**Subject: Commentary/NSCIA Medical Advisory Board**

The cause of back pain in children is largely a mystery.  The one large prospective study identified a cause in only 18%.  Half of these had a structural defect called spondylolysis, where the bony struts that hold the vertebral bodies together are either traumatized or underdeveloped.  But a good understanding of the rest of the problem has been lacking, and heavy school backpacks have come to be one of the principal suspects.

Indeed, the American Academy of Pediatrics recommends that a child's backpack weigh no more than 10 to 20% of the body weight.  Backpack-related pain is thought to be principally a result of strain to the low back muscles that stabilize the spine.  Other less common sources of pain are the vertebral bodies or pain from the intervertebral discs that constitute the shock absorbers of the axial skeleton.  Two studies of student athletes with back pain found that the discs were the source of pain only about 10% of the time.

A new study by Neuschwander et al. (The effect of backpacks on the lumbar spine in children: A standing magnetic resonance imaging study. Spine 2010; 35:83-88) ingeniously explores the effect of backpacks on the intervertebral discs by utilizing a modified MRI scanner that can depict the anatomy of a child's spine while standing upright.  Essentially, they found that increasing backpack loads result in escalating compression of the discs.

They note provocatively that we are tallest when we first get up in the morning, and that the spine shortens through the course of the day.  The act of merely standing up was responsible for at least half of the compression of each disc in this study, with the backpacks contributing the other half of the 1-2 mm change in disc height.  Extrapolating from the effect of 30-60 minutes per day of a child's backpack use to the broader experience of pain in children is the real challenge.  It would have been more interesting to measure the discs in these kids after they wore the backpacks, to see what enduring effect their scholarly devotion was having on their back anatomy.  The other open question is whether the physiologic compression of the discs is really the issue in childhood back pain, since most of their pain seems to emanate from the muscles.

Patrick Whelan MD PhD

Pediatric Rheumatologist

On behalf of the Medical and Scientific Advisory Committee, National Spinal Cord Injury Association

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