



## Imaging stardust

*The orbit of Mars recently brought the red planet closer to Earth than it has been for 60,000 years.*

AT A DISTANCE OF 55.76 MILLION kilometers, it glows brightly in the night sky. Sparkling objects in the sky are just as fascinating to us as they were to pre-historic people and to ancient civilizations such as the Babylonians, Egyptians and Chinese. The science of astronomy has attracted many scientists, including David Holdsworth. He obtained a master's degree in astronomy before deciding to shift his focus from the big picture in the heavens to the small picture in a group of cells.

As a student at the University of Toronto, Dr. Holdsworth realized that many of the big questions in astronomy had been answered well but there were still unanswered questions in medicine. It was easy to transfer his skills in imaging the stars to medical imaging. A PhD in medical biophysics led to cardiovascular imaging and vascular biomechanics, and a position as a scientist in the Imaging Research Laboratories at the Robarts Research Institute in London, Ontario. He is also a professor in the Departments



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Left to right, Dr. David Holdsworth, David McErlain, Danika Batiste

of Diagnostic Radiology and Nuclear Medicine, Medical Biophysics and Biomedical Engineering at the University of Western Ontario (UWO).

Although he began his career with cardiovascular imaging, a lot of the techniques he was developing had applications in musculoskeletal disease. Dr. Holdsworth uses three-dimensional imaging, including x-ray micro-computed tomography, to investigate changes in articular cartilage and sub-chondral bone during the early stages of osteoarthritis. He is also developing novel high-field MRI techniques and 3-D image fusion.

Collaborations with experts in skeletal biology at the University of Western Ontario such as Dr. Jeff Dixon brought Dr. Holdsworth into contact with orthopaedic surgeons Dr. Robert Bourne and the late Dr. Alexandra Kirkley, who specialized in sports medicine. Their interest in imaging applications for arthritis was irresistible to Dr. Holdsworth. The multi-disciplinary aspect of the Network encouraged the participation of people from different fields, so his lack of experience in musculoskeletal work was not a disadvantage. Dr. Holdsworth is now working on the development of

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## Imaging stardust

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advanced imaging techniques such as high resolution MRI and high resolution computed tomography for use on animal models. His program has trained a number of young scientists and fostered their interest in research and medicine with support from the Canadian Arthritis Network. Kevin Saidi obtained a master's degree using MRI and CT of the knee to try to develop more sensitive diagnostic techniques for early osteoarthritis. He has completed his medical education and is interested in orthopaedics and sports medicine. He has returned to London for his residency, so Dr. Holdsworth hopes to be able to work with him again.

Danika Batiste is one of Dr. Holdsworth's students and a recipient of a CAN training award. She is currently finishing her master's degree in developing MRI and CT imaging for a rabbit model of osteoarthritis. Her CAN-funded work was done in collaboration with a larger team.

Network member Dr. Sheila Laverty, a professor of veterinary surgery at the Université de Montréal, prepared an animal model of osteoarthritis from which the specimens were derived. The imaging work was done at the Robarts Research Institute in London and by Network member Dr. Stuart Foster, a medical physicist, who is a professor at the University of Toronto. Dr. Holdsworth is now analyzing data with Network member Dr. Colin Webber, also a medical physicist, who is a professor at McMaster University.

Dr. Holdsworth met Network member Dr. James (Jim) Henry, chair of the Department of Physiology and Pharmacology at the University of Western Ontario at a Network event. Dr. Henry was reading Danika Batiste's poster presentation on micro imaging. A discussion ensued about using this technique in another animal model and the result was the formation of a project for which they have applied for a New Emerging Team (NET) grant

in osteoarthritis offered through the Institute of Musculoskeletal Health and Arthritis and CAN. David McErlain has recently joined this group while he completes his M.Sc. studies, working on a way to improve micro-CT imaging of a rat model of osteoarthritis.

One of Dr. Holdsworth's projects involves the development of high-resolution computed tomography systems for use on tissue specimens or small animals. Over the past few years, he has worked closely on technology exchange for this with Enhanced Vision Systems (EVS) of London, Ontario, founded by a former UWO engineering student, Mike Thornton. Dr. Holdsworth was one of the founding scientists of the company, which manufactures micro CT equipment. In November 2002, EVS

was purchased by General Electric Medical Systems and these devices are now sold all over North America.

The advances in imaging over the last 10 years have provided new capabilities and there have been dramatic changes in what is possible.

Dr. Holdsworth has developed techniques that may soon provide tools for use in pre-clinical animal work as well as clinical work. This is a significant breakthrough because techniques that work in pre-clinical studies on tissue samples do not always work in clinical studies with people. There are many applications for this type of imaging in the development of new pharmaceutical products. It offers the promise of showing how a new drug affects the progression of osteoarthritis.

Dr. Holdsworth is very optimistic about the future. It is now possible to image something as small as several cells and he would love to be able to image a single cell in an intact animal. He has gone from looking at the very big picture in astronomy to the very small picture, a few cells, but he says "Our planet and all living things on it are made up of chemical elements that were ejected from an exploding star at the end of its life. We are made up of stardust. There is just as much mystery in our cells as there is in the stars." ■

"There is just as much mystery in our cells as there is in the stars."

## Canadian Arthritis Network's Annual Scientific Conference

Arthritis researchers and clinicians will be meeting in Montreal November 13-15 at the Canadian Arthritis Network's Annual Scientific Conference. The program offers something for everyone, from the newest trainee to the experienced investigator.

People who work for pharmaceutical and biotechnology companies will also be interested in attending the presentations on CAN-funded research and meeting the scientists. The scope of the research runs from bench to bedside. Workshops will be held on media relations training, writing CAN research proposals, commercialization of intellectual property and career development for trainees.

International speakers include:

### Dr. Linda Sandell

Washington University  
School of Medicine  
*Cell biology of arthritis: the chondrocyte's response to injury*

### Dr. Matt Liang

Harvard Medical School  
*Investigator-initiated clinical trials: too little, too late and imperilled*

### Dr. Chris Evans

Harvard Medical School  
*Gene therapy in rheumatoid arthritis*

### Dr. Hari Reddi

University of California – Davis  
*Regeneration of articular cartilage: signals, stem cells and scaffolds*

### Dr. Jim Witter

*How new technologies may impact on drug development in arthritis*

**Don't miss this exciting opportunity.**

Visit our Web site at [www.arthritisnetwork.ca](http://www.arthritisnetwork.ca) to register.

# The mystery of degenerative disc disease

*The spine is a wonderfully engineered column of interconnected bones that support the head and body and enable us to have a full range of graceful motion.*

A PLIANT BAND OF CARTILAGE, an intervertebral disc, between each of the upper 24 bones of the spine acts as a flexible joint and shock absorber. Trauma, infection, injury or aging sometimes cause the discs to dry out, stiffen or even rupture, resulting in pain as the nerves in the spinal column are exposed or compressed by the discs. The condition is called degenerative disc disease (DDD).

Physicians prescribe anti-inflammatory painkillers for DDD, chiropractors manipulate the joints and both chiropractors and physiotherapists prescribe exercise therapy. Surgeons perform multiple interventions including removal of damaged pieces of the disc or fusion of the adjacent segments. Until now, no one has been able to prevent DDD or fix the disc once it begins to degenerate. Three CAN investigators are working on a repair solution.

Mark Erwin is a former Canadian swimming champion who developed back problems. He was inspired to become a chiropractor after receiving successful treatment for ongoing back and neck pains at the hands of a chiropractor. The difficult clinical problems he saw in his own patients who suffered from DDD furthered his interest in research. While working on his master's degree at the University of Toronto he realized that tissue engineering might offer a solution for DDD, so he decided to change to a PhD program in graduate studies and refine his research interests.

Some animal species do not get DDD and in those species, the notochord cells, specialized cells found in discs, are preserved. DDD occurs in species where the notochord cells decrease early in life. The project is looking at whether the notochord cells play a central protective role in maintaining disc function.

When Mark Erwin's initial PhD supervisor, Dr. Paul Salo, left Toronto to take up a position at the University of Calgary, Paul introduced him to Network

member Dr. Rob Inman as his successor. Taking on the role of supervisor was an important decision for Dr. Inman because his research is centred on inflammation. He is a clinician-scientist, based at Toronto Western Hospital and is a professor of Medicine and Immunology at the University of Toronto. Dr. Inman says, "Degenerative disc disease is the most common cause of lower back pain and the associated disability. At the



Left to right, Dr. Rob Inman and Mark Erwin

cellular level, it is a mystery. The discs have a cell and tissue structure comparable to those of a joint. The fundamental processes involved in DDD are likely to be applicable to other arthritis conditions."

They invited Network member Dr. Jane Aubin to join the project a year ago. Dr. Aubin, a professor at the University of Toronto, is a specialist in molecular and medical genetics. She had collaborated with Dr. Inman on another project and he realized her skills were relevant to Mark Erwin's project. Dr. Aubin says, "My lab had the models and expertise to help take the project in a new direction. None of us would have been interacting on a project like this without the Network."

Mark Erwin is studying how the notochord cells may contribute to the local chondrocyte population's health. He has isolated small molecules produced by those cells that enhance metabolic activity of the chondrocytes. The latter

make the matrix that keeps the disc healthy. Understanding what underlies the degeneration of the disc at the cellular and biochemical level has been slow.

The tissue is in an area where it is difficult to gain access. Finding an appropriate animal model has been a big advance and understanding how the notochord cells provide protection in some species might be an important step forward in defining factors that could help humans.



Left to right, Dominic Falconi and Dr. Jane Aubin

This represents an advance for DDD in particular, but also illustrates the great potential of using animal models of human disease, with state-of-the-art proteomics, to address an immensely important clinical problem. The biology of degenerative disc disease has proved a hard nut to crack, because of the inaccessibility of the target organ. The canine parallel disease, besides mimicking the structural change in the human inter-vertebral disc, also provided a critical clue that there is a genetic basis to DDD. The project exemplifies the power of basic science approaches to complex clinical problems, particularly those proving refractory to clinical investigation.

The investigators have filed a PCT patent application on the observation that notochord cells produce trophic factors that appear to up-regulate genes

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## Degenerative disc disease

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in the chondrocytes that are important for the structure and function of the disc. The patent application was facilitated by the University Health Network and the Canadian Arthritis Network is helping to further commercialize the discovery.

The collaborative culture of the Network has helped move the project forward. Mark Erwin did a platform presentation on his findings at the Orthopaedic Research Society's conference last February. Both Dr. Salo, his former supervisor, and Dr. Aubin were at the conference. At a breakfast meeting during the conference, with Dr. Tineke Meijers, the Network's Executive Director, Research and Development, they discussed the next steps in the project. Dr. Salo is not yet an investigator on the project but has participated by offering advice and reviewing papers, and they hope to collaborate more

closely in the future.

Following the discussion, Mark Erwin made a presentation to CAN in Toronto and then successfully applied for a special project grant with Drs. Aubin and Inman, which will enable Mark to test the factors produced by notochord cells on human cells and to further refine the nature of the genes activated by these factors. The work involves mass spectroscopy peptide sequencing to determine the identity of the factors as well as other experiments designed to determine which factors are active and whether they will work on human cells. The research offers the promise of future novel therapeutic options in the treatment of DDD and possibly other forms of chondrocyte failure and matrix degeneration.

After Mark Erwin receives his PhD he will do postdoctoral work in Dr. Aubin's lab, funded by a fellowship from a partnership between the Canadian Institutes of Health Research (CIHR) and the

Ontario Chiropractic Association(OCA), through which he has been awarded a senior research chair. The financial support of the OCA and CIHR, together with the career development support of Dr. Allan Gotlib, research program coordinator at the Canadian Chiropractic Association, has created the opportunity for Mark to carry on his research.

There are very few chiropractors who do this type of research and it is also novel that he is crossing disciplines to do it. Mark says, "Working with Jane and Rob is perfect. The project is something new for both of them but applies Jane's expertise in bone cartilage and Rob's expertise in immunology and rheumatology. Bringing those strengths together, we can create a new area of expertise. In many ways, this research project is like swimming on a relay team. Everyone swam better on a relay team. We depended on other people and rose to the challenge because we believed in each other." ■

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# Frontiers in Inflammatory Joint Diseases Conference

*People usually think of outer space as the ultimate frontier, the last undiscovered territory.*

MANY OF US ARE CURIOUS about what is out there and now that men have visited the moon, we want to go where no one has gone before, whether it is Mars or the Milky Way or beyond. Next May, 200 people will gather in Toronto to explore another frontier at the Frontiers in Inflammatory Joint Diseases Conference. This frontier is closer to home, in fact, right here on Earth, and explored for the most part in a laboratory. The Conference is a major event that will set a research agenda for Canada in inflammatory joint disease.

Rheumatoid arthritis (RA) strikes one Canadian in 100, affecting twice as many women as men. It is a disabling

disease, characterized by inflammation in the lining of the joints. The cause is unknown but the disease involves an abnormal response by the body's immune system, which attacks and damages healthy joints.

Spondyloarthropathies represent a family of diseases including ankylosing spondylitis and psoriatic arthritis. These diseases may be as common as RA. Both forms of chronic arthritis can occur in children as well.

Current treatments for these inflammatory joint diseases include anti-inflammatory drugs, which reduce inflammation and pain, disease-modifying anti-rheumatic drugs, which slow



Dr. Hani El-Gabalawy

the progression of joint damage, corticosteroids, which reduce inflammation, and biologics, the newest drugs, which block the messenger molecules involved in the inflammatory process. All of these drugs relieve the symptoms but do not represent a cure. The Conference next May will be an important step in provid-

ing a focus for research on the early detection and rapid, effective treatment of inflammatory joint disease.

The Canadian Arthritis Network has pioneered a strategy for identifying the direction and priorities of future research in arthritis. The Osteoarthritis (OA) Consensus Conference in 2002 brought together a broad range of stakeholders in OA and defined the course of future OA research in Canada. A partnership with the Institute of Musculoskeletal Health and Arthritis (IMHA) almost doubled the funding available for OA research to \$5.5 million over five years.

Dr. Robin Poole and Dr. Jane Aubin, scientific co-directors and Chris Nelson, president of the Canadian Arthritis Network, Denis Morrice, president of The Arthritis Society (TAS), and Dr. Cy Frank, scientific director of IMHA, wanted to build on the success of the OA research model which moved OA up on the research agenda and led to an infusion of new resources. They invited Network members Drs. Hani El-Gabalawy and Rob Inman to chair the steering committee of this consensus conference which will chart the way forward for scientific research in Canada in inflammatory joint disease.

Dr. El-Gabalawy, a clinician-scientist, became the co-leader of the diagnostics and therapeutics theme of the Network last year. He is a professor at the University of Manitoba and has just been appointed to an endowed chair in rheumatology research. Dr. Inman, also a clinician-scientist, is based at Toronto Western Hospital, where he heads The Arthritis Centre of Excellence. He is a professor of Medicine and Immunology at the University of Toronto and plays a lead role in inflammation research in the Network.

In addition to the Network and TAS, the Canadian Institutes of Health Research, the Canadian Rheumatology Association and the Canadian Arthritis Patients Alliance are partners in the Conference. All the partners share the same vision, to improve the care and outcomes for Canadians with arthritis, which includes adequate access to expert medical care and to drugs that can protect joints if introduced early enough in the course of the disease.



Dr. Rob Inman

The first task in setting up the Frontiers Conference was to decide on the scope, which was defined as all forms of inflammatory joint disease. The title “Frontiers” captured the essence of the Conference, which is to define the frontiers of research in inflammatory joint disease. As mentioned above, the three sub-themes of the Conference are RA, spondyloarthropathies, and JRA. These chronic rheumatic diseases all have different clinical manifestations, yet some of the new biological agents have proved to be effective in several, indicating that there are common biological mechanisms at work in all.

The first day of the Conference will involve consumers, who will have an opportunity to discuss the research agenda. Plenary sessions will fill the second day, with Canadian and international speakers presenting on the latest research on inflammatory arthritis. All presentations will be in lay language.

Among the confirmed international speakers are:

- Dr. Peter Lipsky, director of the National Institute of Arthritis, Musculoskeletal and Skin Diseases (NIAMS) at the National Institutes of Health in Bethesda, Maryland;
- Dr. Wim van den Berg, professor of experimental rheumatology at the University of Nijmegen in the Netherlands;
- Dr. Steffen Gay, of the Division of Rheumatology at the University Hospital Zurich, in Switzerland and director of the World Health Organization’s Collaborating Centre for molecular biology and novel thera-

peutic strategies for rheumatic diseases.

The organizers welcome participation by the pharmaceutical and biotechnology industry. Many of the goals of industry are congruent with the goals of the Conference – early and accurate diagnosis and appropriate access to new therapies. The organizers anticipate the involvement of federal and provincial government agencies in the Conference.

Canada has traditionally played a leadership role in the study and treatment of rheumatic diseases. There are some distinctive strengths in Canada that permit large population studies. The population is smaller than the U.S., there is a single payer system for health care, and a strong culture of collaboration. The Conference organizers also have an external perspective. When studying the genetics of inflammatory joint disease, no single patient population may be

The Conference is a major event that will set a research agenda for Canada in inflammatory joint disease.

large enough to answer the key questions of genetic susceptibility. Information sharing among researchers in Canada, the U.S. and Europe will be important in advancing the research.

The Conference in May will define the research questions in inflammatory joint disease and generate a request for applications (RFA) following the Conference. It is expected that total funding of up to \$1,000,000 per year will be available for major collaborative, multidisciplinary projects over a period of five years.

For further information about the Frontiers Conference, please contact Sharon McConnell at The Arthritis Society, at 416-979-3353, extension 322 or smcconnell@arthritis.ca ■

# People with arthritis make a difference at CAN

*Arthritis hurts. It robs people of their energy, their ability to work and to enjoy life.*

NO ONE KNOWS THIS BETTER than the people with arthritis who form the Network's Consumer Advisory Council. The Council is a valuable asset whose members put a human face on the disease. They remind the scientists that arthritis research is not just about genetics or biochemistry or engineering a joint replacement but that it has to focus on freeing people from their suffering and the burden of illness.

The formation of the Council marked the first effort to involve consumers in arthritis research and the involvement is particularly effective. Consumers participate on all the Network's committees and in the peer-reviews that make decisions on research funding. They are knowledgeable and savvy, not only about the science, but also about effective engagement. Cheryl Koehn, the Council's co-chair says, "I believe our voices are heard. Furthermore, one can argue that The Arthritis Society and the Canadian Institutes of Health Research (CIHR) are more focused in their work because the Canadian Arthritis Network does the due diligence in the community."

An excellent example of the effectiveness of consumer participation is the Consensus Conference on Osteoarthritis (OA) held in the spring of 2002. Stakeholders in arthritis gathered to identify the future course of OA research. The consumers emphasized the need to find the causes and treatments for the pain and fatigue that are the hallmarks of the disease. When the priorities for research were ranked, pain and fatigue were at the top. The Network then entered into a partnership with the Institute of Musculoskeletal Health and Arthritis, which almost doubled the amount of funding available for OA research. The funding will be made available as New Emerging Team (NET) grants and one of the grants will be for

research in the area of pain and fatigue as it relates to OA.

Members of the Council sit on the panels that provide peer reviews of applications for research funding. "The work" according to Cheryl Koehn "is not easy. The decision-making process is complex and the terminology is



Cheryl Koehn

"We have developed credibility with researchers so now we can make a difference."

daunting." Council members prepare themselves, train and mentor other consumers to make a meaningful contribution by raising their scientific knowledge. They bring a level of expertise to the table that the average consumer does not have because their work with the Network has taught them how research studies are designed.

The Council has prepared an orientation manual for new members, which

serves as a model for other organizations such as CIHR. The experience consumers have had with the Network, the challenges they faced operating in an area foreign to the research and consumer communities, and the excellent dialogue in which the parties engaged, has been put to good use and benefited other organizations.

Council members are active, sharing their knowledge and experience. They helped provide an orientation for consumers to serve on The Arthritis Society's review panel. One council member has been extensively involved with Health Canada, beginning with stakeholder consultation to revise a product monograph that describes how to use the product, warnings and contraindications. She helped Health Canada define the content of the document, which must be issued with six classes of medication, including Methotrexate, a drug prescribed for adult rheumatoid arthritis. Her input on the needs of consumers for information delivered in lay language with a prescription helped Health Canada fine tune their mandatory document to make it easier for consumers to understand it.

The Council has influenced national health policy in the area of prescription drugs. The Council engaged in public consultation with Health Canada on the common drug review process and in partnership with the Canadian Arthritis Patients Alliance (CAPA), had input into prescription drug issues at the federal and provincial levels. Council members working with other consumer groups such as CAPA have taken a lead role in helping establish the Alliance for a Canadian Arthritis Program, a multi-stakeholder group that will develop a single strategic plan to respond the needs of all people affected by arthritis.

Cheryl Koehn says, "Being at the table is not enough - we have to be able to influence decisions. I am proud of the people I work with in the Network. We have developed credibility with researchers so now we can make a difference. The arthritis research community in Canada has a much better understanding of consumer needs than it did before the Network and Council were created but we have only scratched the surface. We have much more work to do." ■

# Focusing on a career in applied medical research

*Hockey is a fast-moving team sport that requires speed, technologically advanced equipment, and the ability to remain fit and focused.*

DR. CAROLINE HOEMANN'S life is a bit like that. She is a senior scientist at the University of Montreal's École Polytechnique. Married to a scientist, she is the mother of two boys, age 8 and 10.

An interest in molecular biology as an undergraduate student at the University of California at San Diego and an experience with molecular cloning, led to a position at the Salk Institute in the Neuroendocrine lab of Dr. Roger Guillemin, who won the Nobel Prize for Medicine/Physiology in 1977. Committed to a career in research, she obtained an M.Sc. in neurobiology from MIT, where she was introduced to intra-mural hockey and was active in the chamber music society.

By the time she had completed her PhD, Dr. Hoemann had met her husband. Their common interest in the French language and culture, led them to Europe for their postdoctoral studies. Dr. Hoemann was awarded a fellowship by the John E. Fogarty International Centre of the National Institutes of Health and National Science Foundation in the U.S. to study cell growth regulation in Grenoble France and subsequently Basel, Switzerland.

After moving to Montreal, Dr. Hoemann spent three years doing post-doctoral work with Dr. Paul Jolicoeur at the Institut de Recherches Cliniques de Montréal on T-cell transformation. By then, Dr. Amine Selmani had founded BioSyntech and there was a need for a molecular biologist to head a cartilage

repair project. The position was a perfect fit for her talents and interest in applied medical research. With a grant from the Canada Foundation for Innovation, she designed and equipped a molecular biology laboratory.

As program manager for a very broad academic-industrial partnership, Dr. Hoemann brought together the

Dr. Hoemann was recently appointed to the faculty at École Polytechnique as a CAN scholar, partly in recognition of her ability to bring together highly diverse academic-industrial collaborations that yield tangible results, including the generation of intellectual property and bringing new products from the bench to the patient.

efforts of researchers and clinicians at BioSyntech, École Polytechnique, McGill University, University of Guelph, Hôpital Sainte-Justine, Hôpital Sacré-Coeur, and the University of Montreal. She worked closely with Network members Drs. Mark Hurtig of the University of Guelph, who conducted large animal studies on the project, and Marc McKee of McGill University who did the histology. Three years of intense research



Dr. Caroline Hoemann

resulted in the development of CarGel®, an injectable biomaterial for cartilage repair. Dr. Hoemann said, "We wanted a product that was convenient to use, and a therapy that fulfilled a real clinical need in orthopaedics."

Serge Savard, who played with the Montreal Canadiens and is in Canada's Hockey Hall of Fame, is the chair of the board of BioSyntech. He was recently the first patient to receive CarGel therapy through Health Canada's Special Access Programme for medical devices.

Dr. Hoemann was recently appointed to the faculty at École Polytechnique as a CAN scholar, partly in recognition of her ability to bring together highly diverse academic-industrial collaborations that yield tangible results, including the generation of intellectual property and bringing new products from the bench to the patient. She received a Discovery Grant from the National Sciences and Engineering Research Council of Canada (NSERC) to study the interaction between chitosan and bone marrow cells. In her future work, she is interested in understanding the fundamental mechanisms of therapeutic responses.

Skating as quickly as she can, Dr. Hoemann balances an exciting research career with the demands of a young family. She still plays hockey with her husband and the students in the lab and she coaches her sons' hockey teams. The equipment in the lab is technologically advanced and Dr. Hoemann remains focused on arthritis research. ■

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# Looking at the outcome of arthritis

*Monique Gignac is a social psychologist and scientist at the University Health Network and an assistant professor at the University of Toronto. She studies how people cope and adapt to chronic illness and disability.*



Dr. Monique Gignac

DR. GIGNAC'S EARLY WORK involved caregivers of older adults with chronic health problems, primarily Alzheimer's Disease. She decided to focus her research on people with physical health problems so she could get the perspective of the person with the problem and not just the perspective of those providing care. An interest in arthritis brought her to the Arthritis Community Research and Evaluation Unit (ACREU), now based at the University Health Network, where she joined the team of Network member Dr. Elizabeth Badley, the founder and director of ACREU. Specialists in epidemiology, rheumatology, family and community medicine, physiotherapy, occupational therapy, and social sciences work together at ACREU to ameliorate the adverse impact of arthritis on people and their families.

At ACREU, Dr. Gignac began to look at the issues for people with arthritis. A lot of research is done on how people feel about symptoms such as pain and disability but Dr. Gignac wanted to know how arthritis affects people's independence. She says, "People don't operate in a vacuum when they have a chronic illness. They have goals they

want to achieve and they receive advice from family, friends, physicians and other health professionals. We usually don't look at that whole network, how people take information from others, what they do with it and how it affects their goals."

By joining the Network and participating in Network projects as the co-leader of the Methodologies and Outcomes theme, she was able to continue her research and look at a broad range of issues including how arthritis affects the ability to remain employed. There are few studies on people with arthritis who continue working. With the seed money received from the Network, Dr. Gignac was able to obtain a grant from the Canadian Institutes of Health Research to do a longitudinal study that will track patients, including people who give up their employment, for three years to better understand the coping and adaptation efforts that help people remain employed.

Through the Network she met other scientists who are interested in employment issues and was able to collaborate with them. "Without the Network" she says, "I would have had to wait for papers to be published to find out what other people are doing. As a Network member I have been able to attend meetings, meet other researchers I can work with, find out what they are doing and see the gaps more clearly. I now have a better idea how to address those gaps."

Dr. Gignac discovered that collaborations develop very quickly in CAN and the work would not move forward at such a rapid pace if the investigators were each pursuing individual projects. She also found that the Network facilitates a broader and faster dissemination of discoveries.

Although intervention is not Dr. Gignac's primary area of research, the issues she studies have a lot of implications for research in that area. Academic

researchers publish their findings and hope someone will read the study and see the relevance for intervention. Membership in the Network however has given Dr. Gignac direct contact with people who are responsible for intervention. She has worked with the Ontario Division of The Arthritis Society to prepare materials on employment for people with arthritis. She is also working with Network member Dr. Diane Lacaille, a rheumatologist, who is an assistant professor at the University of British Columbia and a research scientist at the Arthritis Research Centre of Canada. Dr. Lacaille is designing an intervention for people with inflammatory arthritis in the workplace, to help them remain employed. Recently Dr. Gignac also joined the Institute for Work and Health as an adjunct scientist.

In addition to the impact of arthritis, she is interested in the factors and the processes whereby people make decisions about the big questions in arthritis – how do people decide whether to continue or abandon employment, how do they decide whether to take one medication or another, why is there so much interest in alternative therapies, what are the pros and cons they weigh in making a decision on whether to have a joint replaced? There is a need to better understand what factors people consider, their goals, the information and misinformation available to them, and the cost-benefit analysis people do in their minds before deciding whether to avail themselves of a treatment option.

Research on these processes and the factors that affect people's decisions, Dr. Gignac says, "are complex but they can help us understand arthritis better and provide direction for future research. We have to provide treatment options that will mesh with people's larger goals and life circumstances if we want to help people successfully manage their arthritis." ■

# CAN develops highly qualified personnel

*Scientists are very special people who combine intellectual acumen with a curiosity about the world that leads them to discover how to travel to the moon or the effect of a single molecule on human health.*

**ARTHRITIS RESEARCH NEEDS** more scientists to unlock the mysteries of the disease and to translate these discoveries into effective treatments.

The Canadian Arthritis Network's Training and Education Committee (TEC), under the leadership of Dr. Jeff Dixon, of the University of Western Ontario, oversees the Network's programs to attract Canada's brightest young scientists and to encourage them to pursue careers in arthritis research. The Committee is charged with ensuring the next generation of arthritis researchers brings expertise from many disciplines to their clinics and labs and that they receive the mentoring, training and experience needed to make significant contributions to arthritis research and development.

Committee members include basic scientists, clinicians, representatives of national and international pharmaceutical and biotechnology companies, current and former trainees, and consumers. Two recent additions to the Committee are Steve Stimpson of GlaxoSmithKline in the U.S. and Claudia Kassera of Inflazyme in Vancouver. Both are experienced at mentoring in their corporate environments.

TEC identifies gaps and needs in training by involving stakeholders and working with other organizations such as The Arthritis Society and the Institute of Musculoskeletal Health and Arthritis of the Canadian Institutes of Health Research to harmonize strategies for training highly qualified personnel. The mandate of the Committee is to develop policies and strategies to create innovative training programs that will allow:

- Recruitment, training and retention of outstanding researchers in research areas critical for economic growth, public policy and the quality of life of Canadians;
- Promotion of trans-disciplinary and multisectoral research approaches;



Dr. Jeff Dixon

CAN has been very successful with its retention rate: ninety per cent of CAN trainees have remained in Canada and most have begun careers in arthritis research or medicine.

- Encouragement of trainees to consider the economic, social and ethical implications of their work;
  - Increased marketability of trainees in relation to the needs of user sectors.
- The Committee oversees two competitions a year for the award of CAN training

funds, which include a significant contribution from The Arthritis Society among major partners.

Since its inception the Network has been able to attract \$1.9 million in funding for training from industry, institutions and provincial governments. The Network has supported 75 people through its training program, in addition to those who were funded through Network operating grants. CAN has been very successful with its retention rate: ninety per cent of CAN trainees have remained in Canada and most have begun careers in arthritis research or medicine.

A bilateral exchange program was created with the German Rheumatology Competence Network to foster interactions and collaborations among arthritis researchers in Canada and Germany. The program, under the direction of Dr. Frank Beier, of the University of Western Ontario, supports short-term exchanges of Canadian and German graduate students and fellows to participate in research projects carried out by Network members.

The Committee continues to develop fresh ideas on ways to support not only formal training but opportunities for trainees to attend scientific conferences. A recent innovation is the dissemination bursary that funds trainees to attend high-profile scientific meetings at which they can present their work to an audience of leading scientists in their field. It brings them to the attention of people who may help with the trainee's career development or who may consider them when recruiting personnel for their research teams. It also provides the trainees with experience in preparing and presenting their work.

TEC will hold a one-day workshop in October to re-define strategies and identify non-traditional training opportunities in industry and government. Rx&D, the association of Canada's research-based pharmaceutical companies, and the Biotechnology Human Resource Council are participating in the workshop. TEC is exploring training partnerships with industry and government that would provide CAN trainees with exposure to the clinical and regulatory aspects of arthritis research and development. ■

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# Late start – swift ascent

*Janet Henderson waited 22 years to begin her PhD studies, raising a family and working part-time as a technician. Her field was renal osteodystrophy, a bone disease that can result from kidney dialysis.*

NETWORK MEMBER DR. DAVID Goltzman, physician-in-chief at the McGill University Health Centre, chair of physiology at McGill University, and director of the Centre for Bone and Periodontal Research (the Centre), was happy to supervise her PhD studies because of the wealth of technical experience she brought to the lab.

Dr. Henderson studied the molecular basis of hypercalcemia of malignancy during her PhD and then worked in molecular oncology before joining Network member Dr. Andrew Karaplis, a physician-scientist and project director at the Lady Davis Institute of the Jewish General Hospital. She then spent seven years building an independent research program in skeletal biology before being recruited as the associate director of the Centre at McGill University, which was established in October 2001. Dr. Henderson says, “Dr. Goltzman, guided me through the steps to set up the Centre but allowed me free rein. We are a good team.”

The Centre was funded with grants from the Canada Foundation for Innovation for the purchase of advanced instrumentation for mineralized tissue research, Valorisation-Recherche Québec for the hiring of technical and management personnel, and the Canadian Institutes of Health Research for strategic training in skeletal health. Funding partners include McGill University, Fonds de la recherche en santé du Québec, and industry.

Dr. Henderson says, “Mineralized tissue research is difficult because it needs highly specialized expertise and



Left to right, Dr. Janet Henderson and Paul Plut

instruments. The Centre is primarily an academic platform for research and education in skeletal health, rather than a service centre.” The facility is unique in North America for training scientists, ranging from postdoctoral fellows to undergraduate summer students. The experience encourages them to consider careers in skeletal health research, and having their names on publications enhances their credibility for independent grant applications.

Cartilage development is the subject of Dr. Henderson’s work, which is focused on understanding the changes that allow articular chondrocytes to proceed to a terminal mineralization stage in diseases such as osteoarthritis. Dr. Henderson uses animal and cell models to investigate the role of growth factors in these processes and uses many of the Centre’s facilities to do the work. She has recruited researchers with similar

interests from the Shriners Hospital for Children to join the Network. She also collaborates with Network members including Dr. Jane Aubin, a professor in the Department of Molecular and Medical Genetics at the University of Toronto and Drs. Michael Underhill and Frank Beier at the University of Western Ontario, all of whom work on chondrocytes and cartilage development.

Dr. Henderson, the co-leader of the Network’s cellular and molecular biology of joint tissues theme, is a member of the Network’s Research Advisory Committee. She describes the Canadian Arthritis Network as “the best research tool I have seen in 35 years in academia. Investigators now realize that major scientific advances in our understanding of human disease are most often the product of collaborative, trans-disciplinary research teams, rather than individual research programs.” ■

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# Rising stars

The Centre for Bone and Periodontal Research at McGill University has a number of young rising stars who spent their summer doing research on bone and cartilage. The program marks the first time clinicians and basic scientists at McGill University and the Royal Victoria Hospital, both part of the McGill University Health Centre, and École Polytechnique collaborated on a summer program. These young people have a passion for science and are learning about cartilage and bone research from Network members Dr. Janet Henderson, Associate Professor of Medicine at McGill University and Dr. Mike Buschmann, Professor of Chemical Engineering at École Polytechnique. Drs. Henderson and Buschmann worked with Centre members Drs. Richard Kremer, a clinician-scientist at the Royal Victoria Hospital and Robert Funnell from Biomedical Engineering at McGill University, to supervise this work.



**Sen Chai** obtained her pilot's licence at 16 and has flown Cessnas and gliders. Her career goal also reaches for the sky. Currently an electrical engineering student at McGill University, she started working with Dr. Janet Henderson four years ago as a summer student and is considering a career in medicine. Her summer project tied together engineering and biology as she worked with micro CT and conducted a three-point bending test to test the rigidity and stiffness of bone. Her goal is bioengineering – to make artificial organs or limbs.



**Mathieu Charlebois** has always had an interest in math and physics and became involved in physical imaging. He obtained an M.Sc. at École Polytechnique, working with Dr. Mike Buschmann, testing the tensile strength of articular cartilage. He is working at the Bone Centre as a technician for a year on imaging and bio-mechanics. He is considering doing a PhD on mechano-transduction in bone.



**Arye Kremer** discovered science in high school. He competed successfully in science fairs, studied health sciences at CEGEP, and is currently studying business and computer science at McGill University. Interested in bio-medical engineering, he wants to invent devices for surgery and life-support. At the Bone Centre last summer he tested healthy and diseased bones using new equipment and compared three methods of getting results. He says, "this gives you a perspective – it shows you what is to come."



**Antoine Larouche** was attracted to physics and biology. His CEGEP professor told him it was possible to combine his two interests. He is studying engineering at École Polytechnique and hopes to get a masters degree in biology. His summer project involved studying the stiffness of cartilage, comparing normal and diseased cartilage in animal models. He plans to make his career in science.

# IAIS Conference



B. Stanley

Last August the International Association of Inflammation Societies held the Sixth World Congress on Inflammation in Vancouver. This was the first time the meeting took place in Canada. The Network's Scientific Co-Director Dr. Robin Poole was the Congress President and with Network member Dr. Pierre Borgeat, participated on the conference program committee. Dr. Tineke Meijers, the Network's Executive Director, Research and Development, was the chair of the social events committee and participated in the fundraising committee. Dr. John Schrader was on the review committee for the young investigator award.

More than 1,000 researchers from academia and industry attended the Congress and heard presentations by Network members. Dr. Chris Overall chaired a symposium on matrix metalloproteinases that was organized by CAN and sponsored by Pfizer. Dr. John Esdaile chaired a focus session on sports injuries and inflammation that included Drs. Cy Frank and David Hart. Dr. Marc Pouliot spoke at a symposium on lipid mediators co-chaired by Dr. Pierre Borgeat. Dr. James (Jim) Henry presented a session on neurogenic inflammation and pain.

The Seventh International Congress of Inflammation will take place in Melbourne, Australia in 2005. In 2007 the Eighth International Congress on Inflammation will take place in Copenhagen, Denmark.

# Dr. Robin Armstrong and Jeff Davis appointed to CAN's board of directors

*Dr. Robin Armstrong and Jeff Davis were appointed to CAN's board of directors in August.*

DR. ARMSTRONG IS CURRENTLY a professor emeritus at the University of Toronto and has had a long and distinguished academic career. He is a past president of the University of New Brunswick, was a member of the Natural Science and Engineering Research Council of Canada and a founding director of the Canadian Institute for Advanced Research.

Mr. Davis is the general manager of P&G Pharmaceuticals Canada. He has worked for P&G for 17 years in its consumer and pharmaceutical businesses and brings the experience of working in North America and Europe. He is involved in several areas to influence positive changes in the industry and community and is a member of the board of directors of Rx&D, Canada's Research-Based Pharmaceutical Companies.

Sydney Jackson, Chair of the Board of Directors, said, "With a background



Dr. Robin Armstrong Jeff Davis

in physics and research in magnetic resonance imaging, Dr. Armstrong brings scientific expertise to the board as well as experience with providing direction in an R&D environment. Mr. Davis brings an international perspective of the pharmaceutical industry and the drug development process. They will make a significant contribution to governance and will help further the mission of the Network to improve the quality of life of people with arthritis, decrease the burden of illness and develop the Canadian economy." ■

## CAN on display at BIO and DIA

THE NETWORK RECENTLY participated in two exhibits to showcase CAN's expertise, skills, knowledge and experience. A presence on the exhibition floor at a major conference is an important way to make contact with people who have a potential interest in the work of CAN researchers. CAN staff who participated in the shows met many of the people who attended the conferences, met other exhibitors, and learned what is new and interesting in the research world.

The Biotechnology Industry Organization (BIO) is an American trade association that represents more than

1,000 biotechnology companies, academic institutions, state biotechnology centres and related organizations. Its members conduct R&D in health care, agricultural, industrial and environmental biotechnology products. There were more than 16,000 people from 55 countries at BIO 2003 in Washington, D.C. last June.

The Drug Information Association (DIA) is a global professional association. It provides a global forum for the exchange of information in the pharmaceutical and related industries. More than 5,000 people attended the DIA conference in San Antonio, Texas last June. ■



CANADIAN ARTHRITIS NETWORK | LE RÉSEAU CANADIEN DE L'ARTHRITE

The Canadian Arthritis Network is the gateway to arthritis R&D in Canada, a single point of contact linking researchers, clinicians, academia, The Arthritis Society, the Institute for Musculoskeletal Health and Arthritis of the Canadian Institutes of Health Research, pharmaceutical and biotechnology companies, and government. In addition to funding research, the Network helps scientists bring their discoveries to market by facilitating technology transfer and commercialization of new arthritis products. The Network is a not-for-profit organization funded by the Government of Canada's Networks of Centres of Excellence.

Chris Nelson  
President

Jane Aubin, PhD  
Scientific Co-Director

Robin Poole, PhD, D.Sc.  
Scientific Co-Director

Canadian Arthritis Network  
250 Dundas Street West  
Suite 402

Toronto, Ontario

Canada M5T 2Z5

Tel: 416-586-4770

Fax: 416-586-8395

E-mail: [can@arthritisnetwork.ca](mailto:can@arthritisnetwork.ca)

[www.arthritisnetwork.ca](http://www.arthritisnetwork.ca)



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