

# A healthy glow

Can the right light help Olympic athletes win medals and alleviate your jet lag? Toine Schoutens, a light and health researcher at Eindhoven University of Technology, certainly thinks so



Toine Schoutens and the original Bright Light from Philips, which creates artificial daylight

**W**hat kind of light are you researching? Dynamic artificial daylight – light that has the qualities of sunlight: the same intensity, colour temperature, timing, periodicity and comfortable diffused quality. The “dynamic” means that the light is changing in brightness (or colour temperature) over time just as natural daylight does, creating an artificial day cycle.

#### Why do we need artificial daylight?

We are creatures of daylight but, since the invention of electricity, we’ve been forgetting that fact. Unfortunately, though, our bodies can’t forget. They suffer, because we still need several hours of daylight each day for maximum health and to function properly. Artificial daylight can therefore be tremendously beneficial in indoor settings like offices, hospitals and nursing homes. Because it can reset our biological clock, it can also help with jet lag. Above all, it’s very important for people like shift workers, who comprise around 16% of the working population in The Netherlands and in most other countries.

#### So how does it benefit people?

In offices and with shift workers, artificial daylight increases concentration and alertness, and therefore productivity.

It helps people have better, healthier sleep patterns, so they awake feeling more refreshed. There is an important safety angle, too. The major industrial accidents of Bhopal, Chernobyl and Three Mile Island all occurred through human failure that took place between 2am and 5am – exactly the time when people are least alert. Exposure to artificial daylight can keep people awake and reduce the chance of accidents. Then there’s the health issue. Cancer and heart disease are more common in shift workers, and that seems to be a sleep issue, so it’s also a daylight issue – if you don’t get enough daylight your sleep will be affected.

#### How did you become interested in light?

I trained as a psychiatric nurse, and in the late 1980s I established, with a group of colleagues, light therapy for seasonal affective disorder (SAD), a type of winter depression caused by a lack of daylight, which is common in northern countries. Our light clinics proved very successful in treating SAD, so I decided to learn more and came to Eindhoven University of Technology to study with the light researcher here, Professor Ton Beggemann. Up until now, there has been no education in the new light technologies, so my current job is to establish a new Masters degree in the subject. It will cover light sources, design, applications, installations ➤

*“Artificial daylight can be tremendously beneficial in indoor settings like offices and hospitals. It can also reset our biological clock”*



Toine Schoutens wants to educate people about the benefits of healthy lighting

*“We’re using exposure to lots of lights to give the athletes more energy and boost their performance”*

and, of course, the health benefits of the right kind of light. As far as I know, it will be the first course of its kind in the world. The light and health component underlies all our work here, and so far we’re unique in that.

**How does daylight affect our mood?**

We don’t really know, there are several theories. Melatonin and cortisol are involved, but there is no consensus. I think it has to do with increasing energy. Light stimulates the adrenal glands to produce cortisol, the hormone we need to extract energy from glucose.

**Can you tell us about your current work with the Dutch Olympic team?**

It’s confidential, but I can tell you about a part of it. All the athletes face the problem of jet lag since they’re travelling to China for the competition. We can deal with this using our jet lag protocol. This means that four days before the flight, you get up one hour earlier using an artificial daylight alarm clock, and go to bed one hour earlier. The next day you get up another hour earlier, and so on, until the day you leave. And you also use a light therapy box at a given point in the day; this all helps to reset your biological clock. If you were travelling west, instead of east, you’d get up an hour later each day rather than earlier.

However, the Dutch swimming team has another problem, in that they perform slightly better in the evening than in the morning, and the finals will take place in the morning because of TV rights. So we’re using exposure to lots of light at a specific time and a specific wavelength – I can’t go into details, obviously – to give them more energy and boost their performance in the morning.

**Another group you’re working with is Alzheimer’s patients. What can light do to help them?**

Light therapy can treat one of the symptoms of Alzheimer’s, called “sundowning” – agitated, anxious behaviour late in the day, accompanied by poor sleeping. These symptoms can actually disappear after using artificial daylight, although the disease can’t be cured.

**What future trends do you anticipate in lighting?**

The tube light will disappear in ten to 15 years. It will be replaced by LEDs (light-emitting diodes). This is very low-energy lighting, and although the light quality is not yet very good, it will be. It’s extremely flexible and low-heat, so it can be used in all sorts of unusual applications. Offices and houses of the future will use LEDs to create all sorts of different lighting environments. Artificial daylight will be one of them – this can already be created in the lab using LEDs. I’m very excited about the research we want to do with a variant of LEDs, OLEDs – that’s organic light-emitting diodes, where the emitting layer is an organic substance. In the lab, we are experimenting with OLEDs in the form of a thin, light-producing foil, that could be used as a wall covering. But it’s still under wraps for now.

**As a light and health researcher, what’s the most important aspect of your work?**

Increasing awareness. People are becoming better informed, but there’s still a long way to go. We need to educate the public on what healthier lighting environments can do for them. ☺  
[www.solg.nl](http://www.solg.nl) or [www.dynalight.nl](http://www.dynalight.nl)