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HARVESTING STEM CELLS WITHOUT DAMAGING EMBRYOS: COULD NEW RESEARCH MAKE OLD NEWS OF AN ETHICAL DEBATE?

by Daniel Auld

Much has been said about the use of embryonic stem cells for the treatment of human disease. On the one hand, these cells offer enormous potential for the treatment of diseases for which there are few effective treatments, including neurodegenerative diseases and other maladies associated with aging. On the other hand, the ethical debate rages on because harvesting stem cells from a human embryo for the treatment of disease in a patient would be associated with the destruction of that embryo. Accordingly, much research has focused on finding alternative sources for stem cells, with umbilical cord blood and even skin having populations of stem

(Continued on page 4)

ARE WE READY TO AGE?

An interview with Dr. Stéphane Ledoux, M.D., Clinical Neurologist and Researcher, McGill Centre for Studies in Aging and Cité de la santé, Laval

by Tania Elaine Schramek

In 2007, an estimated 97,000 Canadians will develop Alzheimer's disease (AD). Every year in the United States, 360,000 older adults receive an AD diagnosis. In fact, AD affects about 10 percent of people ages 65 and up, and the prevalence doubles roughly every 10 years after 65. Thus, half of the population over 85 may



(Continued on page 2)

POLICY AND POLITICS

HOW WELL ARE CANADIAN SENIORS DOING? THE 2006 REPORT CARD OF THE NATIONAL ADVISORY COUNCIL ON AGING

by Elaine Waddington Lamont

How are Canadian seniors doing? How healthy are they? How is the healthcare system serving seniors? How are they doing economically? What are their living conditions, and how are they serving their communities? With seniors now making up more than 12.5% of the Canadian population, these questions are important for individuals and policy makers alike.

The National Advisory Council on Aging (NACA) has sought to answer these questions with their 2006 Report Card, by

talking to experts in gerontology, seniors' organizations, and federal government officials working in aging and seniors' policy and looking at national data on 4.2 million persons aged 65 or older. This is the second time the NACA has undertaken this daunting task. The first report card on the wellbeing of Canadian seniors was published in 2001. With the 2006 report card, they were able to gauge whether the situation had improved, gotten worse, or remained the same over the last 5 years. Each question was graded

(Continued on page 3)

IN THIS ISSUE

Embryonic stem cells: end of the debate	1
Interview with Stéphane Ledoux	1
How well are Canadian seniors doing?	1
Does your doctor google?	4
Memory and cognitive intervention	5
Men's health	6



***An interview with Dr. Stéphane Ledoux, M.D., Clinical Neurologist and Researcher,
McGill Centre for Studies in Aging and Cité de la santé, Laval***

(Continued from page 1)

have this most common form of dementia. Figures such as these and the lack of a definitive cure for the disease are in large part what motivate Dr. Stéphane Ledoux, M.D., to work as tirelessly as he does.

Dr. Ledoux first studied medicine at the Université de Montréal and then went to McGill University for his specialization in neurology. He is now a clinical neurologist based at the Cité de la Santé in Laval that also devotes considerable time and efforts as an Associate Researcher and clinician at the McGill Centre for Studies in Aging.

Since its establishment in 1985, The McGill Centre for Studies in Aging has grown to become internationally recognized as a leader in research on AD, cognition, and memory. Through its clinic and academic training programs the Centre is highly regarded for its ability to offer postgraduate training in gerontology that comprises both clinical work with patients and exposure to the basic research aimed at delineating the mechanisms of brain aging with a particular emphasis on neurodegenerative diseases. On the clinical side of things, the Centre is involved in the evaluation, treatment, and follow-up of individuals living with cognitive disorders and diseases such as AD.

Dr. Ledoux contributes to the Centre's efforts in several ways. First, he sees patients in the Alzheimer's and Cognitive Disorders Clinic. The majority of the patients seen at the Centre have not yet been seen by a specialist. Dr. Ledoux explains that most are referred by a family physician suspecting that pathological aging in some form is taking place. He and a team of health professionals will then proceed to evaluate the individual both cognitively

and with a detailed neurological exam. Should dementia such as AD be suspected, then, Dr. Ledoux and his team will propose a course of action that often involves both the patient and his/her family.

Early intervention is critical he states because of the progressive and irreversible nature of the disorder. Dr. Ledoux explains that the progressive loss of cognitive function in AD is accompanied by disease-associated changes in the brain. One of these is the abnormal formation of plaques of a protein called beta amyloid in the space between brain cells. In addition, another protein called tau which normally channels chemical messages inside brain cells, deforms and collapses into neurofibrillary tangles. Over time, brain cells die, including those cells that normally produce an important chemical messenger that relays brain signals from one brain cell to another.

As of yet, there is no definitive treatment that halts the progression of AD and most AD medications offer only modest symptomatic benefits. Dr. Ledoux is very hopeful however; in fact he states that within the next two years there will be a breakthrough in the management of AD that in his view will be highly clinically significant. He owes this optimism to the clinical trials designed to test the efficacy and safety of experimental drugs for AD that are currently under way at multiple sites around the world, with the McGill Centre for Studies in Aging being on the forefront of these drug trials. Moreover, Dr. Ledoux is well positioned to offer such an opinion as he is one of the physicians directly involved in monitoring the effects of these new medications in AD patients at the Centre.

Another important mandate of the McGill Centre for Studies in Aging is to work at the level of education and prevention. Dr. Ledoux explains that the two proven risk factors for AD are age and a family history of the disorder. Having a family member with AD increases one's risk, particularly if the relative has the early-onset form of the disease (beginning before age 65) that is thought to have a genetic basis.

Many non-genetic or environmental factors may also increase one's risk. Some of these include a former serious head injury, lower levels of formal education, and lower socioeconomic status - but scientists aren't sure why or how these things interact to produce the disease in some people but not others. There is recent evidence that one's environment and experiences early in life may also play a role in the eventual development of AD. Research is ongoing to try to understand these observed links.

Until we do get these answers Dr. Ledoux stresses the importance of being informed. To date there is no way of directly preventing AD from developing but getting a head start in terms of treatment has definitely proven clinically meaningful. Although Dr. Ledoux assigns no blame, he does mention that we have a ways to go before we regard age-related issues with the level of importance they should command.

He cites as an example the fact that there are fewer doctors becoming specialists and fewer still that end up working with older adults. Unless we are directly affected by diseases such as AD most of us tend to take little notice of the realities of aging. What exactly underlies this trend? Dr. Ledoux has no definitive

(Continued on page 5)

HOW WELL ARE CANADIAN SENIORS DOING? THE 2006 REPORT CARD OF THE NATIONAL ADVISORY COUNCIL ON AGING

(Continued from page 1)

according to the following scheme: A – Very good; B – Good, with improvements needed; C – Satisfactory, with significant improvements needed; and D – Unsatisfactory.

Overall, the 2006 Report Card says that Canadian seniors are doing well, with a grade of B. Although this leaves room for improvement, Canadian seniors seem to be generally healthy (B-), and fairly well served by the healthcare system (C+). The other questions regarding economics, living conditions, and community service all received B. If we look at the two questions regarding health and the healthcare system in more detail, we see that there are very positive findings, but also areas of concern.

On the question of senior's health, overall life expectancy and dependency-free life expectancy at age 65 have improved over the last 5-10 years. As well, self-assessments of physical health, mental health and functional health are also improving. A 2005 survey reveals that 74% of seniors describe their own health as good, very good or excellent, up from 70% in 2000. This is very encouraging because it suggests that today's seniors are enjoying a better quality of life than even 5 years ago. What is less encouraging is that chronic conditions like hypertension, diabetes and arthritis seem to be worsening. These chronic conditions may have an impact on levels of obesity and physical activity, which also have worsened over the last 5 years.

With an overall grade of C+, the healthcare system is the area in greatest need of improvement. Factors such as insurance coverage and contact with medical specialists and dentists are

improving. However the waiting times to see a specialist about a new medical condition remain high and quality of care received from family doctors and other physicians is worsening. Concern has also been raised about the inadequate number of geriatricians. On the whole, seniors are satisfied with their medical care, but if the problems of waiting time and quality of care are not addressed, this may change. Clearly, the level of health care seniors receive is of critical importance for their overall health, and improvements will need to be made so that Canadian seniors can continue to enjoy good health.

The results of the 2006 Report Card on Aging are both interesting and encouraging. However, there are some limitations. The most important of these is that it mainly reflects younger, healthier seniors. This is because the data are taken only from seniors living in households, meaning that seniors living in any kind of hospital or extended care setting are not included. Although 93% of all seniors live in a household, only 66% of seniors over the age of 85 are still living at home. This means that the 2006 Report Card may not reflect the actual health and wellbeing of older seniors who are no longer living at home.

Another issue is that many of the surveys used in this report did not include seniors living in the Yukon, Nunavut, and the Northwest Territories. Although this is probably a small fraction of Canadian seniors, the particular challenges of aging adults living in Canada's North are not well represented in this report.

With these limitations in mind, the 2006 Report Card is definitely worth a read for anyone interested in the current wellbeing of Canada's aging population.

Also important is to make your own views known by filling out the evaluation form at the end of the report and send it to the NACA by mail, fax, or e-mail.

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Seniors in Canada: 2006 Report Card,
National Advisory Council on Aging.
<http://www.naca-cnta.ca/rc2006/index.htm>

Canada's Seniors: A Growing Population.
Statistics Canada.
http://www.phac-aspc.gc.ca/seniors-aines/pubs/factoids/2001/pdf/1-37_e.pdf

HARVESTING STEM CELLS WITHOUT DAMAGING EMBRYOS: COULD NEW RESEARCH MAKE OLD NEWS OF AN ETHICAL DEBATE?

(Continued from page 1)

cells that could prove useful. Recently, researchers in the United States looked at the issue from another angle. Since most of the ethical debate concerns the destruction of embryos, they asked whether stem cells could be taken from an embryo without it being destroyed. They recently proved with mice embryos that the answer to this question is 'yes'. Surprisingly, they showed that it can be done employing a technique that is already widely used to diagnose potential genetic problems after in vitro fertilization. In this technique, a tiny number of cells are taken before the

embryo is implanted into the mother's womb. In their remarkable study, Chung et al. took such a micro-biopsy of the tiny mouse embryo (which was called a blastomere – or a tiny ball of cells – at that point). The stem cells taken from the embryo behaved normally. Excitingly, the embryos continue to develop normally after the micro-dissection of cells. Thus, stem cells were taken without damaging the embryo, leading the authors to conclude that “The ability to generate human embryonic stem cells without the destruction of ... embryos would reduce or eliminate the ethical concerns of many.”

Y. Chung, I. Klimanskaya, S. Becker, J. Marh, S.J. Lu, J. Johnson, L. Meisner & R. Lanza (2006) Embryonic and extraembryonic stem cell lines derived from single mouse blastomeres. Nature 439: 216-9.

DOES YOUR DOCTOR GOOGLE?

by Tania Elaine Schramek

When doctors in Australia struggled with telling the father of a teenage boy that they could not explain the cause of his symptoms, the father point blank told them that his son was of course suffering from a rare genetic disorder and that a simple internet query using the Google search engine had given him the answer. The father was correct, leaving the physicians astounded. This prompted the doctors to empirically study how well Google fared at coming up with correct medical diagnoses.

They carefully chose 3 to 5 key words from 26 case records and entered these terms into Google. Then, the doctors selected the top three logical diagnoses from their Google searches and compared them to the real diagnoses in the medical charts. Google was correct 58% of the time.

So, should we be consulting Dr. Google over our own physicians? The answer to this question is a resounding NO. Something to keep in mind is that doctors have a much better chance of getting the correct information because they use the right key words for their searches. They also have the knowledge needed to weed out irrelevant links compared to the lay person who can get totally lost or even worse, end up thinking that their days are numbered! Just as a case in point, take a minute; go to the Google home page and type in: symptoms, neck ache, dizziness, and weakness. The resulting links to possible diagnoses range from migraine to cancer. Clearly, this can add to one's worry.

Nonetheless, going on the web after we have seen the doctor and obtained a diagnosis to address unanswered questions

(there are always several...) is definitely called for; like the old adage states, “knowledge is power”; we simply have to be careful about self-diagnosing. As for doctors using Google, no one could hold all existing medical facts in their heads, so internet search engines are indeed useful tools for physicians.

Source:

Hangwi Tang & Jennifer Hwee Kwoon Ng (2006). Googling for a diagnosis—use of Google as a diagnostic aid: internet based study. BMJ 2006;333;1143-1145.

IMPROVE YOUR MEMORY: COGNITIVE INTERVENTION IS EFFECTIVE FOR HEALTHY OLDER ADULTS AND PEOPLE WITH MILD COGNITIVE IMPAIRMENT

by Elaine Waddington Lamont

Everyone would like to improve their memory. Just as exercise trains the body, it may be possible to design a “fitness program” for our memory. This is especially important for individuals suffering from mild cognitive impairment (MCI). MCI is defined as impaired memory performance in older adults without general cognitive impairment or dementia. MCI is important because individuals with this disorder are much more likely to develop dementia over a 2-3-year period than the general population. It is hoped that interventions aimed at MCI may improve quality of life for these individuals and even slow down the development of Alzheimer’s Disease.

In a recent paper in *Dementia and Geriatric Cognitive Disorders*, Drs. Sylvie Belleville, Brigitte Gilbert, Francine Fontaine, Lise Gagnon, Édith Ménard, and Serge Gauthier reported that healthy older adults and individuals with MCI showed improvement in face-name associations and memory for lists after completing an 8-week cognitive intervention program aimed at improving memory, attention, and stress management. In contrast, those subjects who did not receive the memory training showed no improvement over the same time period, and MCI patients even showed a small decline. What is especially exciting about these results is that the memory improvement seen in subjects with MCI was on memory tasks that are known to deteriorate in Alzheimer’s Disease patients. This provides some hope that even brief memory training courses may be useful for MCI sufferers and maybe even reduce the chances of developing dementia later on. But since healthy older adults also showed memory improvement, a little memory workout is probably good for everyone. Now, everybody work that memory!

Reference:

Belleville, S., Gilbert, B., Fontaine, F., Gagnon, L., Ménard, E., & Gauthier, S. (2006). *Improvement of Episodic Memory in Persons with Mild Cognitive Impairment and Healthy Older Adults: Evidence from a Cognitive Intervention Program. Dementia and Geriatric Cognitive Disorders, 22, 886-499.*

*An interview with
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(Continued from page 2)

answers but he did allude to the notion that if we continue to do, the ones we will disserve are ourselves. Diseases of aging are everybody’s business because the one thing in which we have absolutely no choice is *aging*. Unfortunately, for some of us that will mean developing AD, which is why staying informed and supporting the efforts of individuals like Dr. Ledoux and the dedicated team of the McGill Centre for Studies in Aging is so very important.

SCIENCE HERE AND NOW

DR. SERGE CARRIER: MEN'S HEALTH SPECIALIST

by Daniel Auld

Dr. Serge Carrier is a Urologist and Assistant Professor of Surgery, and the Urology Program Director in the Division of Urology at McGill University. In addition to being an active clinician treating patients, he maintains a busy presence in the research world pursuing his major research interests, which relate to bladder problems and erectile dysfunction. Much of his recent work has focused on erectile dysfunction, a situation that touches the lives of many mature men. Indeed, erectile dysfunction is quite common and it is often under-treated. In an effort to advance and improve the treatment options for men with erectile dysfunction, Dr. Carrier spearheaded an investigation of the effectiveness of a drug called tadalafil for treating erectile dysfunction. In this study run at 25 sites throughout Canada, Dr. Carrier and his colleagues found that tadalafil improved erections and was associated with more successful sexual intercourse than was the placebo (no drug) treatment. In terms of his other research interests, Dr. Carrier has been active in the lab studying bladder dysfunction associated with diabetes. Diabetes is known to affect the bladder in a condition called diabetic cystopathy, which results in difficulty in voiding due to impaired bladder sensation. The causes underlying this have not been entirely clear, but some of the damage associated with diabetes in other parts of the body are believed to be associated with what is called oxidative stress or damage. With this in mind, Dr. Carrier and his colleague

Evette Beshay decided to look at oxidative stress in the development of diabetic cystopathy in diabetic rats. They found evidence of oxidative stress in the bladders of the diabetic rats. From their work, they hypothesized that in diabetes, oxidative damage to the smooth muscle cells of the bladder could contribute to the bladder problems. In addition to his research activities and busy clinical schedule, Dr. Carrier has helped to prepare for a major conference on the aging male that Montreal was hosting this February. As a member of the scientific committee for the 2nd Canadian Society for the Study of the Aging Male Congress, Dr Carrier has contributed to the success of this conference. Dr. Carrier is another example of how vibrant the Montreal aging research community is!

S Carrier et al. (2005) Efficacy and safety of oral tadalafil in the treatment of men in Canada with erectile dysfunction: a randomized, double-blind, parallel, placebo-controlled clinical trial. Journal of Sexual Medicine 2:685-98.

Beshay E, Carrier S. (2004) Oxidative stress plays a role in diabetes-induced bladder dysfunction in a rat model. Urology. 64:1062-7.

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TRANSLATION

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