

Garvan's Breakthrough Medical Research 2008-2009 Osteoporosis Research Program Update

Background

Pain, disability, loss of independence – these are the very human costs to the two million Australians that are living with osteoporosis. This bone disease affects more than **two thirds** of Australian women and over **one quarter** of Australian men over the age of 60.

Garvan's Osteoporosis team focuses on the links between genetic, hormonal and lifestyle influences on optimum bone mass. Garvan's Dubbo Osteoporosis Epidemiology Study (DOES), which began in the late 1980s, is the longest running, large-scale epidemiological study of osteoporosis in the world. It focuses on identifying risk factors for fractures in both men and women as well as identifying new genes that are important to bone health.

2008-2009 Highlights

Risk of Osteoporosis for Men and Women

Throughout the year, utilising data from our internationally recognised Dubbo Osteoporosis Epidemiology Study, our researchers have:

- Demonstrated that low testosterone in men doubles their risk of bone fracture, all other risk factors being equal. This is significant as low testosterone could be attributed to a quarter of all fractures in elderly men.
- Found that for 5 years after an osteoporotic fracture a person's risk of premature death increases. With hip fractures, there is double the risk of death for women and 3 times the risk for men – and this increased risk lasts for 10 years. There is premature mortality after all types of osteoporotic fractures in older men and women. We are now trying to identify what specifically signals this premature mortality, which may then lead to new preventative approaches that could save lives.
- Showed that there is a link between prostate cancer and a higher risk of bone fracture, particularly in those men who received androgen deprivation therapy. Men with prostate cancer face a 50% higher risk of fracture, which increases to nearly doubled risk if they are receiving treatment. The results suggest a link between the two diseases, although we still don't understand the mechanisms. The clear message that comes out of this study is that men with prostate cancer should consider seeking evaluation for osteoporosis, particularly if they are being treated with androgen deprivation therapy.
- Provided doctors with guidelines on when to repeat bone mineral density (BMD) tests for their patients. International clinical guidelines are hazy, with different practices followed in different countries.
- Participated in the first multi-nation genome-wide search to find genes linked to osteoporosis and fracture, resulting in the identification of several chromosomal regions that could harbour novel osteoporosis risk genes.
- Showed, by combining our own study with studies by other research groups, that individuals with specific variants of a major bone regulating gene are at increased risk of reduced bone mass and fracture.

Bone Regulation Research

In 2008, the Bone Regulation team has

- Identified the pathways by which the brain hormone NPY acts to control bone mass and protect against excessive bone loss in certain situations. This project is a collaboration with Neuroscience Program researchers. The team has found that when NPY levels are high (as in starvation) bone formation is inhibited, thereby conserving the body's energy, but when NPY decreases (eg as a result of 'over feeding'), bone formation is stimulated. This means NPY plays a major role in the way our bodies match bone mass to body weight. Importantly the team has also discovered that under situations of **chronic** stress (like depression, or long-term starvation) when NPY increases, it protects the skeleton from **excessive** bone loss, and reduces stress-induced anxiety. This work could lead to a new therapeutic for osteoporosis.

Fracture Risk Calculator – World-First

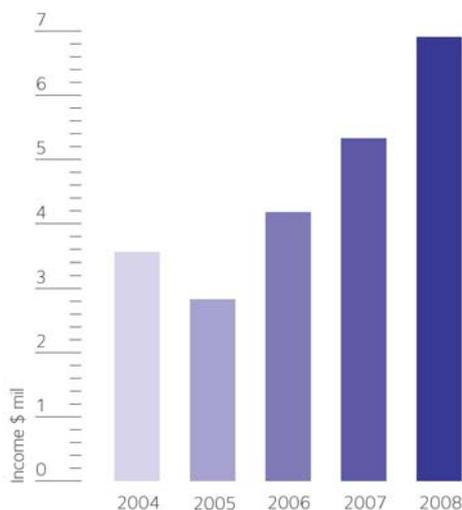
In 2007 Garvan scientists developed a world-first graphically-based model for estimating the individual risk of hip fracture in men and women. If you are over 60, by simply entering your data on sex, age, history of prior fracture, number of falls in the past 12 months and weight or bone mineral density, the tool will calculate your individual risk of having a hip or any osteoporotic (fragility) fracture over the next 5 and 10 years. This will then allow you to make informed choices and, in consultation with your doctor, decide what steps you might wish to take to reduce that risk.

The calculator is ready to use right now at www.fractureriskcalculator.com.

GARVAN AT A GLANCE - 2008

Garvan Research Foundation Income Growth

Garvan Research Foundation is the marketing and fundraising arm of Garvan Institute. In 2007 donations from the public (excluding bequests) increased by **30%** to almost **\$7 million**. In 2009 Garvan Research Foundation must raise at continue to raise funds from the public to help fund the Institute's planned research program.



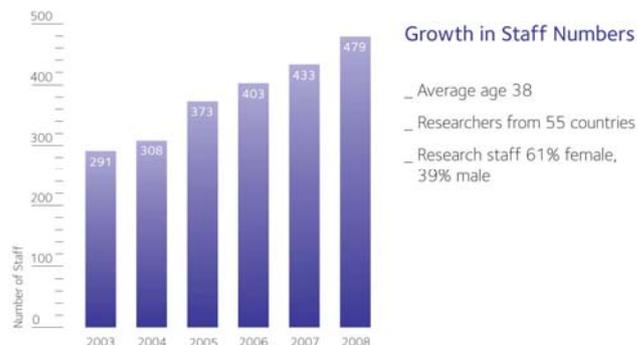
Garvan Institute Sources of Income

Donations from the public constituted **10%** of the Institute's total income for 2008. This excludes earnings from our Endowment Fund.



Growth of the Institute's Research Capacity

Over the past 6 years the Garvan has significantly increased our research capacity across our 5 program areas. Our staff numbers have grown by almost 65% since 2003.



Garvan Publications

Breakthrough research by Garvan scientists appeared in **185** publications in 2008. Each paper published constitutes a **new piece of knowledge**, and scientists aim to publish in the most highly regarded journal in their research field. Each journal has an "impact factor" which is a common measure of its relative importance within a specific discipline. Research organisations use "average impact factor" measurements to determine the overall significance of their research output. For example, in 2008 Garvan achieved an "**average impact factor**" **greater than 8 for the top 75% of its publications**. This is an excellent result, well above the international benchmark.

