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MEDIA RELEASE

Lower back pain may have ties to our last common ancestor with chimpanzees

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Photos: http://at.sfu.ca/ikNgWF
Paper: www.biomedcentral.com/

A Simon Fraser University researcher has uncovered what may be the first quantified evidence demonstrating a relationship between upright locomotion and spinal health.

Scientists have long pondered whether there is a link between walking upright and back problems, since people have more back pain than other primates such as chimpanzees, with whom we share 98 per cent of our DNA.

Kimberly Plomp, a post-doctoral fellow and biological anthropologist, spent the past seven years studying ancient bones for the telltale signs of disease and injury that give archaeologists insight into our ancient ancestors' health and lifestyles.

"Evidence of injury and disease on human skeletons provide archaeologists with valuable insight into our ancestors' health and lifestyles and can provide a lot of information about the health of a person or a population," says Plomp, who is working with professor Mark Collard as part of the Human Evolutionary Studies program (HESP).

"For example, in ancient remains we can see evidence of metabolic issues, infectious disease, and trauma related to heavy activities or a rough lifestyle."

Plomp has investigated the relationship between vertebral shape, upright locomotion and human spinal health, using two-dimensional shape analyses of chimpanzee, orangutan and archaeological human vertebrae (the bones that form the spine.)

"We have found that some characteristics of human vertebrae differ in shape between those individuals who have a lesion called a Schmorl's node – a small hernia that can occur in the cartilaginous disc between vertebrae," says Plomp.

"The humans who have Schmorl's nodes tend to have vertebral elements with a shape that is statistically indistinguishable from chimpanzee vertebrae."

Humans and chimpanzees split from a common ancestor about eight to nine million years ago, and at some point after that split it is thought that human lineage evolved to be bipedal, moving on two rear legs, while the chimpanzees evolved to be knuckle-walkers, notes Plomp.

Plomp says her findings show that the vertebrae of humans with disc problems are closer in shape to those of our closest ape relatives, the chimpanzee, than are the vertebrae of humans without disc problems.

"As evolution occurred our vertebrae would have changed as we evolved, from using some form of quadrupedal locomotion, using four legs, to bipedalism, using two legs," she says.

However, she adds, evolution isn't perfect and some vertebral characteristics, such as those identified as being similar to chimpanzees, may have remained within the human 'blueprint' and result in some people having vertebrae that are less able to withstand the pressures of bipedal walking.

"In short, our study suggests that the pathological vertebrae of some people may be less well adapted for walking upright," says Plomp.

Plomp and Collard call this the "ancestral shape hypothesis" and plan further investigation using 3D shape studies of ancient and modern human and primate vertebrae, and include other spinal diseases such as osteoarthritis.

She says the findings not only have potential clinical implications but also illustrate the benefits of bringing the tools of evolutionary biology to bear on problems in medicine and public health.

Her research paper, "The ancestral shape hypothesis: An evolutionary explanation for the occurrence of intervertebral disc herniation in humans," has been published in the peer-reviewed journal *BMC Evolutionary Biology*.

Other team members include researchers Darlene Weston from UBC, Una StrandViðarsdóttir from the University of Iceland, and Keith Dobney from the University of Aberdeen.

Funding for her research has come from the Social Sciences and Humanities Research Council, Canada Research Chairs Program, Canada Foundation for Innovation, British Columbia Knowledge Development Fund, MITACS Elevate Fellowship, and SFU.

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