



**Canadian Arthritis Network
International Partnership Initiative**

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

Contact information of the principal investigator

Name:	Dr. Cyril B. Frank
Dept and Institution:	Surgery/University of Calgary & Calgary Health Region
Complete mailing address:	Rm 451 HM 3330 Hospital Drive NW Calgary, AB T2N 4N1
Phone:	403-220-6881
Email:	cfrank@ucalgary.ca

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):	
---	--

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. Anterior Cruciate Ligament/Medial Collateral Ligament (ACL/MCL)2. Ligament Transplantation3. Ligament Healing4. Osteoarthritis5. In Vivo Kinematics6. Biomechanics7. Robotics8. Molecular Biology9. Health Care Delivery10. Knowledge Translation

Brief description (up to ½ page)

<p>Using an animal model, my laboratory is focused on studying the mechanisms responsible for the development of osteoarthritis (OA) in the knee joint. Joint instability is induced either by ACL/MCL transection or by lateral meniscectomy. Animals are followed longitudinally for 20 weeks post injury. In vivo kinematics and ground reaction forces are recorded pre and post injury. A camera based motion analysis system is used to collect the in vivo kinematics and these motions are imported into a parallel robot (we were the first to develop this system) which is able to assess total joint loads and subsequently individual soft tissue loads by using the method of superposition. These injury models do develop OA slowly and in much the same locations as in the human. To restore joint stability, we have developed an ACL graft model using the animals own ACL as the best possible graft. The etiology of OA is still largely not understood – whether it is the biological injury or the subsequent alteration in joint mechanics that is more important in initiating OA is still unknown. It is our aim to be able to determine which plays a greater role – biology or mechanics. We aim to do this by studying the early inflammatory markers of OA and the changes in joint mechanics. We are using molecular biology techniques (RT-PCR, microarray etc), tissue ultrastructure, protein chemistry (Western Blot, immunohistochemistry), in vivo kinematics, ACL grafting, biomechanics and robotics to attempt to answer this question. In my role as a clinician, I hope to be able to translate the knowledge gained from these animal experiments to better understanding the clinical situation.</p>

Key publications (maximum 5 publications)



CANADIAN LE RÉSEAU
ARTHRITIS CANADIEN
NETWORK DE L'ARTHRITE

1. Funakoshi, Y., Hariu, M., Tapper, J.E., Marchuk, L.L., Shrive, N.G., Kanaya, F., Rattner, J.B., Hart, D.A., Frank, C.B. Periarticular ligament changes following ACL/MCL transection in an ovine stifle joint model of osteoarthritis, *J. Orthop. Res.*, July, 2007.
2. Tapper, J.E., Fukushima, S., Azuma, H., Thornton, G.M., Ronsky, J.L., Shrive, N.G., Frank, C.B. Dynamic in vivo kinematics of the intact ovine stifle joint. *J. Orthop. Res.* 24(4):782-792, 2006.
3. Howard, R.A., Rosvold, J.M., Tapper, J.E., Marchuk, L., Ronsky, J.L., Frank, C.B., Shrive, N.G. Reproduction of in vivo motion using a parallel robot and calculation of resulting connective tissue loads. *J. Biomech. Eng.* In press, 2007.
4. Frank, C.B., Shrive, N.G., Boorman, R.S., Lo, I.K.Y., Hart, D.A. New perspectives on bioengineering of joint tissues. Joint adaptation creates a moving target for engineering replacement tissues. *Ann. Biomed. Eng.* 32(3):458-465, 2004.
5. Frank, C., Dick, D., Smith, D., Wasylak, T., Gooch, K., Zernicke, R. The Alberta Bone and Joint Health Institute. Creating sustainable accountability through collaboration, relevant measurement and timely feedback. *Health. Pap.* 7