Friday's child – KneeKG

"The knee is a complex joint; but it is also so unstable that you would think it was invented on a Friday afternoon," says Jacques de Guise, a CRCHUM researcher and Director of the Imaging and Orthopaedics Research Laboratory, professor at the École de technologie supérieure, and the Canada Research Chair in 3D Imaging and Biomedical Engineering. It is not surprising, therefore, that it is easily injured. In fact, 70% of athletes (skiers, long-distance runners, hockey players, etc.) with knee injuries never completely recover because their original biomechanical "signature" is not re-established.

By Monique Guilbault

MAKING THE RIGHT DIAGNOSIS

The challenge for health professionals is to reduce the time needed to make the right diagnosis of the problem and therefore optimise recovery. To meet this challenge, de Guise and his team developed KneeKG, a revolutionary technique for knee evaluation and rated as one of the 15 most promising inventions of 2008 by the Fonds de la recherche en santé du Québec. What sets this technique apart is that it allows for real-time 3D analysis of the knee during movement and while supporting the body's weight, something which cannot be done by the traditional tools of analysis, X-rays or magnetic resonance.

KneeKG does not replace the latter two techniques; rather, it provides valuable new information about how the knee works, which helps clinicians to prevent, detect and treat pathologies such as arthrosis, tendinitis or torn ligaments and other knee injuries. "KneeKG helps clinicians make the right diagnosis," says de Guise, "which makes it possible to design a more effective treatment or rehabilitation plan." Making the right diagnosis also helps direct patients to the right treatment, the appropriate health professional, at the right time. The device could even delay or eliminate the need for early surgical intervention.

BOON FOR BABY BOOMERS AND THEIR GRANDCHILDREN

"KneeKG", which stands for kinematic knee graphic (or CKG for cinematic knee graphic), is a bit like an electrocardiogram of the knee, as the acronym implies. It consists of a harness studded with electromagnetic motion captors. Once attached to the tibia and the femur, it makes it possible to sketch a precise portrait of the knee's articular mechanics along all of its axes while the patient is walking on a treadmill or making bending movements. The challenges posed by this kind of analysis were fully met by de Guise's team, which succeeded in developing a valid, precise and reproducible clinical tool.

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This invention is something of a godsend for the growing ranks of Baby Boomers, whose knees often cannot keep up with their desire to maintain an active lifestyle. It is also of vital importance for their grandchildren, whose increasing involvement in sporting activities brings with it a greater risk for knee injuries.

Since KneeKG offers improved treatment possibilities, it will also lead to reduced social costs by lowering, if not eliminating, the worsening of a given disease or injury, which in turn will reduce interminable treatments and costly surgery, long periods of convalescence or permanent invalidity. In many cases, it will also lead to a more rapid return to work and to normal activities.

Jacques de Guise

WORLDWIDE DISTRIBUTION

KneeKG's more than $1 million in development costs over a ten-year period were funded by the Canada Foundation for Innovation, the National Sciences and Engineering research Council of Canada, the Fonds québécois de la recherche sur la nature et les technologies, Valorisation Recherche Québec, and the Canada Research Chairs Program.

The Clinique Emovi in Laval, Quebec, holds the exclusive commercialization licence for KneeKG and will begin worldwide distribution (Canada, USA and Europe) in June 2009. ■