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Letters to the Editor

In our August 2009 issue, we published the article "Challenging an Assumption" (p. 29), which was a profile of Dr. John Plunkett, a Minnesota pathologist who questions the validity of the shaken baby syndrome diagnosis. In January, we received and published a letter critical of our article and of Dr. Plunkett's views (p. 5). That letter was signed by members of the international advisory board of the National Center on Shaken Baby Syndrome. Since then, we have received numerous letters taking issue with their letter and the views of its signers. Clearly, we have touched a nerve in writing about this issue. Our intent for the story about Dr. Plunkett was neither to validate nor to denigrate his work. We merely wanted to highlight the fact that a Minnesota physician is taking part in a highly controversial debate that has ramifications for medicine and the legal system. Below are some of the letters we have received recently on this topic. Others can be viewed online at www.minneotamedicine.com.
—the editors

Growing Body of Contrary Evidence

In your January 2010 issue, nine doctors, a prosecutor, and a police detective—all of whom are associated with the National Center on Shaken Baby Syndrome, an advocacy group devoted to the promotion of "shaken baby" theory—attacked Dr. John Plunkett, who was featured in the August 2009 issue of *Minnesota Medicine*. Dr. Plunkett has spent his recent career applying basic biomechanical and medical principles to shaken baby syndrome (SBS) and testifying, if needed, when accused parents or caretakers are confronted with unproven or demonstrably incorrect medical claims. Because of his work and research by others, the literature on SBS has changed substantially since 2000, forcing major changes in the SBS position papers of the major medical organizations. In their 2010 letter, the representatives of the National Center on Shaken Baby Syndrome claim that Dr. Plunkett's findings are based on "belief" rather than "evidence." In fact, doctors have been diagnosing SBS for nearly 40 years without an adequate scientific basis—and in the face of a growing body of contrary evidence.

In the 1970s, "shaking" was advanced as a theory to explain a triad of findings (subdural hemorrhage, retinal hemorrhage, and/or brain swelling) that is sometimes seen in infants or children who have no signs of trauma. The theory was that shaking caused these findings by rupturing bridging veins and tearing the axons within the brain. In 1987, Dr. Ann-Christine Duhaime, a neurosurgeon working with biomechanical engineers at the University of Pennsylvania, attempted to prove that shaking could cause these injuries. However, her study showed the opposite: The forces of shaking fell well below established injury thresholds and were 1/50th the force of impact, including impact on soft surfaces.[1]

Despite these findings, many doctors continued to testify that shaking was the primary or sole cause for the triad of symptoms and that it would take a fall from a multistory building to cause these findings. In 2001, Dr. Plunkett disproved this premise in an article that included a videotaped fall of a toddler from a 28-inch plastic indoor play structure that resulted in subdural hemorrhage, retinal hemorrhage, and death.[2] This videotape proved definitively that short falls can cause the triad and are sometimes fatal. Although SBS proponents initially suggested that the videotape had been altered, Dr. Case (one of the signatories to the attack on Dr. Plunkett) has acknowledged the validity of the videotape, which has been shown in courtrooms and at teaching seminars in the United States and England.[3] Numerous biomechanical studies have further confirmed that the force from short falls meets the injury thresholds, while shaking does not.[4-6]

Short falls are not the only cause of medical findings previously attributed to shaking. Studies by Dr. Jennian Geddes published in Brain, England's leading neurology journal, from 2001 and 2003 found that the brain injuries of allegedly shaken children were generally hypoxic rather than traumatic in origin, and that subdural hemorrhages are also found in natural deaths.[7,8] In 2002, Drs. Hymel, Jenny, and Block (two of whom signed the attack on Dr. Plunkett) listed the alternative causes for findings previously attributed to shaking or inflicted head trauma as accidental trauma; medical or surgical interventions; prenatal, perinatal, and pregnancy-related conditions; birth trauma; metabolic, genetic, oncologic, or infectious diseases; congenital malformations; autoimmune disorders; clotting disorders; the effects of drugs, poisons, or toxins; and other miscellaneous conditions.[9] A 2006 text on abusive head trauma in infants and children (co-edited by Dr. Alexander, another signatory to the attack on Dr. Plunkett) and a 2007 review article by Patrick Barnes, professor of radiology at Stanford University and chief of pediatric neuroradiology at Lucile Salter Packard Children's Hospital, are in accord.[10] Despite this consensus, hundreds to thousands of parents and caretakers have been imprisoned based on testimony by doctors that subdural hemorrhages, retinal hemorrhages, and/or brain swelling are diagnostic of abuse, with little or no regard to the alternatives, including short falls and natural causes.

At the same time, many doctors and academics have recognized that the real problem lies in the lack of an evidence base for shaken baby theory. In 2003, a review article by Dr. Mark Donohoe found that "[T]he evidence for SBS appears analogous to an inverted pyramid, with a small data base (most of it poor-quality original research, retrospective in nature, and without appropriate control groups) spreading to a broad body of somewhat divergent opinions." [12] In 2006, the National Association of Medical Examiners withdrew its position paper on shaking, and its annual conference included presentations with titles such as "'Where's the Shaking?': Dragons, Elves, the Shaking Baby Syndrome, and Other Mythical Entities" and "Use of the Triad of Scant Subdural Hemorrhage, Brain Swelling, and Retinal Hemorrhages to Diagnose Non-Accidental Injury is Not Scientifically Valid." In subsequent publications, Dr. Waney Squier of Oxford University, one of England's leading neuropathologists, and Dr. Jan Leestma, author of the textbook Forensic Neuropathology, similarly concluded that the evidence base for shaken baby syndrome is lacking.[13,14] None of this material is addressed or cited in the attack on Dr. Plunkett.

The problem, in short, is not that Dr. Plunkett was wrong; the problem is that he was right. Over the past decades, hundreds to thousands of caretakers—many of whom are innocent—have been convicted based on theories that lack a scientific basis. These convictions must now be revisited.

Of course children are abused. But there are many ways to abuse children, one of which is ripping them from their families and imprisoning their parents and caretakers based on misdiagnoses of abuse. We therefore urge the medical profession to join us in developing a calm, rational and evidence-based approach to pediatric head injury and child death.

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Circular Reasoning

We read with interest Kate Ledger's article "Challenging an Assumption: A pathologist questions shaken baby syndrome" (*Minnesota Medicine*, August 2009) and the response of Drs. Alexander, Barr, Block, et al. (January 2010).

Dr. Block and his cosigners complain that Ms. Ledger ignored the enormous body of international peer-reviewed medical literature about shaken baby syndrome. Much of this literature exhibits circular reasoning, selection bias, or misrepresents the data. Of the 14 references they cite, six are unsystematic reviews or consensus statements that mingle opinion with fact and add no original supporting evidence. Two are based on data described by the authors as "explorative." Those authors suggest that "further surveillance ... and modelling will be required." Two are invalidated by insufficiently robust criteria to reliably diagnose abuse and one by failure to address the fundamental methods on which the study was based.

Dr. Block and his cosigners suggest that this literature "consistently and repeatedly supports the concept of shaken baby syndrome." We do not disagree with this but would point out, as Ms. Ledger clearly did, that supporting a concept is far from demonstrating the scientific basis for it.

Just as disturbing as the literature Block and his cosigners cite is the indignation they expressed that someone should challenge their opinions as medical "experts" in a court of law—as if they are somehow exempt from the human tendency for cognitive errors in medical decision making. What scientist is afraid of debate that is crucial to our understanding of evolving ideas?

Fortunately, medicine has never been static. There is much to learn about the pathophysiology of infant brain trauma. We cannot make up for this lack of knowledge by reiterating opinion and poor data: Ignoring new evidence and failing to question and engage in debate is a dereliction of our duties to our patients and their families.

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Persuasive Evidence and a Theory

I serve on occasion as an expert witness for the defense in shaken baby syndrome (SBS) cases. That is a matter I disclose as a potential conflict of interest. I wish the writers of the letter in your January 2010 issue had done the same.

When I cast doubt on the validity of SBS, I cite the original literature. In my judgment, SBS is so lacking in evidence, it is hard to understand how the hypothesis ever gained traction.[1,2]

I cite a review of seminal SBS literature up to 1998. It concluded the evidence was inadequate.[3] I cite Ommaya, et al., who did the original work on whiplash biomechanics that debunks the SBS hypothesis.[4] I cite experimental work that indicates forces generated by manual shaking are an

order of magnitude less than forces of impact, and less than the threshold for injury.[5] I cite an article that states the neck should be destroyed if manual shaking were capable of producing brain damage.[6] I have seen no case in which neck injury was observed.

Finally, I cite my own hypothesis. It is untested, just as the SBS hypothesis is untested. If the forces of shaking are sufficient to cause brain damage, the thumbs of the shaker and the places where the thumbs are applied on the victim should be conspicuously injured. They are not.

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