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To Whom It May Concern:

I am a musculoskeletal radiologist specializing in spine and joint imaging and image-guided procedures. Until recently, I served as the Director of Musculoskeletal Intervention at Massachusetts General Hospital, and Instructor in Radiology at Harvard Medical School. In that capacity, I had the opportunity to work with the physicians and athletic trainers for several professional and collegiate teams, and performed diagnostic and therapeutic procedures on many athletes.

It has been my observation that collegiate and elite post-collegiate rowers were disproportionately represented among the young athletes referred to our practice for management of acute and chronic lower back pain. There were typically two distinct temporal peaks in the number of referrals: first in the fall, when young rowers were transitioning from high school to collegiate rowing, and again in the late winter and early spring, as local rowers moved from indoor ergometer training and onto the water. MRI examinations accompanying these patients almost invariably showed focal radial tears of the annulus fibrosus, that outer ring of collagen fibers maintaining the integrity of the intervertebral disc.

The annulus fibrosus consists of a series of ten to twelve circumferentially arranged layers, which successively alternate in fiber orientation to provide increased resistance to tensile forces. At the periphery, the annulus is connected to the endplates of the vertebral bodies by short bands called "Sharpey's fibers." There are also tiny sensory nerve fibers distributed throughout the outer ring. This arrangement works quite well at absorbing axial loads and maintaining alignment as the spine flexes and extends. It is vulnerable, however, to asymmetrically applied, rotational forces.

It is easy to visualize these forces on the lower lumbar disc of a rower as he or she pulls a conventional oar handle through a stroke—progressive spine extension increases the axial load on the posterior ring of the disc, and rotation of the torso directs a torquing component that shears through the outer ring. Eventually, the fibers are disrupted, producing an annular tear of the disc. Alone, this is a source of considerable pain, due to the small nerve endings in the annulus. Unfortunately, it also predisposes to herniations of the inner portion of the disc—the nucleus pulposus—through the defect in the outer ring. The nucleus pulposus is the gelatinous shock absorber in the center of the disc, and once it herniates, it begins to desiccate and loses its ability to dampen the axial loads

between the vertebrae. This can lead to progressive spondylosis and a lifetime of back pain and disability.

Asymmetrically applied forces are also the usual culprit in most muscular strains, another common participation-limiting injury among athletes. In the lower back, the paraspinal muscles serve to help stabilize the spine and further protect it from injury.

I believe that any mechanism by which the asymmetric, rotational forces applied to the lower back can be mitigated should decrease the risk of these intervertebral disc injuries, and increase the longevity of both competitive and recreational rowers. The design of the BalancePoint Oar Handle would certainly seem to directly address this issue. Please note that I have no financial interest in this product or any other athletic equipment or enterprise. My opinions are entirely my own, submitted freely and without compensation of any kind, and do not reflect upon my employers or their institutions. Thank you.

Sincerely,

Erik N. Nelson, M.D.