



**STAYING OUT  
OF THE SUN**  
Dr Byrne's  
equipment  
can simulate  
UV exposure  
in the comfort  
of his lab

## THE SUN KING

**IF THERE'S ONE THING** that gets Dr. Scott Byrne hot under the collar, it's people who spend too much time in the sun. The senior researcher from the Dermatology Research Foundation at the University of Sydney is studying the effects of sunlight on the immune system, and he gets exasperated by Australia's high rate of skin cancer because it is so easily preventable.

The sun itself in most parts of Australia is extremely strong. Partly to blame is the North America-sized ozone hole over Antarctica that lets more harmful burning rays through than in other parts of the world; also, Australia is a lot less populated than Europe or the US, so there are fewer

pollutants in the air to filter the sunlight. "It takes less than 10 minutes to get burned in summer here, whereas in Europe it could be a lot longer than that," Byrne says.

### CANCER CAPITAL

When skin cancer develops, two things occur: the DNA gets damaged and the immune system's anti-tumour system is suppressed. Byrne works largely on the immune side of the equation. He points to established studies showing that kidney transplant patients, who take immunosuppressants to keep their bodies from rejecting their new organs, show a much higher incidence of skin cancer. "In fact, they get skin cancers that most of us wouldn't find particularly dangerous, and can have severe complications because of the drugs they're on," says Byrne.





called interleukin-10 instead and begin to 'regulate', or suppress the immune system. Byrne's group has named these cells UVB regs. The group's next challenge is to find out more details – how does UV light activate the B-cells, and then how exactly do the UVB regs suppress the immune system? Once they can answer these questions, research can begin on ways to inhibit those processes, which could lead to medications or new ingredients for sunscreens.

#### SUN THERAPY FOR MS?

Byrne's other research passion stems from work done at Tasmania's Menzies Research Institute and by other researchers at the University of Sydney. It involves the impact of sunlight on autoimmune diseases such as Multiple Sclerosis. Autoimmune diseases are caused by the opposite of immune suppression. Instead, the immune system is basically in overdrive – it begins to destroy the body.

Researchers have found that residents of Tasmania are almost seven times more likely to develop MS than people who live close to the equator. They hypothesise that sunlight is protecting the northerners from getting the disease. In theory, more sunlight may actually dampen these overactive immune systems and therefore help keep diseases such as MS in check.

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#### SEEKING QUESTIONS, NOT CURES

Byrne realises that cures for these diseases may be years away, but he's not looking for an easy reward. "You can't go in thinking, 'I'm going to cure cancer,'" he says. "You've got to go in with the attitude of, 'That's really interesting. How does that happen?'" He started asking questions like that back as an undergraduate at the University of Sydney, where he studied medical science. He went on to get his PhD, and eventually received a grant from the Australian government to do a fellowship at Houston's prestigious MD Anderson hospital, in the same lab where 30 years ago, the discovery was made that sunlight suppresses the immune system and causes cancer.

Byrne's job takes him to conferences all over the world. But he tells his PhD students that the most exciting part of his field is how dynamic and applicable immunology is. It affects every anatomical system, and eliminates tumours, bacteria, viruses and worms. "Textbooks probably shouldn't be written, because by the time they're written, they're out of date," he says. "We're discovering new things every day." —YASMIN GHAREMANI

#### BYRNE'S UV DISCOVERIES

Of the two types of ultraviolet light, it was once thought that only UVB was dangerous; UVA was considered good because it let you tan without burning. But Byrne's group found that UVA was just as harmful to the immune system as UVB. Plus, UVA rays are the ones that cause wrinkles (think B for burning and A for ageing). "What most people don't realise is, if you've got a tan, then you've got too much UV," explains Byrne. "It's the body's response, trying to give you protection from further sun exposure."

Byrne's main mission is to find out exactly how UV rays suppress the immune system. So far, his group has identified a unique type of white blood cells, called B-cells, which normally produce antibodies to fight foreign invaders such as viruses and bacteria. But when exposed to UVB, they produce a molecule