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## Footwear Prescription System for Injury Prevention and Management

TECH ID #: 1015.2

### Background

Patellofemoral pain syndrome (PFPS) is the most frequently encountered overuse injury in sports medicine clinics. Additionally, it is estimated that 1 in 2 adults will develop symptoms of knee osteoarthritis (OA) during their lifetimes. Combined, these two injuries affect well over 25 million people in Canada and the United States, and this number is expected to rise over the next generation. Both injuries are characterized by increased knee joint loading during walking and running, and therefore orthotics are commonly prescribed for the treatment and management of PFPS and OA to reduce this loading. However, in 15 to 45 % of cases, individuals receiving an orthotic will actually experience increased knee joint loads, possibly contributing to disease worsening. Currently no method is available for predicting the biomechanical response of a given footwear intervention resulting in the incorrect prescription of potentially hazardous orthotics to millions of individuals each year.

Researchers in the Human Performance Laboratory at the University of Calgary have developed a method for predicting the response to a given footwear intervention. The method combines 2D video data and uniaxial ground force data from a single stepping motion to predict the biomechanical response at the knee during walking and running. The system has the potential to reduce injury risk and improve the efficacy of orthotics by using a scientific, precision medicine approach to footwear prescription.

### Areas of Application

- Footwear prescription system for injury prevention and management
- Point-of-sale system for selling personalized, biomechanically optimized footwear interventions
- Clinical tool that can be used to validate clinician recommendations

### Competitive Advantages

- Increases the efficacy of orthotics
- Recommends the correct product for reducing injury risk and optimizing treatment
- More effective management of common musculoskeletal injuries



- Prevention of prescribing a potentially hazardous orthotic

## Stage of Development

- Method accurately predicts the biomechanical response at the knee to medial and lateral wedge insoles
- Effective method for predicting orthotic response in healthy, PFPS and osteoarthritis populations

## Intellectual Property Status

- US provisional patent application filed

## Publications

- Stefanyshyn DJ, Stergiou P, Lun VM, Meeuwisse WH, Worobets JT. Knee angular impulse as a predictor of patellofemoral pain in runners. *Am J Sports Med* 2006; 34(11): 1844-51.
- Lewinson RT, Worobets JT, Stefanyshyn DJ. Calculation of external knee adduction moments: A comparison of an inverse dynamics approach and a simplified lever-arm approach. *Knee* 2015; 22(4): 292-7.
- Lewinson RT, Fukuchi CA, Worobets JT, Stefanyshyn DJ. The effects of wedged footwear on lower limb frontal plane biomechanics during running. *Clin J Sport Med* 2013; 23(3): 208-15.
- Lewinson RT, Collins KH, Vallerand IA, et al. Reduced knee joint loading with lateral and medial wedge insoles for management of knee osteoarthritis: a protocol for a randomized controlled trial. *BMC Musculoskelet Disord* 2014; 15: 405.