



**Canadian Arthritis Network
International Partnership Initiative**

**International Research & Training Program
LABORATORY/CLINIC PROFILE**

Contact information of the principal investigator

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Please indicate if you are member or affiliate of one or more of the following International Partnership Initiative organizations:

- AO Foundation – Biotechnology Advisory Board, Switzerland
- Arthritis Foundation, USA
- Arthritis Research Campaign, UK
- Canadian Arthritis Network, Canada
- Japan Society for the Promotion of Science, Japan
- Nuffield Foundation Oliver Bird Rheumatism Program, UK

International Research & Training Program Opportunity

Please indicate which of the following international opportunities would be available at your laboratory/clinic.

- Training Elective Rotation
- Research Mini-sabbatical
- Industry Training Rotation



The International Research & Training Program will be available for trainee elective rotations and investigator mini-sabbaticals that commence on or before March 31, 2009. If you have any preferences regarding the dates when you can host an international trainee or investigator, please indicate this below.

Visit Length (please indicate start and end dates if known):	
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Please provide ten key words and a brief description of the research currently being conducted in your laboratory/clinic, including descriptions of any specialized equipment, methods or technologies employed at your facility.

10 key words

<ol style="list-style-type: none">1. Cartilage bioengineering2. Gene expression3. Cell biology4. Spine tissue engineering5. Tissue engineering6. PCR7. Cartilage pathology8.9.10.
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Brief description (up to ½ page)

<p>Cartilage Tissue Engineering: My laboratory has been instrumental in developing new approaches to cartilage tissue engineering. These initial studies focused on developing a novel method to form cartilage tissue in vitro that is suitable to use to repair a damaged joint. As our initial studies identified that fixation of tissue engineered cartilage to bone after implantation is the major limitation to successful articular joint repair, we developed a novel approach to overcome this problem. This consisted of generating biphasic constructs composed of cartilage formed in vitro and anchored to the top surface of a bone substitute that we have created. We then used these biphasic implants to successfully resurface focal defects in sheep knees confirming the validity of this approach. Further studies are ongoing.</p> <p>2. The cartilage generated in vitro using this approach is an ideal model to study the mechanisms regulating tissue formation by chondrocytes. We demonstrated that cyclic compression applied in vitro resulted in the formation of more cartilage tissue with improved mechanical properties. We are examining the signal transduction mechanisms regulating these alterations. Our studies indicate that remodelling contributes to cartilage tissue formation in vitro and opens up a new area of investigation.</p> <p>3. Another area of active investigation is the development of a tissue engineered intervertebral disc. These tissues are being utilized to study the mechanisms regulating disc degradation.</p>



Key publications (maximum 5 publications)

1. Kandel RA, Grynypas M, Pilliar R, Lee J, Waldman S, Zalzal P, Hurtig M. Repair of Osteochondral Defects with Biphasic Cartilage-Calcium Polyphosphate Constructs In a Sheep Model. *Biomaterials* 27(22):4120-31, 2006.
2. DeCroos JNA, Dhaliwal SS, Grynypas MD, Pilliar RM, **Kandel RA**. Cyclic compressive mechanical stimulation induces sequential catabolic and anabolic gene changes in chondrocytes resulting in increased extracellular matrix accumulation. *Matrix Biology* 25(6):323-31, 2006.
3. Séguin CA, Bojarski M, Pilliar RM, Roughley PJ, Kandel RA. Differential regulation of matrix degrading enzymes in a TNF-alpha induced model of nucleus pulposus tissue degeneration. *Matrix Biology*. 25(7):409-18, 2006.
4. DeCroos JNA, Jang B, Dhaliwal SS, Grynypas MD, Pilliar RM, **Kandel RA**. Membrane type-1 matrix metalloproteinase is induced following cyclic compression of in vitro grown bovine chondrocytes. *Osteoarthritis and Cartilage*. In press, 2007.
5. **Kandel RA**, Hamilton D, Séguin C, Li S-Q, Arana C, Pilliar R. An In vitro tissue model to study the effect of age on nucleus pulposus cells. *Eur Spine J*. Submitted, 2007.