Acta Derm Venereol 2004; 84: 257–258

Taylor & Francis
healthsciences

In this issue...

Mathematical modelling and how phototherapy works

Danny Hillis, the computing science prodigy, and inventor and builder of the world's first massively parallel computer wrote an essay outlining why biologists should be more enamoured by mathematical models (1). He outlined some of the reasons for the suspicions: biologists tend to avoid maths; biology is full of worrying and annoying little details; whereas the idea of grand theory is what the world expects of physicists. But he also highlighted another critical issue. Biologists tend to think of models only in terms of prediction, rather than as tools in which to gain insight into how things work. They may accept that mice are never going to predict exactly how drugs work in man, but the use of mice is implicitly based on the idea that they provide insight into ways of thinking of experiment in man. They seem reluctant to expand this insight to mathematical models.

Brian Diffey, a physicist, with a background in photomedicine, in the current issue of Acta D-V provides an interesting account of using mathematical modelling to try and understand how ultraviolet therapy can be best used for patients with psoriasis. His mode of thinking will not please all. First, why think about his problem at all? After all, cannot various clinical trials be undertaken to determine the optimum strategy. Second, can a model really provide biological insight into the complexities of human biology? I'll deal with these issues in turn.

The idea that you can carry out all the trials necessary to chose between an infinite number of choices is of course patently absurd. Should you give phototherapy once a day, twice a week, three, four times a week? Should you use 50% of the MED, 70% MED etc. Trials are expensive, often lack robustness and unless designed appropriately (as experimental procedures) furnish little information about how to improve upon any of the experimental permutations tested, let alone guide action in those persons not in the trial. Understanding of these factors explains the paucity of appropriate studies in this area, and the dominance of industry designed studies in other areas of dermatology. What the clinical scientist requires however is a clear model of how treatments work. The clinical trial is then a test of a real hypothesis about how a treatment achieves its effect, rather than a black box comparison between two pragmatic choices. It is this that is the most interesting aspect of Diffey's paper. His model suggests that frequency of UVR dosing is relatively unimportant but that the way to maximise efficiency would be to give fewer, but larger doses of UVR, with a twice weekly dosing regimen.

The second issue, relates to whether his stripped down model (that ignores immunological factors) has any real-world relevance. Here, the biologist's hubris is often to the fore, boasting about how complicated biology is. But of course physics is just as complicated: we may predict the movement of the planets fairly well, but predicting where a paper aeroplane lands when thrown across a room is also pretty messy. But this isn't to deny the utility of Newton's laws of motion. The purpose of computation is to see how far one can get with simple models and to allow future experiments to home in on which hypothesis is the most plausible.

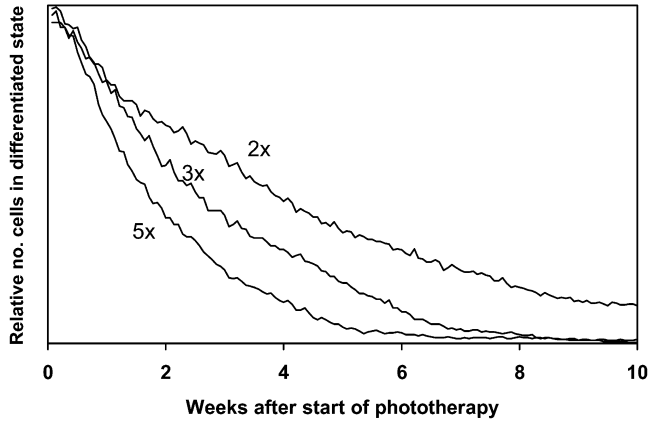

Fig. 1. Disease activity (relative no. of cells in differentiated state) calculated following the start of phototherapy for treatment corresponding to two, three and five times per week (from Diffey, p. 261 in this issue).

In an age where system based approaches are once again coming to the fore (2) we should welcome — and argue — with this contribution.

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2. Rees JL. Genetics, past and present, and the rise of systems dermatology. Br J Dermatol 2000; 143(1): 41–46.

Jonathan L. Rees
Section Editor

Hand eczema: Treatment options and classification

Drs. Nordal & Christensen (p. 302) have performed an open study on the efficacy of narrow-band UVB in the treatment of psoriasis and eczema of the hands in patients suffering from this chronic skin condition. Their results are preliminary, but show that hand psoriasis can benefit from narrow-band UVB treatment, whereas eczema is questionable, and pustulosis of

 ISSN 0001-5555
DOI: 10.1080/00015550410017470

palms is not responsive. The study has its limitations in being an open, although prospective study, but with no direct comparable control group – although all patients had received standard topical steroid therapies. Thus, the study group of patients suffered from chronic and severe hand dermatitis.

Hand dermatitis is a major problem in our daily dermatological practise. Scandinavian studies on this topic are many and show that almost 10% of the adult population is affected by hand eczema (Meding B et al., Acta Derm-Venereol 1989;69:227–33). Hand eczema is the most common occupational disorder among workers less than 25 years of age (Halkier-Sørensen L, Contact Dermatitis 1996;35 suppl 1:1–120). Thus, it affects many young persons early in their professional career eventually leading to sick leave, job loss or even early retirement. This can be a catastrophy for a young person and costs a lot of money for society (direct health costs, social costs and insurrance costs).

Veien et al. showed promising results on the continued use of topical steroids in controlling hand eczema (psoriasis patients were not included) (Veien NK et al. Br J Dermatol 1999;140:882–6). But, it is not certain if the patients included by Nordal & Christensen are quite comparable to the patients by Veien et al. This illustrates a very significant problem not yet solved: How do we classify "dermatoses of the hands"? Etain Cronin, a "world champion on hand eczema" wrote a quite depressive statement almost 20 years ago that she was not able to find a relevant classification of hand eczema based upon her detailed analysis of 240 patients (Cronin E. Contact Dermatitis 1985;13:153–61). This section editor has together with Lars Halkier-Sørensen and Klaus E. Andersen, two experts in the disorder, tried to suggest a "simplified scheme" for classification, where weight was put on the clinical picture and not so much on the outcome of allergological testing. But – our classification paper didn't survive "Scylla and Karybdis" i.e. three "world experts" on hand eczema (Drs. Menné, Veien and Rycroft).

Thus, "experts" are still fighting – while patients are itching, scratching, loosing their jobs – and dermatologists are awaiting better treatment options and strategies. Now, the narrow-band option has been studied – showing its limitations. Hopefully, a Scandinavian multi-centre study including 100's of patients would look further into this topic both regarding classification and treatment guidelines. This is an ideal clinical project for interested dermatologists in private practise. It is just a matter of organization and planning. So – get going! The patients deserve so.

Kristian Thestrup-Pedersen
Section Editor

"Washing your way to the dermatologist"

Cosmetics are in daily use by anyone – almost. We wash, we shampoo, we "rinse", we put on perfumes, after shaves, etc. etc.. "Cosmetics" is an industry with a very big turn-over. It is inherent to our modern life. Therefore, it is fair to ask: Is it dangerous or damaging to our skin? A multi-center, prospective study in Sweden documents that "adverse reactions" to cosmetics are quite common among females, those with previous atopic dermatitis, and those with eczema of the face and neck (Lindberg M et al., p. 291). Further, adverse reactions are significantly correlated with increased age and this is relevant for elderly people, who need to be taken care of in institutions, where "cleanliness" may be too much, creating skin problems as "asteatotic eczema" or "eczema craquelé". Dr. Michael Cork in Sheffield once told me that he strongly believed that the increased use of soap and detergents was part of the reason for the "atopic eczema epidemic". He is likely right as a study in Nottingham could find a significant correlation between "hardness of water" and atopic eczema – probably because calcium-containing water leads to larger use of soap, when showering (McNally et al., Lancet 1998;352:527). So – should we prohibit/significantly diminish the use of "cosmetics"? Well, personally I know that my wife and daughter would object to not buying the many "skin care products" on the shelves of L'Oreal, Shiseido, Estée Lauder, etc. And – I would miss my daily shower. But in our daily clinic we should reconsider to include recommendations on limited use of "cosmetics" if you have a skin problem. This is in particular relevant for children with eczema.

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