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Gently does it

16 June 2001 by [Andy Coghlan](#) and [Michael Le Page](#)
Magazine issue 2295. [Subscribe and save](#)

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IT MAY not take much force to kill babies, says the largest and most detailed study yet on the brains of infants whose deaths were suspicious. The findings challenge the widely held view that only extreme violence causes shaken baby syndrome.

The research, revealed exclusively to New Scientist, calls into question the scientific evidence behind many convictions for killing infants and could open the way for a wave of appeals. "Unless it is certain that injuries were caused by gross negligence or worse, the judge will direct the jury to acquit," says John Binns, a criminal defence solicitor with Victor Lissack & Roscoe of London. "On the basis of these findings, it is impossible to imagine a prosecution succeeding in anything but the clearest cases."

Jennian Geddes, a neuropathologist at the Royal London Hospital, and her colleagues found that shaking can damage nerve fibres in the neck area that control breathing. The subsequent lack of oxygen, makes the brain swell dramatically. This causes brain damage of the kind previously blamed on direct trauma to the brain caused by violent shaking, they will report in the July issue of the neurology journal *Brain*.

"This is a type of damage that's not been reported before," says Geddes. "It shows that you don't have to use a lot of force to injure a baby," adds Geoff Vowles, a colleague at the Royal London Hospital.

Geddes says such injuries couldn't happen just by bouncing a child on your knee, or in normal everyday interactions between mother and child. "They would have to involve vigorous unsupported movement of the head." She believes most people would realise this kind of force would be dangerous. "But you could imagine scenarios that might produce the damage without it being deliberately inflicted," Geddes says.

"Hopefully, this will stop American attorneys being so dramatic in the way they present evidence," Vowles says, referring to the way the prosecutor in the Louise Woodward case demonstrated how he thought Woodward had shaken the baby with all her might for up to a minute.

Geddes's team, including Helen Whitwell of Sheffield University, studied the brains of 53 children suspected of dying from deliberate injuries. The coroners at their inquests had ordered that the brains be removed and stored. Of the 53 children, 37 were less than a year old and 16 over a year.

In the past, brain damage in such circumstances has been blamed on the brain banging against the skull as a baby is violently shaken or struck. This direct assault causes a characteristic kind of damage to the axons of nerves known as diffuse axonal injury, or DAI. But the researchers found evidence of DAI in only two of the 37 infants less than a year old.

Instead, they found that three-quarters of the 37 babies had died because they stopped breathing. "We found an as yet unseen pathology focused on the craniocervical junction, the point where the brain meets the spinal cord," Geddes says. A rocking motion at this point can damage the vital part of the spinal cord that controls breathing.

The joint is uniquely vulnerable in very young babies because their neck muscles are so weak and their heads relatively large and heavy. Evidence of this kind of stretching was found in eight babies, and three others showed damage to neck nerves. Others may have had similar damage too, but the pathologists who did the original autopsies didn't look for it.

Pressure in the skull rises massively as the body tries to compensate for the lack of oxygen, and the brain swells up. This causes a kind of damage virtually identical to DAI but the two can now be distinguished, thanks to new tissue staining techniques that are far more sensitive and reliable. "Blood vessels in the brain get squashed by the swelling and cause a specialised form of damage to axons," says Geddes.

The investigators also question the origin of other lesions that are assumed to be evidence of extreme violence and markers for DAI. These include subdural haemorrhages, or bleeding under the skull, and retinal haemorrhages.

Geddes found subdurals in 72 per cent of the 53 cases, but most were too superficial to have caused death. She also found retinal haemorrhages in 71 per cent of the 38 cases in which eyes had been examined. But she believes that both types of lesions can also occur when the brain is starved of oxygen.

The researchers expect to receive a lot of flak over their findings, but they believe the size and thoroughness of the study stands them in good stead. "The evidence is there, and what spin others choose to put on it is up to them," says Whitwell. The message is to treat babies with extreme care, she stresses. "Don't shake them in the first place."

Bibliography

1. More at: www.brain.oupjournals.org

From issue [2295](#) of New Scientist magazine, page 4.

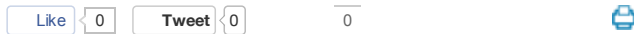
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