rhythm for extended periods after respiratory effort has ceased. Because infants who succumb to SIDS are clearly not undergoing hemorrhage, some other (as yet unknown) trigger must be eliciting the shock-like sequence.

The potential for the prone sleeping position to contribute to an enhanced risk for SIDS is readily apparent if the fatal mechanism is primarily of a cardiovascular nature. Vestibular input can substantially modify blood pressure responses. Indeed, body tilt is a primary autonomic challenge in clinical medicine, and prone *versus* supine position directly modifies heart rate[8]. Such a vestibular effect may be mediated by afferent projections to the cerebellar fastigial nucleus, as lesions of that nucleus result in ineffective compensatory responses to hypotension. If the failure in SIDS is of a cardiovascular character, then the arcuate nucleus findings of Kinney and her colleagues are of particular interest. The arcuate nucleus has classically been thought to project to the cerebellum, and could well modulate a vestibulo-cerebellar, fastigial nucleus-mediated compensatory response to hypotension. Moreover, based on a study using a lipophilic dye, Kinney's group report that, in humans, the arcuate nucleus projects strongly to the caudal midline medullary raphe region[9]. These findings are significant in light of recent reports that excitation of the caudal midline medullary raphe (at approximately the level that receives arcuate nucleus input in the human), evokes hypotension, often accompanied by bradycardia. This region does not normally contribute to maintenance of resting blood pressure or baroreflex function; however, it is involved in triggering vasodepression in response to challenges such as hemorrhage or muscle pain[10]. Thus, a possible consequence of reduced muscarinic and kainate receptor binding in the arcuate nucleus could well be a critical reduction in the ability to compensate to challenges that provoke hypotension.

The latest neurochemical findings renew the hope that a specific failure mechanism, apparently exerted at a defined period of postnatal development, and operating in concert with particular challenges during sleep, may be identified. The suddenness of SIDS, combined with physiologic signs observed prior to death and during the fatal event, favors a cardiovascular, rather than a respiratory mechanism. The trigger(s) for this event remain obscure.

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Promising regeneration in the adult CNS

IMAGE UNAVAILABLE FOR COPYRIGHT REASONS

Courtesy of Stephen Davies

The failure of injured neurons in the adult central nervous system (CNS) to regenerate their axons has devastating consequences. Davies and colleagues, reporting in *Nature* (**390**, 680–683), now demonstrate that regeneration of adult axons can be achieved. They used an elegant microtransplantation technique that limits the extent of glial scarring (the infiltration of glial cells that accompanies CNS injury) and clearly show that glial scarring contributes to inhibition of axonal regeneration.

For years, neuroscientists have been trying to elucidate the inhibitory factors that are present in the adult CNS but not in the peripheral nervous system or in the developing CNS. Postulated factors include myelin associated proteins and infiltrating glial cells that secrete growth inhibitory factors.

Davies and co-workers transplanted dissociated dorsal root ganglia (DRG) from adult and neonatal rats into the corpus callosum of adult rats. The corpus callosum is a broad band of myelinated axons that connects the hemispheres of the cerebral cortex. Regenerating axons were observed as early as two days after transplant. By day six post-transplantation they had extended through host white matter, crossing the midline of the brain (M in figure) and in some cases terminating in host grey matter in the opposite hemisphere—a distance of 7 mm!

The figure shows a subpopulation of donor DRG neurons (red)—which can be distinguished from host cells because they express calcitonin-gene-related-peptide—and the extent of their regenerating axons. The donor neuron cell bodies are surrounded by donor satellite cells (green), which are primarily restricted to the transplant site.

In some cases there was no axonal regeneration. The investigators were able to show that upregulation of the proteoglycan chondroitin-6-sulfate at the host/transplant interface blocked regeneration, whereas proteoglycan levels were minimal in the successful transplants. Intriguingly, upregulation of proteoglycans has previously been shown to coincide with the stage of development at which axons fail to regenerate in the CNS. The reactive extracellular matrix seems to play an important inhibitory role in axonal growth, both during normal development of the CNS and also following disruption of the extracellular milieu. Finding the molecules that trigger upregulation of proteoglycans may offer the possibility of future therapeutic interventions in debilitating spinal cord and brain injury.

MICHELLE PAGE

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