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CaMos
Canadian Multicentre Osteoporosis Study
Étude Canadienne multicentrique sur l'ostéoporose

BONE HEALTH for life

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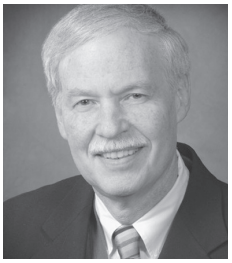
Where We've Been and Where We're Going

DR DAVID GOLTZMAN, CO-PRINCIPAL INVESTIGATOR, MONTREAL



Dr David Goltzman
Co-principal Investigator, Montreal

The Canadian Multicentre Osteoporosis Study (CaMos), established in 1995, has, for the past 15 years, helped to shape our understanding of osteoporosis, both in Canada and internationally. For example, among many other advances, we found that in Canadians over 50 years of age, osteoporosis occurs in over 20% of women and about 6% of men. We showed in which part of the skeleton and at what age, bone loss was the greatest in women and in men. We also found that bone mineral density (BMD) measurement alone was insufficient to accurately predict the risk of future osteoporotic fractures. We therefore collaborated in a World Health Organization (WHO)-sponsored effort to identify other factors predisposing to osteoporotic fractures. These studies provided the basis for the development of the WHO "FRAX" system for assessment of the 10-year chance of sustaining an osteoporotic fracture. Additional factors predisposing individuals to fractures were found in CaMos, such as the presence and severity of non painful spine fractures and certain medication. We showed that the relative decrease in health-related quality of life in participants with osteoporosis was comparable to other chronic medical conditions such as diabetes or chronic lung disease, and showed, furthermore, that participants with a vertebral fracture or hip fracture were also at increased risk of death. We found that in CaMos, osteoporosis therapy was associated with a major reduction in nonvertebral osteoporotic fractures, although it was less effective in some subgroups. CaMos has therefore provided important insights into the development, diagnosis, consequences and treatment of osteoporosis which have been Canadian in origin but international in scope, applicability, and impact.

Last winter, the Canadian Institutes of Health Research (CIHR), the health research funding agency of the Canadian government, announced continued financial support for CaMos for an additional 5 years. This support, along with that of our industrial partners should allow us to examine many new questions. We plan to examine changes over time in fracture rates at different regions of the skeleton in women and men and changes over time in factors which predispose to osteoporosis (e.g. calcium and vitamin D intake) and to see if changes in these risk factors correlate with fracture rates in these different skeletal regions. We plan to examine the health-related quality of life of CaMos participants who have a diagnosis of osteoporosis but have not yet fractured compared to those with osteoporotic fractures. We will also evaluate the effectiveness of osteoporosis treatment on the prevention of first and subsequent fractures, how therapy impacts on quality of life, and try to discover the factors predisposing to loss of effectiveness of therapy.

To be able to answer these and many other questions, and make the next five years successful, we will continue to rely on the dedicated work of the CaMos Centre Directors, Centre Coordinators, and most important our very committed CaMos participants to collect the necessary information. Annual follow-up will continue, with a complete reassessment of the participants aged 60 to 75 once during the next 5 years. Complete reassessment will include an interviewer-administered questionnaire, physical measurements (height, weight, bone densitometry and spine x-rays) and blood samples. Participants who report a fracture on the annual mailed follow-up questionnaire will be asked to complete a telephone interview to obtain detailed information on the fracture and on health-related quality of life.

(see **Where We've Been**, page 2) ➤

➤ (**Where We've Been** from page 1)

This information should provide important advances in osteoporosis that will be crucial for health care providers, clinical scientists, and health care policy makers. Most importantly however they should contribute to the development of an effective plan for prevention and treatment of osteoporosis and osteoporotic fractures which will benefit those who suffer from this disease. ◆

New Co-Investigators

Dr. Brent Richards is Assistant Professor of Medicine (Endocrinology and Metabolism) at McGill University in Montreal and a CIHR-Clinical Investigator. His research interests are focused on the genetic determinants of common, aging-related disease, and in particular, osteoporosis.

Dr. Brent Richards
McGill University

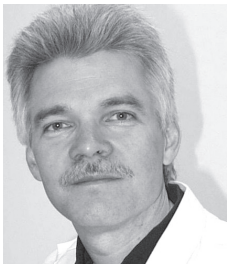
Dr Elham Rahme is an Associate Professor in the Department of Medicine and Associate Member in the Department of Epidemiology and Biostatistics of McGill University. She holds a PhD in statistics and has extensive expertise in pharmacoepidemiology and health services research. Her research interests include the evaluation of the safety, effectiveness, and economic implications of prescribed medications.

Dr. Elham Rahme
McGill University

Wilma M. Hopman is the Research Facilitator for the Clinical Research Centre at Kingston General Hospital, and an Adjunct faculty member of the Department of Community Health and Epidemiology at Queen's University. She has an Honours BA in Psychology from Brock University and a Master's degree in Applied Psychology from Queen's University. Her area of research is health-related quality of life in the general population and in those with chronic disease.

Wilma Hopman
Kingston General Hospital

Dr. Leslie is Professor of Medicine and Radiology at the University of Manitoba. He is currently Chair of the Scientific Advisory Council, co-led the "2010 Clinical Practice Guidelines for the Diagnosis and Management of Osteoporosis in Canada", on the Board of the International Society for Clinical Densitometry, Director of the Manitoba Bone Density Program, and Co-Director of the Winnipeg PET Imaging Centre.



Dr. William D. Leslie
University of Manitoba

Dr. Lentle is a Professor Emeritus of radiology at the University of British Columbia and consultant radiologist to the Osteoporosis Clinic at the Women's Health Centre in Vancouver. Dr. Lentle is also Chair of the Facility Accreditation Quality Team for bone densitometry of the Ontario Association of Radiologists and a Board member of the International Society of Clinical Densitometry. He has been awarded the gold medal of the Canadian Association of Radiologists and the Radiological Society of North America. ◆

Dr Brian Lentle
University of British Columbia

FRAX® Model for the Assessment of Fracture Probability in Canada

DR. WILLIAM D. LESLIE, *UNIVERSITY OF MANITOBA*

You may have heard about FRAX®, a fracture risk assessment system from the World Health Organization (WHO) that was released in March 2008 *(http://www.shef.ac.uk/FRAX/)*. The FRAX tool was developed to evaluate fracture risk in patients. It is a major advance over fracture risk assessment from bone mineral density (BMD) alone since fracture risk is affected by many other factors: your age, sex, whether you have already had a fracture, other health conditions, steroid medications, and even the country in which you live. FRAX combines information from multiple clinical risk factors in order to provide a single measure of fracture risk. It is noteworthy that CaMos played a critical role in helping to develop FRAX.

If you go to the FRAX website, you will be asked to enter your sex, age, weight, height, whether you have had a prior fracture, whether either of your parents had a hip fracture, whether you have used steroid medication for more than 90 days in the last year, whether you have rheumatoid arthritis (or other secondary causes of osteoporosis), currently smoke, or have three or more alcoholic drinks per day. BMD of the femoral neck is optional with FRAX: if you know this number then entering it gives a more reliable risk calculation but if you don't the FRAX measurement is still very good. The FRAX tool then calculates your 10-year risk of hip fracture and your 10-year risk of a major osteoporotic fracture (spine, forearm, hip or shoulder fracture). The 10-year risk of a major osteoporotic fracture is the best indicator of your overall fracture risk.

In July 2010 the Canadian FRAX tool became available on the FRAX website. Thanks to CaMos, we are confident that the fracture predictions that are obtained with the Canadian FRAX tool agree with the actual numbers of fractures that occur. Since 2008, almost 40 countries have had their FRAX tools added to the website. Different FRAX tools are needed for each country because fracture rates are very different, even between Canada and the United States.

The 2010 Osteoporosis Canada guidelines, released in October 2010, explain to patients and physicians how FRAX should be used in making decisions about osteoporosis treatment *(http://www.osteoporosis.ca/multimedia/guidelines.html)*. The 10-year major osteoporotic fracture risk is divided into three zones: low (< 10%), moderate (10%–20%) and high (> 20%). This is used to decide who needs treatment for osteoporosis and who does not. A simplified version of FRAX was created that does not need a computer, and this is frequently used by radiologists and other doctors to assess fracture risk decide who needs treatment. Once again, CaMos was instrumental in the development and testing of the CAROC tool. ◆

The CaMos Bone Quality Study

ANDY KIN ON WONG, *MCMASTER UNIVERSITY*

Bone density machines take scans that provide information about a person's bone density that then allow us to make a prediction about who may fracture a bone. However, there are still individuals who break a bone despite having a normal bone density. More and more, we are discovering that, just like a building, the structural support of our bones is also important in determining its fragility. We now have safe and reliable CT machines at six cities across Canada that can be used to look at the three-dimensional architecture of bones.

In recent years, we have discovered that bone and muscle interact closely with one another. With aging, some people have accelerated muscle loss - just like what you see with bone in people who have osteoporosis. Using these same CT machines, we can also look at the density and fat content of muscles. This information can be linked to whether or not people fall or fracture.

Recently we have received funding for a study that will look at the bone architecture in women aged 60 - 85 who are participating in CaMos where these CT machines are available. Women who are interested in participating in this Bone Quality study, will be invited by a member from our team of over 20 investigators to have a scan done on a CT machine in addition to the Year 16 CaMos activities. Then, through the regular annual mailed CaMos follow-up which asks about any fractures you may experience, we will be able to see if bone structure is a contributing factor to fractures.

This study could guide better management of disease by gauging when medications may or may not be necessary and it has the potential to help prevent more women from fracturing. We will also be able to see how various activities; such as regular exercise, proper nutrition, vitamin D and calcium intake, contribute to bone structure. We will be the first to explore the new realm of bone and muscle health and will place Canada as an international leader in this area of research. ◆

CaMos Publications

Dietary patterns and incident low-trauma fractures in postmenopausal women and men ages 50 and older.

(American Journal of Clinical Nutrition Jan; 93(1):192-9) ***by Lisa Langsetmo, Fellow, Montreal***

Recent research has assessed the effect of diet on health by assessing dietary patterns. There are two typical dietary patterns: a "Prudent" diet (high in fruits, vegetables, whole grains, poultry, legumes, and fish) and a "Western" diet (high in processed and red meat, French fries, high fat dairy products, and refined grains). Studies have shown these patterns are related to multiple health outcomes (stroke, diabetes, cardiovascular disease, and mortality); those with a "Prudent" diet are at lower risk, and those with a "Western" diet are at higher risk. Our aim was to assess dietary patterns in Canadian adults and determine whether these patterns are related to bone health, and in particular fracture. We found two dietary patterns in Canadian adults, with younger Canadian having a more "Western" diet and older Canadian having a more "Prudent" diet. For postmenopausal women, at a given age, each 40% increase in foods typical of a "Prudent" diet was associated with a 14% decrease in the risk of osteoporotic fracture. The association found in men ages 50 and older was quite similar, although these results were less certain. Use of osteoporosis therapy, calcium, and vitamin D had no impact on the observed association. Thus, a diet which is likely to be good for overall health may also be good for bone health.

Fragility Fractures and the Osteoporosis Care Gap in Women.

(Osteoporosis International, Mar; 22(3):789-96) ***by Lisa-Ann Fraser, McMaster University***

Having one osteoporotic fracture greatly increases the risk of having more fractures. Therefore fragility fractures are considered an indication to start treatment with an osteoporosis specific medication. We looked at 10 years of follow-up information from CaMos to see if women who had suffered a fragility fracture were receiving a medication to treat their osteoporosis and prevent further fractures. We found that only around half of the women who had a non-traumatic fracture were treated with an osteoporosis medication. The use of bisphosphonate therapies (Actonel, Fosamax, etc.) in the women receiving treatment increased over the 10 years studied and the use of hormone replacement therapy (Estrogen) decreased.

This difference between the number of women who should be on treatment with an osteoporosis medication and the (much lower) number who actually are on treatment is termed a therapeutic "care gap" and tells us that more efforts in education and awareness are needed so that more health care professionals properly treat individuals with osteoporosis and fractures.

Normative Bone Mineral Density Z-scores for Canadians aged 16-24 years.

(Journal of Clinical Densitometry. July-Sept 2010; 13(3):267-276) ***by Wei Zhou, CaMos statistician, Montreal***

The International Society of Clinical Densitometry (ISCD) recommends the use of Z-scores when interpreting dual-energy X-ray absorptiometry (DXA) results in children, premenopausal women and men younger than 50 years of age. Z-Scores are defined as the number of standard deviations from the mean BMD of a healthy population of the same age, race, and sex.

Having collected BMD measurements from the youth cohort (ages 16-24 years), provided CaMos with the opportunity to develop bone mineral density (BMD) reference standards and BMD Z-scores at various skeletal sites in the Canadian youth population. For this study we looked at BMD measurements from 837 Caucasian participants that had not reported a fracture or having asthma. We created reference standards for lumbar spine (L1-L4), femoral neck, total hip, and greater trochanter, by each year of age (16-24 yr), and by sex. These references standards can be used for the calculation of age and sex- specific BMD Z-scores in Canadian youth. This information will be valuable to help to identify individuals with clinically meaningful low BMD. ◆

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