

### RECOVERY AFTER RABIES

An experimental protocol called the Milwaukee protocol has been used to save three patients with documented rabies.

The first person to survive, Jeanna Giese, developed rabies after bitten by a rabid bat. She did not receive post exposure prophylaxis. When she reached the hospital she couldn't talk, stand or sit and had fluctuating consciousness. She was ventilated and started on a ketamine-midazolam induced coma, amantidine and ribavirin. Her medical coma was withdrawn after a week and she was supplemented with tetrahydrobiopterin for 6 months. She then received intensive rehabilitation for a year. Now 4 years later, she has a driving license, is studying biology in Marian University and is normal except for a slight limp and slow speech.

The second patient was 8 year old Nelsy Gomez, in Colombia who developed rabies after the bite of a rabid cat. She recovered quickly on the Milwaukee protocol but died a month later of pneumonia. Rabies is usually lethal within a week hence much credit is being given to the protocol.

The third success for the protocol is from Brazil. Fifteen year old Menezes, developed rabies after a bite from a rabid bat though he did receive 4 doses of antirabies vaccine. He received the medically induced coma for 2 weeks and is now slowly being weaned off the ventilator.

Willoughby, the father of the Milwaukee protocol, who is an infectious disease specialist, has studied pterins and monoamine neurotransmitter metabolites in the CSF of rabies patients. He found they had low tetrahydrobiopterin, and pathological deficiency of dopamine and serotonin transmission which may explain some of the neurological manifestations. Neuronal nitric oxide synthase is also tetrahydrobiopterin dependant and may cause cerebrovascular insufficiency. If more detailed study of the role of tetrahydrobiopterin proves its role, we will have a metabolically specific, readily available, enteral therapy for rabies.

*(J Inherit Metab Dis. 2008 Oct 25; Scientific American 21 November 2008).*

### E-WASTE: THE NEW HAZARD

Electronic waste comes from broken down electrical and electronic machines like computers and cell phones. What is disturbing about it is that many parts are toxic and non-biodegradable. Mumbai city produces 12,000 tons of e-waste annually according to the Maharashtra Pollution Control Board. The bigger problem is that other Western countries regularly export e-waste to India because of our greater ability to recycle and reuse. Also India's lackadaisical environmental rules as well as lesser stringent working conditions are an open invitation for e-waste. A Carnegie Mellon University study estimated that in 2002, the US sent about 10 million computer units to Asia for recycling, keeping only about three million on its own shores.

Toxic substances include lead, mercury and cadmium in circuit boards and monitors. A typical computer monitor may contain more than 6% lead by weight, much of which is in the lead glass of the CRT. Recyclers, many of them women and children, melt computer parts with acids, releasing a smoky stream of lead, dioxin and other toxins. Carcinogenic substances in electronic waste include polychlorinated biphenyls (PCBs). Capacitors, transformers, PVC insulated wires, PVC coated components that were manufactured before 1977 often contain dangerous amounts of polychlorinated biphenyls. The garbage handlers who deal with it on a daily basis are at most risk. Disposal by landfill will lead to soil and water pollution with long term hazards.

In Mumbai, e-waste collection is mainly by the unorganized sector. The only e-waste collecting truck in Mumbai is operated by an organization called Ecoreco. An e-waste recycling plant is on the anvil in Mumbai, but Bangalore has an electronic waste processing area.

Technology is a double edged sword which needs sheathing. *(The Economic Times 8 December 2008, Greenercomputing news, 8 December 2008)*

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