



Rode cited three outstanding Red Cross cases with burns ranging from 65% to 94% of total body area where the CEA process saved the children's lives and left them with dramatically minimised disfigurement.

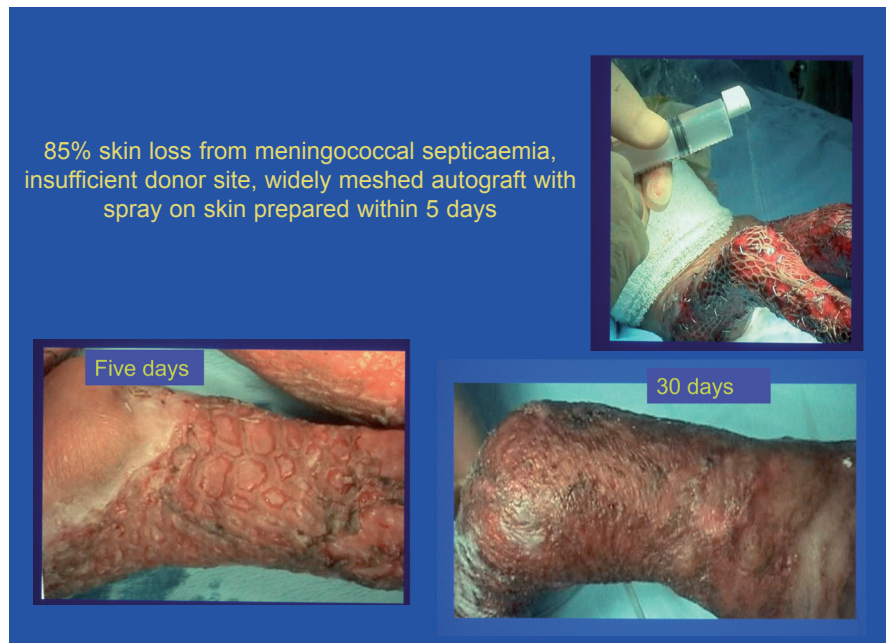
A 6-year-old girl left by a gas bottle explosion with insufficient donor skin for grafts (94% burns) had the skin solution sprayed on her face, enabling full recovery with barely noticeable facial scarring. A 1-year-old child with meningococcal septicaemia and 85% skin loss had both legs sprayed over widely meshed autografts. She recovered fully with minor scarring and functional legs. The third case involved a 4-year-old girl with 65% full-thickness burns. Here also, both her legs were sprayed to minimise donor site scarring, resulting in a pleasing physical outcome.

Rode said that in all three cases the skin 'looks almost normal, has a beautiful texture, is soft, colour-matched, pliable and robust'.

### Infection the biggest obstacle

So far Red Cross has used the CEA process on 20 children, with a small minority of 'non-successes', mostly due to infection of the wound. The hospital admits between 900 and 1 300 children every year, drawn from across southern Africa and beyond.

In Australia the technology (which was valued at R100 000 for their first operation, including travel, but which has since been reduced to an 'infinitesimal amount') is also used for re-pigmentation of patients.



85% skin loss from meningococcal septicaemia, insufficient donor site, widely meshed autograft with spray on skin prepared within 5 days

Rode said Wood had put 'absolutely no restraint' on usage of the technique within Red Cross Hospital, but he and his in-house colleagues were not allowed to 'export' the technique. Wood, a 48-year-old British-born mother of six, is head of the Royal Perth Hospital's Burns Unit and is married to an Australian surgeon. She cites among her most satisfying achievements the last of the Bali bomb survivors to leave Royal Perth, Antony Svlicich. He walked out after 44 days in a coma and 4 weeks after surgery and extensive rehabilitation to burns that had covered 64% of his body.

Wood started a company called Clinical Cell Culture (C3) to commercialise the CEA procedure. The business came about after a schoolteacher arrived at Royal Perth

Hospital in 1992 with petrol burns to 90% of his body. Wood turned to the emerging US-invented technology of cultured skin to save his life, working nights in a laboratory along with scientist Marie Stoner. The two women began to explore tissue engineering. They moved from growing skin sheets to spraying skin cells, earning a world-wide reputation as pioneers in their field.

However, the lack of proper clinical trials for the technology caused a minor storm of controversy and extensive debate in the scientific world until they were scheduled for a laboratory in the UK. Royalties from licensing are ploughed back into a research fund, called the McComb Foundation.

**Chris Bateman**



# AUSTRALIAN SURGEON'S TENACITY MORE THAN SKIN DEEP



Red Cross Children's Hospital burn's surgeon, Professor Heinz Rode.

The generosity of a brilliant, indefatigable plastic surgeon in Australia who developed 'spray-on skin' has saved over a dozen lives at Cape Town's Red Cross Children's Hospital, where local colleagues deal with southern Africa's worst paediatric burn cases.

Royal Perth Hospital's Fiona Wood was named Australian of the Year in 2005 for leading a team working to save 28 patients suffering from between 2% and 92% body burns, deadly infections and delayed shock after the 2002 Bali bombings.

Her patented intervention, called cultured epithelial autografts (CEA), a solution of epithelial cells harvested from the patient's own skin and grown in an accelerated 5-day laboratory

process (reduced from 3 weeks), played a central role in the healing and recovery, with hugely reduced scarring, of the Bali bomb survivors.

The CEAs are sprayed, fan-like from a nozzled syringe onto severely burnt areas, prepared (ideally) with a patchwork of grafted skin. About half of the cells fall face down and grow because of the enzymes they secrete (being non-confluent), thus adhering to the recipient bed to proliferate. The beauty of Wood's 'spray-on skin' (besides the speed of intervention so crucial for burns treatment), is that procuring epithelial cells from just 1 cm<sup>2</sup> of a patient's skin enables an area 500 cm<sup>2</sup> to be covered.

Local burns surgeon Professor Heinz Rode, who worked closely with Woods to set up the local capacity, said she readily agreed for her tool to be exclusively used to alleviate the plight of hundreds of southern African children, mostly from low-income families treated annually for often disfiguring burns at Red Cross.

## Burns top cause of trauma-related under-4 mortality in SA

In South Africa burns are the leading cause of trauma-related death for children under the age of 4 and the third greatest cause of trauma-related death for people under 18. Red Cross Children's Hospital is the only southern African facility using CEAs, although other hospitals can purchase the technology from Australia, including a dramatically improved more expensive CEA process that takes just 20 minutes to prepare.

*A 6-year-old girl left by a gas bottle explosion with insufficient donor skin for grafts (94% burns) had the skin solution sprayed on her face, enabling full recovery with barely noticeable facial scarring.*

While not new (Rode and his chief microbiological technician Peter de Wet, now retired, criss-crossed the Indian Ocean to learn the process 10 years ago), the spray-on skin is used sparingly for the most clinically appropriate cases – it has amazing results.

'The crux is to get the wound healing as quickly as possible. If it's a full-thickness burn or a deep partial-thickness skin burn you'll excise it and cover either with an allograft or synthetic skin (both temporary) or the patient's own skin (permanent),' said Rode.

If there is sufficient donor site, surgeons stretch the skin up to six times to create the mesh and then fill the gaps with spray-on skin. The meshed skin acts as an effective protective template, as the proliferating cells on their own are prone to mechanical trauma.

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