletries* magazine in September 2007: "On May 2, 2007, the first of several likely *in vitro* test methods to replace animal testing for skin and eye irritation was approved by a European Government Regulatory Agency—The European Centre for the Validation of Alternative Methods (ECVAM)." This skin irritation test came a lot later, not because ECVAM did not care, but maybe because they cared too much.

Dr. Jon Heylings from Syngenta worked or maybe still works with Julia Fentem in the ECVAM Management Team. My information is from April 2002 when Jon gave a magnificent presentation for the Dutch Society of Cosmetic Chemists about his experience with setting up alternative tests. He outlined the whole procedure and to be honest, it is not something to get very happy about if you are a rabbit and waiting to be shaved if a testing alternative is not found in time. Jon told us that ECVAM funded a pre-validation study that lasted from 1999 to 2001 with the objective to find a replacement for the Draize rabbit skin irritation test to distinguish irritants from non-irritants. The challenge to the industry was to provide tests that could do this using 10 chemicals. The Task Force initially reviewed a test protocol, prediction model and supporting data used with the EpiDerm human skin model, recommending to ECVAM that this test was put forward for pre-validation. In addition, since it was felt preferable to be able to include other *in vitro* tests in such a pre-validation study, the Task Force recommended that an open "challenge" was set, which involved laboratories submitting data on ten specified chemicals, and on 20% sodium lauryl sulfate as a reference standard, for review by the Task Force. Following review of test protocols, prediction models and data submitted by test developers, the Task Force recommended that ECVAM should support a pre-validation study on four tests: EpiDerm, EPISKIN, PREDISKIN (BIOPREDIC, Rennes, France) and the non-perfused pig ear method. Again, on the recommendation of the management team (following its review of the test protocol, prediction model and supporting data), an additional test, the mouse skin integrity function test (SIFT), was incorporated into the study in November 1999, following the completion of phase II with the four methods selected initially.

Jon had worked extensively on the SIFT model, he already published on that at the IFSCC in 2000 in Berlin, Germany. He concluded that of the five methodologies that went into the pre-validation study, only three passed ECVAM Phases I and II. And none of them fully met the management team criteria for a Phase III blind study, which made him wonder how good the in vivo data actually

was. Now 8 years later, ECVAM finally picked two alternative assays. Guess which ones? EPISKIN and EpiDerm, the two reconstituted human epidermal models! My alternative predictive testing, also known as scientific gut-feel, could have predicted that one with a high probability. On the ECVAM Web site (*http://ecvam.jrc.it/index.htm*) you can find a statement on the validity of in vitro tests for skin irritation. I quote: "Of these (EpiDerm and EPISKIN), the EPISKIN method showed evidence of being a reliable and relevant stand-alone test for predicting rabbit skin irritation, when the endpoint is evaluated by MTT reduction, and for being used as a replacement … for the Draize skin irritation test."

Let's now go back to what Rich Ulmer writes to us in his "Letter to the Editor: What's the Future of Safety Testing?" He states that "... ECVAM showed an ability to balance risks, such as public safety, with the benefits of eliminating unnecessary animal testing by stepping in as the first group of government regulators to actually move a segment of the industry toward in vitro testing." But I am not that sure whether the ability to balance risks is coming at too high a price. First of all, Episkin is owned by L'Oréal and some other manufacturing companies may not want to give money to the competition. Tough, bad luck; those can still use EpiDerm. Secondly and more importantly, what alternative test methods always do is predicting the values obtained with a previous test. The Draize test was a test on rabbit skin to predict the irritancy of chemicals on human skin but was performed on rabbit skin, so what it really told us was rabbit skin irritancy. As you could read in the statement of ECVAM's Scientific Advisory Committee, the new test alternatives are tests that predict rabbit skin irritancy. Rabbits don't use cosmetics! Now that is what I call an alternative, folks! Instead of spending all that time, money and effort on finding a replacement for an animal test, should we not calibrate it against true human in vivo skin irritancy data? Jon already wondered how good the in vivo data actually was and rightly so. Our alternative tests should measure or predict the best and not a surrogate. Is that alternative testing or a testing alternative? Nothing can replace the real thing. Think of breast firming and you know what I mean.

Modified from a column “Alternative testing or testing alternatives” previously published in *Cosmetics & Toiletries* magazine’s Newsletter, September 21, 2007

Chapter 36

With the Speed of Light...

Whereas you know that scientists like Copernicus showed to the world that the world is spinning at a constant speed (a logical consequence of placing the sun at the center of the universe), you nevertheless still have the impression that the world is turning at an ever increasing speed. In the good old days (and I am only talking about 20 years ago), you sent contracts by post and subsequently waited a few days if not weeks until the other party had received, read, signed and returned them. Nowadays, we take a former contract, change a few words, print them off, sign them, scan them in, attach them to an e-mail, enter an e-mail address and hit the send button. And we get annoyed if we have not had a response within an hour. But the world is still spinning at the same speed.

Increasing the speed of something is only a relative thing. In times gone by (on August 12, 490 BC to be precise) a messenger was sent out from Marathon to Athens to inform the Athenians that the Persians were coming. Pheidippides ran the 42 kilometer distance without stopping. He would have been subjected to temperatures as high as 39°C, and just after he arrived in Athens with the news, he died (likely from heat stroke). We get annoyed if we send something out to the other side of

Would it not be better if our products would spontaneously degrade as soon as another improved version gets onto the market?

the world and do not receive an instantaneous answer. When things can go faster, nobody accepts any longer that they do go slower than the maximum imaginable speed. We're facing a temporary benefit, but the benefit becomes the standard and we want more (skin tan), less (skin tone), faster (delivery), bigger (portions), leaner (thighs), longer (legs or holidays), etc., etc.

In case you're wondering where this list of superlatives is leading you, my topic this time is accelerated testing. We test quite a few things in our cosmetic industry. We test for safety (actually, the in vitro alternatives I discussed last time have a much greater chance of being accepted if they also offer a speed benefit), for stability, for efficacy, for microbiological contamination, for interactions between the (ingredients of the) product and its container, etc., etc. Especially physical stability testing can be quite time-consuming. Imagine you had to store all your samples for three years before you were able to state that your product was stable for this period of time. This would be far too long relative to the lifetime of the product in the market place. Our world would have moved on. We therefore invented accelerated testing to gain time.

Take physical stability testing of formulations as an example. Emulsions may undergo flocculation (internal droplets form a weak, reversible association without a change in size), coalescence (merging of internal phase droplet to form one larger particle-but of different sizes), Oswald ripening (the newly formed larger droplets are uniform in size), creaming or sedimentation (less dense particles rise to the top), or phase inversion. How do we do our accelerated testing of emulsions? We are aware of freeze-thaw cycles, prolonged testing at elevated temperatures but are they truly predictive? For example, by subjecting the formulation to high temperatures, the assumption is made that if a formulation is stable after 3 months at 50°C, it would be stable for 2 years at ambient temperatures. The problem with this approach is a possible phase change that may occur at the formulation's critical temperature (which means a breakdown), that may not occur at ambient temperatures for several years. Centrifugation tests can also be misleading, since subjecting the formulation to a high gravity force may cause coalescence that may not occur at

normal gravity forces. So, how valid are these accelerated tests? Do they depend on the formula? Do they depend on the product? Help is definitely needed here and I was glad to find on the Internet the March 2004 "Guidelines on Stability Testing of Cosmetic Products" compiled by the CTFA and Colipa (*www.colipa.com/site/download.cfm?SAVE=28540*). Unfortunately, after reading this document you know just as much (or little) as before reading this document. It states that "there is very little generally applicable published research to support specific accelerated methods for predicting cosmetic shelf life." Had we not already reached that very same conclusion? About "Accelerated" Conditions," it states that "Accelerated test conditions are internationally recognized as appropriately predicting product shelf life in many industries" and continues to list a number of parameters that need to be investigated: temperature variations and extremes, mechanical and physical tests and light stability. Did we not just conclude that these tests were inappropriate under certain conditions? Luckily, the document does leave enough space for new experimentation appropriate for the product form: "Each manufacturer should design their stability testing program such that it is reasonable and efficiently addresses the testing required."

While, on the one hand, this is pretty useless, it means on the other hand that you may design your own testing regimen, provided it is reasonable and efficiently addresses the testing required. Do you notice a resemblance with what is written about cosmetic claim substantiation in the European law? Claims should be supported by sound, relevant and clear evidence based on generally accepted data, experimental studies (instrumental / biochemical methods, sensory evaluations, studies without using human subjects) and consumer evaluations. Here the big question is always, what is sound and what is relevant? For accelerated testing, what is reasonable and what is efficiently enough?

Anyway, accelerated testing is something where you can almost do whatever you want. If you do it badly, i.e., your product that you declared to be stable is in reality unstable, *you* are the one that will suffer in the market place. And who cares about a 3-year stability certificate anyway if we launch new "improved" formulations every

six months anyway? Would it not be better if our products would spontaneously degrade as soon as another improved version gets onto the market? You may think it is crazy but that is what happens in the computer industry. I will have to save this Word document written on my new Vista computer in the Word 2003 format, as otherwise my friends at Allured may not be able to open it. And that is, like it or not, normal. Something works till something better pops up. Fax machines replaced the registered mail. E-mails replaced fax machines. The faster option becomes the norm. Until we reach the speed of light. What happens then is all very relative....

Modified from a column "With the speed of light. Accelerated testing" previously published in *Cosmetics & Toiletries* magazine's Newsletter, October 8, 2007

Chapter 37

Pigments, Pigments, Everywhere...

So, here you are reading my first column about pigments. I know absolutely nothing about pigments which is probably the most enticing and stimulating reason for continuing reading. For me as a skin biologist, there is only one pigment and that one is melanin which consists of eumelanin and phaeomelanin. These are the pigments that give color to our skins, provide utterly unjustified reasons for discrimination and aggression, unite and separate nations, or make you look very sexy. But one thing is universal about this pigment: whatever color you've got, you want something different! Caucasians want to have a suntan, whereas Asians want whiter skin. The expression, the grass on the other side is always greener is chromatologically not completely accurate, but you get my point. So, what can I talk about when I should not speak about eumelanin and phaeomelanin but still want to fill a column about pigments?

Of course, I could write about titanium dioxide that, depending on size, is white or colorless. But you would argue that, again, I am making this into a biologically oriented column. I would argue that scattering and the like is pretty physical and, although you would have to admit that I was right there, I would have to admit

I may not know anything about pigments, but once you start thinking about it, they pop up everywhere. Of course, our whole industry comes from pigments.

that the benefit would be pretty biological. Although? Let me reveal a little bit of mind-boggling innovation that I encountered not too long ago. Someone was deliberately using large TiO_2 particles in a skin whitening cream containing a biologically active agent. Whereas most people would argue that you automatically add a sunscreen agent to every skin whitening formulation because you want to compensate for the reduced photoprotection caused by the reduced amounts of melanin in your skin, the innovative step here was to provide immediate skin whitening! In that case, you could just as well stick your head in a bucket of white paint! And with that, I am back at square one, namely pigments, pigments, everywhere … also in paints!

I may not know anything about pigments, but once you start thinking about it, they pop up everywhere. Of course, our whole industry comes from pigments. It was the paint industry (with all its pigments) that initiated the emergence of the pharmaceutical industry. And you can probably state with some degree of correctness that the cosmetic industry emerged from the pharmaceutical industry (at least when you are a biological scientist like I am). So, a first thing you need to know about pigments is that they are particles. And particle science is an up-and-coming subject in cosmetics. Have you looked recently at the contributions of Korean scientists at the last couple of IFSCC Congresses and Conferences? You will see that pigments constitute a disproportionally large fraction of their cosmetic science. These Koreans are fundamentally different in their approach to cosmetics. Whereas all of us focus our attention on the biology of skin and hair, especially on the molecular biology of skin and hair, and we have many active ingredient suppliers whose stories on mechanisms of action require you to have a PhD in molecular skin biology to understand what they are talking about, the Koreans are just that little bit smarter than the rest of us. They use pigments to fill up lines and wrinkles for immediate anti-aging benefits.

But in contrast to me, you know something about pigments and will now argue that that is not novel. Many suppliers in the Western world (and probably Eastern world too) use pigments to fill wrinkles. Again, you're right, but what these Koreans do better than anybody else in this world of ours, is that they do not just fill lines and wrinkles,

they also modify particle surfaces to give additional benefits like an even skin tone, less shine, whatever you can think of. And why do I think that they got it absolutely right? Whereas the rest of us is worried about what to do when our biologically active ingredient is getting too active (will it become a drug?), they focus on the physical side of things and never have to worry about this change in regulatory status if their active is getting too active. Their pigments don't need to penetrate to do whatever they need to do; they can engineer their desired properties on the surface of the particle; they can easily test their materials; they can achieve a physical effect without affecting the underlying biology and on top of all this, not even face regulatory problems!

I may not know a lot about pigments, such as the meaning of all these abbreviations like D&C in D&C Red and D&C Yellow (let me guess Drugs and Cosmetics), or FD&C in for instance, FD&C Blue No. 1 Aluminum Lake (let me guess Food, Drug and Cosmetics). I may not know what a Lake is apart from a fresh water sea, but I do know that these Koreans are doing a great job in overcoming scientific and regulatory hurdles. Koreans KISS, or in case you do not like acronyms: Koreans Keep It Stupid and Simple. That normally works best. After all, all we want in cosmetics is to have an immediate result from whatever product we apply, something that we can control and dose and particulate science allows you to do so. By manipulating the surface, you can create the effect you want whereas in skin biology we always have to find out how things work first and then find a chemical that can modulate this often delicate balance to our advantage, that chemical then needs to be penetrating the skin and reach the site of action in sufficient quantities for a sufficiently long period of time to do what it is supposed to do. No delivery issues for the Koreans. They simply apply their pigments on the face and their job is done. No waiting for months for dermal fibroblasts to re-orient themselves, they fill the wrinkles within minutes if not seconds. All they need are some particles (ah, but which?) and some clever particle surface chemists (ah, but which?) to get the job done in no time.

Of course, you are now going to ask what particles you need and what type of surface chemistry you need to apply, but now I hide

myself behind the fact that I know nothing about pigments. Folks, I need to run, I'll be back next month with a column on antiaging. I'll be a month older then and no product that can stop that (unless it is very toxic). I'll see you when you're older, I'm off now. I'm off to Korea. To learn about pigments. Pigments, pigments, everywhere….

Modified from a column "Korean Pigments" previously published in *Cosmetics & Toiletries* magazine's newsletter, December 5, 2007

Chapter 38

Too Stressed to Age Properly...

Simply because everything changes, and because we all age, the logical combination of these two statements implies that one day, we will not age any longer. And also that is true. By that time, we are either dead or you and/or I have, finally, created the ultimate antiaging product. I know which one of the two options I prefer. But are these indeed the right options?

Let me first differentiate between being alive and being young. The statements above deliberately make the mistake that anti-aging really means preventing us from passing on to "the other world," whereas that is not what cosmetic products do at all. That would definitely be outside the official definition of the function of a cosmetic product and, I believe, even outside the definition of a drug. Because we prefer aging over the alternative, we want to get old, but not to be old, i.e., we do not want to look old. All we want is to stay younger for longer.

How successful have we been until now? I have seen living examples of elderly people that proudly told me their age, simply because their looks did not match their age. These cases have also been the only times that I heard people of 50+ years proudly state their age. All these proud people looked significantly younger than

I ask you, if we have products that really do work and living examples to prove it, why then have we not really solved the problem of antiaging yet?

their calendar age. But why then does not *everybody* look younger for longer if it technically can be done?

Yes, we do indeed have great active ingredients that can prevent our collagen molecules from being hopelessly tangled. We include them at too low concentrations in formulations that feel great but do not necessarily deliver the active ingredient. But some, obviously, do get it right and the users of those products look younger for longer. But the rest of us, including me, have aged yet another year as we are heading into 2008. Our wrinkles keep deepening as the years go by.

I ask you, if we have products that really do work and living examples to prove it, why then have we not really solved the problem of antiaging yet? We're doing such great science to reveal the secrets of skin aging. At the Annual Scientific Meeting and Technology Showcase of the SCC in December 2007, Dr. Leonard Guarente of the Massachusetts Institute of Technology, spoke about sirtuins, aging and diseases in the Frontiers of Science Award Lecture, sponsored by *Cosmetics & Toiletries* magazine. According to Guarente, over the past decade or so, we have learned that a few critical genes seem to exert a disproportionate control over aging and life span in many organisms. Among these are the sirtuins, a group of related genes homologous to the yeast SIR2 and shown to possess an anti-aging function in a wide variety of organisms. The silent information regulator (SIR2) family of protein deacetylases (sirtuins) are NAD(+)-dependent enzymes that are well conserved in both eukaryotes and prokaryotes. Their biological activities include cell development, metabolism, apoptosis, and heterochromatin formation. The NAD requirement of SIR2 inextricably links it to metabolism, for which NAD and the reduced NADH are critical conduits.

Why is that important, you may ask? Because this links antiaging to metabolism, in particular to what dieting can do for antiaging. It has been known for a long time that calorie restriction leads to a couple of metabolic adjustments, including improved glucose and lipids homeostasis that lower blood glucose and LDL-cholesterol (bad cholesterol) and raise insulin sensitivity and HDL-cholesterol (good cholesterol). But only this century, it was found that these beneficial effects are mediated via the SIR2 related sirtuins in yeasts

and fruit flies and in mice, required the mammalian SIR2 gene, SIRT1. Two years earlier at the same SCC Annual Scientific Meeting, Claude dal Farra (then Vincience, now ISP) described SIRT1 as the human homologue of SIR2 and indicated that SIRT1 was expressed in human cultured skin cells and in *ex vivo* skin and confirmed that its expression was related to stress. Under moderate stress conditions, SIRT1 expression increases in a dose related manner and inversely with p53 expression. Under strong stress conditions, the balance between SIRT1 and p53 shifts and p53 expression takes over.

In normal English, this means that in order to prevent aging, we need a small amount of stress. That is why a restricted calorie intake gives you an antiaging benefit. You need both SIR2 and a low diet to give you antiaging benefits. And what did you just do over the Festive Season? You ate too much, you drank too much and you gave or received that latest antiaging product to/from your partner. We can make the best antiaging product of the world but that alone is not going to do the trick. We also need to change our lifestyle. We need some stress, but only that little bit of metabolic stress, not the long-term excessive stress that you get, free of charge, from your boss, your partner, your children, your never-ending responsibilities.

And I know I am right. Once you realize the necessity of this little bit of stress, everything falls into place. My good friend Gavin Greenoak of the Australian Photobiology Testing Facility in Sydney, Australia, gave a beautiful talk at the In-Cosmetics India show in Mumbai in November 2007 where, in his very last slide, he showed that mice that were only allowed to eat between 8 am and 6 pm had much higher MED (minimal erythema dose) values than mice that were allowed to eat freely. Two days later, he repeated this talk at the Indian Pharmaceutical Association and indicated that Indians also had higher MED's than the rest of mankind. This resulted in a discussion why this could be. One of the suggestions from the audience was that in contrast to most other races, most Indians have been vegetarians for centuries.

I hope you make the same connection. These mice whose food intake was limited to a few hours a day were under limited metabolic stress and had higher MED's. Vegetarians seemingly live under

limited metabolic stress and have higher MED's. This healthy life style is obviously good for them. But what do most of us do? We apply the best antiaging products whilst we eat too much, drink too much, work too much, sleep too little and have so much stress that our p53 expression takes over. Too much "too" in our lives and that is why even our best antiaging products don't work for us. Unless we get the balance right between lifestyle and product use.

And that is the great thing about writing a column on antiaging in the first week of January. It is not too (oops, too again) late to (that's better) start a new resolution. Combine your antiaging products with a healthy life style and you may look great too (oops)! Everything with moderation, less food, less drink, less hassle, less carbon dioxide, less pollution, less work. Sounds OK, doesn't it? Leonard Guarente ended by quoting one of his colleagues who claimed that if living with calorie restriction didn't really make you live longer, it certainly did feel that way. But I would say everything with moderation and all will be fine. I better stop. After all, it's Saturday, why am I working? I wish you all a very successful and relaxing 2008 with only that tiny bit of necessary stress.

Modified from a column "Stress and anti-aging" previously published in *Cosmetics & Toiletries* magazine's newsletter, January 5, 2008

Chapter 39

Getting It Right or Being Right...

So, I managed to do it all within a single month. Not bad for a just starting consultant in cosmetic science, I thought. But sorry, you do not have the faintest idea what I am talking about. I booked within a single month a flight to Brisbane (Australia), Auckland (New Zealand) and Shanghai (China), a flight to Bristol (United Kingdom), and a flight to Sao Paulo (Brazil), Buenos Aires (Argentina) and Lima (Perú). In each of these countries I am meeting with representatives from the local Societies of Cosmetic Chemists or Scientists and will be presenting on some cosmetic science subject. For each trip, I tend to make a new talk but you can use the same talk in different corners of our spherical world as the probability that you will find another person with the same enormous carbon footprint as myself to be pretty slim. And what's even more, cosmetic science is a global business and what is true on side of this planet is also true at another side of this planet. Correct, don't you think?

Unless you think about ethnic products. If the rationale for those products is correct, then cosmetic science should be different in different places of the world. But my behavior of using a talk in different corners of the world suggests that the science is the same. And if the science is the same, the prod-

If the rationale for those products is correct, then cosmetic science should be different in different places of the world.

ucts should be the same. So, either I am wrong and there is indeed a different need amongst the various races on this planet or our marketing colleagues have got the wrong end of the stick and we're selling stories. I know which one of the two I would prefer to be wrong.

Many papers and reviews have been written about different permeabilities of skin from different ethnic origins. When Japanese women were compared to European women in their perception of lactic acid-induced sting, the difference was profound. Japanese women suffered a lot more from lactic acid than their European counterparts. If you look at studies that compared in vivo differences in skin barrier function between Asians, Blacks and Caucasians, you quickly conclude that based on methyl nicotinate penetration, Asian skin is by far the most permeable of the three, followed by that of Caucasians, whereas Blacks have the toughest skin of the three.

So, there are differences and I am more wrong than I would like to admit publicly! I better study the literature a bit better before I open my big mouth again and shout that there are no differences between skins of different color. How can I have been that wrong? But then I remember that other article describing skin penetration of acetylsalicylic acid, benzoic acid and caffeine and I see that I was not that wrong at all. That article shows no difference whatsoever between the three races in skin permeability!

But because it is impossible for someone to be right and wrong at the same time, the search for the truth continues, although I cannot resist quoting my brother-in-law, a lawyer, who once said to me: "Johann, life is not about being right but about getting right" and I guess that is why he became a judge, so that he is always right! A reduced skin barrier function should be able to explain an increased sensitivity of the Asians, so if my theory is right, their transepidermal water loss (TEWL) should be higher than those of representatives of the Black and Caucasian populations. Back to the scientific literature and what do we see? To my astonishment, I see that when TEWL values of Japanese and German women were compared, those of Japanese women were statistically significantly lower. I am shooting myself in the foot here and can already hear my marketing colleagues

laugh in the background. “We don’t need all this science, we just know by listening to our customers!”

I really have to defend myself here to maintain some credibility and argue that my marketing colleagues do not know why the TEWL of Japanese women is lower than that of German ladies. This could be caused by a stabilization of the orthorhombic skin lipid phase in their intercellular spaces. And then it hits me and I see the light. The methyl nicotinate penetration and the lactic acid that showed that Asian skin was more permeable, penetrate via pores whereas the acetylsalicylic acid, the benzoic acid and the caffeine all penetrate via the bulk of the stratum corneum. If Asians would have more pores, or bigger pores, or cleaner pores because of spicier food that causes their pores to open up wider, then I can explain it all. Asian skin seems to be more permeable but this could only be related to pores, whereas the least permeable skin lipid phase, the orthorhombic phase, may genetically be more stabilized in Asian skin. Finally, I know that I am right!! I can explain it all. Skin differences between the human races are often very small but sometimes very real.

But by this time, I have completely lost my marketing colleagues. They’re already out on the market selling anti-sensitive creams to the Asians. I may be right, but they are getting right. And you know what is so nice about our industry? Being right or getting right, yes, it definitely is an ethnic issue. You’re either a cosmetic scientist or a cosmetic marketer, but we’re both happy!

Modified from a column “Getting right or being right” previously published in *Cosmetics & Toiletries* magazine’s Newsletter, February 25, 2008

Chapter 40

Cosmeceuticals are No Longer Sustainable!

A column about this horrible word, the curse of cosmetics called cosmeceuticals. It is a word that should never have been invented, but that at least a few cosmetic colleagues claim to have coined. Why am I so negative?

The word suggests that we are talking about cosmetic products with a close to medical activity profile. But a topically applied product is a medical product or it is a cosmetic product, it can't be both. And it certainly can't be in-between. You can't be half medicinal and half cosmetic, in the same sense as you can't be half pregnant. It's a binary system, it is a zero or it is a one and there is nothing in between.

I know, of course, that the above is not completely true. Very often, it is the claim that makes the skin care product a medicinal product whereas without that claim it classifies as a cosmetic product. Please agree with me that this is daft! It suggests that the active ingredient must jump out of the bottle, read the label and subsequently decide whether it will cure or only clean, perfume, change appearance, correct body odor, protect or keep in good condition. Yes, I admit, we have very smart active principles nowadays but this is giving our quasi-drugs a little bit too much credit. An active ingredient is like the average man, it does

Certain types of active ingredients are very active whereas others will do close to nothing, even if pushed into the skin by its surrounding excipients.

what it does and nothing more. And what the average man does is determined by the quality of the women surrounding him. Similarly, whether an active is active is determined by the excipients in the formulation surrounding it. A certain type of man will always try to impress the women in his surroundings, irrespective of being married, single or tired, whereas another type of man will always be shy, dazed, timid, or introvert. That's in his character. Certain types of active ingredients are very active whereas others will do close to nothing, even if pushed into the skin by its surrounding excipients. We call that intrinsic activity. And if you are still not convinced about the similarity between men and active ingredients, just think who of the two genders men think is the more important of the two? And what do cosmetic marketers consider to be the most important component of any efficacious cosmetic product? I rest my case...

Still, it does not explain why I am so negative about the use of the term cosmeceuticals. My reasons are actually quite pragmatic. We really cannot differentiate between a cosmetic and a drug if we accept the fact that a claim made for the product can determine to which category it belongs. Let's not forget that the original definition of a cosmetic and a drug were established before we discovered DNA and that was in 1953! Of course, if our definition of a calculator originates from the time we were still using the abacus, how can we anticipate multifunctional computers to fall somewhere within that definition? Don't solve the problem by introducing a super-abacus aka the cosmeceutical! Change the definition! If we can hardly define the difference between a medical product and a cosmetic product, why should we be able to differentiate between a cosmetic active and a cosmeceutical on the one hand and a cosmeceutical and a drug on the other? We should adapt our definitions of the terms cosmetic and medical products and bring them into the 21st century. That should solve the problem. The term cosmeceutical is no longer sustainable and should be banned. The only question is, will we get to a new definition before the 21st century is over?

In the mean time, we should work on completely different things. We all know that green chemistry and sustainability are of utmost importance nowadays. Also in our industry, we aim to be CO_2 neutral.

But I have not heard anyone yet talking about the enormous waste that happens in the cosmetic industry. In May and June 2008, I will publish two columns in *Cosmetics & Toiletries* magazine, in which it is stated that we waste on average 99% of all active ingredients applied to the skin. Why, because on average only 1% penetrates. If, like men, these ingredients are so important and hence so expensive, why do we allow 99% of them to be wasted? And that is only the economic aspect; how about the environmental aspect of wasting 99% of your raw material? Which industry would allow that? Techniques are available that allow you to optimize the skin delivery of active ingredient (to get men to do what they are supposed to do: work hard for their money, if you allow me to continue with my analogy). But there is more. We can also get more for less. When we formulate cleverly, we can use significantly lower amounts of active ingredients without any loss of efficacy. Feminist cosmetic formulators will know exactly what I mean if I would continue my analogy. The trick is to find for the active ingredient the minimal concentration with maximal activity. The what? The minimal concentration with maximal activity, aka MICMAC! Rather than spending time on inventing new nonsense words like cosmeceuticals, neutraceuticals, botaniceuticals, natura-ceuticals, organoceuticals, nanoceuticals, oligoceuticals, pepticeuticals, and vitaceuticals, we should invest time and money in identifying MICMACs. That will contribute to increasing your company's profits as well as contribute to waste reduction and therefore sustain the environment. It will happen. I don't know when, but rest assured it will. And if you are not convinced, you or your active ingredient can always continue to behave like a chauvinistic male pig and see how long you last. Cosmeceuticals are no longer sustainable, we should MICMAC our active ingredients and in doing so sustain the environment!

I dedicate this column to all smart cosmetic formulators that help to sustain the environment as well as company profits. Female as well as male, as long as you are smart. Only then, you are sustainable.