Cane Use May Reduce Risk of Knee Osteoarthritis Progression

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A common, incurable joint disease, osteoarthritis (OA) is the leading cause of disability in elderly people. While nearly any joint can be affected, OA most often strikes the knee, particularly the inner aspect of the tibiofemoral joint. One source of stress on this vulnerable joint compartment is the knee adduction moment, an indication of weight placement while walking. A 20 percent increase in the peak knee adduction moment is associated with a 6-fold or greater increase in the risk of knee OA progression over 6 years. To reduce knee load, pain and damage in knee OA patients, physicians often prescribe two inexpensive interventions: footwear and cane use. While these simple strategies have the potential to alter the knee adduction moment, there is little research attesting to their specific benefits for knee OA sufferers.

To assess the immediate effects of walking shoes and a walking cane on the peak knee adduction moment in people with knee OA, researchers at the University of Melbourne turned to 3-dimensional (3-D) gait analysis. Their findings, featured in the May 2008 issue of *Arthritis Care & Research* (www.interscience.wiley.com/journal/arthritis), strongly support using a cane on a regular basis to reduce the load borne across the knee, while underscoring the urgent need for studies into which aspects of shoe design best support the treatment of knee OA patients.

Led by Dr. Rana S. Hinman, the team recruited 40 volunteers—16 men and 24 women—from the Victoria, Australia, community who met the clinical and radiographic criteria for knee OA. All had medial tibiofemoral osteophytes, as well as knee OA symptoms such as persistent knee pain and loss of physical function. None had a history of joint replacement. The group's mean body mass index was 29.6 and mean age was 65 years.

Each subject underwent 3-D gait analysis, focusing on the knee most affected by OA, using a state-of-the-art Vicon 6-camera motion analysis system. Embedded in the test area walkway, and unknown to participants, two force plates captured ground impact. Reflective markers, strategically placed on the pelvis, thigh, knee joint, and foot, captured limb movement.

All participants were tested first in bare feet, followed immediately by testing in their own shoes—a comfortable pair typically used for walking. 20 of the participants were further tested wearing their own shoes and using a cane in the opposite hand to the study knee, after a brief instruction in ideal cane use by a physiotherapist. Data from 5 successful trials were collected for each test. A mean score was used to calculate changes in gait parameters and determine the peak knee adduction moment.

Overall, the peak knee adduction moment when walking in shoes was significantly higher—7.4 percent—than when walking barefoot. The effect of footwear, however, varied considerably among individuals. While most demonstrated an increased knee adduction moment while wearing shoes, 6 of the 40 subjects actually demonstrated a beneficial decrease. The use of a cane resulted in a striking 10 percent average decrease in the knee adduction moment. What's more, a quarter of the participants demonstrated a reduction of more than 20 percent. While individuals tended to walk more slowly with the cane than unaided, they exhibited greater stride length and improved pelvis control, alleviating the destructive load on the affected knee.

Though canes are widely recommended to knee OA patients, this study validates their therapeutic value, at least in the short-term. "Further studies are required to establish whether knee loading remains lower with ongoing use of a cane," notes Dr. Hinman, "and whether the reductions in loading translate to a reduced risk of disease progression." Additional studies

should also focus on men with knee OA, since 90 percent of the participants in this cane trial were women, and examine changes in knee pain, an issue which the team did not address.

On the other critical matter of footwear, Dr. Hinman admits lack of a clear explanation for why wearing shoes increased the peak knee adduction moment. Heel height, sole thickness, and arch supports may all play a contributing role. "Because it is potentially dangerous as well as impractical to advise patients with knee OA to walk about in bare feet, further research is needed to determine which types of shoes least increase the knee adduction moment or, ideally, reduce it," Dr. Hinman observes. "The shoe type optimal for knee OA with regard to its effects on symptoms and disease progression must be determined."
