

SEEING THE *LIGHT*

Mike Murphy gives his view on how to effectively treat hair using light energy



Mike Murphy is a physicist/bioengineer who has

been involved in medical laser research since 1986 and in the commercial sector since 1989. His original research group developed the scar-free removal of tattoos by Q-switched ruby laser in Canniesburn Hospital, Glasgow. He now runs training courses on IPL systems and aesthetic lasers and their applications.
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Lasers and IPLs have been used to remove hair for a number of years with varying degrees of success. The early days promised ‘permanent’ hair removal but this appears to have been a pipe dream. In reality, the best many users can hope to achieve is ‘photo-waxing’. This occurs when the light energy is absorbed by the hair leading to a little localised heating. The hair is sufficiently damaged to fall out but a new hair will take its place in due course – perhaps thinner, perhaps a bit weaker, but it is still there.

So why is this the case? Surely modern technology can do the job properly? Well, I believe it can. But the laser/IPL users need to understand what they are trying to do and why. As do the manufacturers, which explains why sometimes their training is not so good!

The light-tissue interaction is relatively straightforward. If enough light is subjected to the right tissue for a long enough period of time then the tissue proteins should break down irreversibly. I think of this like cooking an egg – if I want to boil it to perfection I need to have the water in the pan at boiling temperature before putting the egg into it. Once in it needs to cook for around four minutes (for my taste). I know if I take it out too early it will be undercooked and too gooey. If, however, I leave it for too long it becomes too hard!

Treating tissue is exactly the same – we need to ‘cook’ the proteins for the correct length of time at the correct temperature. There is an equation known as the Arrhenius Rate Equation which tells us how this process works. It’s a bit complicated but basically it can be used to figure out the relationship between time and temperature. In essence you can achieve the same results with tissue for a range of temperatures and times – high temperature and short times, or lower temperatures with longer times.

The ultimate goal with hair removal is the irreversible denaturation of the germ cell proteins. If this can be achieved then the follicle will die and cannot re-grow – hence permanent hair removal can be achieved. To do this in the user requires a good understanding of the above temperature/time relationship.

It also depends on the geometry and size of the hair follicle – however the size of the hair itself is not so critical, contrary to popular belief. In fact, smaller

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diameter hairs require higher incident fluences than thicker hairs! This is generally misunderstood in the industry, and certainly by many manufacturers going by their recommended parameters. This is one of the reasons why so many users do not achieve good results!

Many systems currently on the market do not generate enough fluence (energy density) or sufficiently long pulses to ensure permanent hair removal. Even stacking pulses on top of each other does not make much of a difference in outcome, except that this technique may increase potential dermal damage! A good knowledge of these issues will help you to choose the correct system for your requirements and help to produce good, consistent results time after time.