

About Professor Josef Penninger, ASMR Medalist 2009

Josef Penninger is the Scientific Director of the Institute for Molecular Biotechnology of the Austrian Academy of Sciences (IMBA), also a Professor in the Department of Immunology and Medical Biophysics at the University of Toronto; Professor for Genetics at the University of Vienna; and Honorary Professor of the Chinese Academy of Medical Sciences.

- At 44 he must be considered one of the most successful scientists in all fields of research. Making the list of the 10 most cited scientists in the world two years in a row, recently Austrian Scientist and Austrian of the Year, he is no stranger to honours and accolades.
- It is the broad scope of his work which is exciting and sometimes frightening to researchers in these days of specialisation. Driven by intellectual curiosity married to a willingness to *explore, collaborate, take risks and innovate* he has a steady stream of significant breakthroughs across the breadth of medical research behind him. His main focus is heart, lung, pain, cancer and bone disease.
- Branded a chronic underachiever by his teachers as a youngster, he learned quickly to believe in himself and not to live down to the expectations of others. *He found his feet and his passion in biology!* Educated at the University of Innsbruck (Austria), he studied medicine and immunology as well as art history and Spanish, falling into medical research through a series of fortunate coincidences. He has strong views on how scientists should be educated, funded and encouraged to retain the awe, amazement and fun of discovery!
- He lived and worked in Canada for 13 years, strengthening his research career, playing a key role in the pharmaceutical industry and making his mark as a celebrated scientist. Head hunted back to Austria to set up and run the IMBA in 2003, this opportunity has placed him in the lucky position of administering a substantial research budget as he sees fit.... his young scientists have the freedom to "*jump from disease to disease, technology to technology*" as intellect, curiosity and passion drives them. He believes that it is the young who innovate and has, as the saying goes, "put his money where his mouth is".

He will be speaking at dinners in Brisbane, Adelaide, Sydney, Melbourne and Perth, and at the National Press Club in Canberra.

- Friday 29th May, Brisbane Dinner, 7pm, Sebel and Citigate Hotel, King George Square, Brisbane
- Monday 1st June, Adelaide Dinner, 7pm, Adelaide Pavillion Restaurant and Function Centre
- Tuesday 2nd June, Sydney Dinner, 7pm, Convention Centre, Darling Harbour
- Wednesday 3rd June, Canberra, 11:30am – 1:30 pm, National Press Club, 16 National Circuit, Barton, Canberra
- Thursday 4th June, Melbourne Dinner, 7pm, Melbourne Convention and Exhibition Centre
- Friday 5th June, Perth Dinner, Friday 5th June, 7pm, Perth Convention Centre

Questions and Answers

Q What particular problems did you encounter in setting up the IMBA?

A It became quickly apparent that countries with small populations like Austria cannot compete with the quantity of research output from places like the USA and the UK, however, quality is another matter. There are two ways for small countries to build internationally competitive research communities – like building a good soccer teams.... spend lavishly and buy the best or, develop your own young talent. We are developing our own young talent.

Q What do you see as the key things you are able to do at the IMBA in developing that young talent?

A I believe good scientists, like good artists, must look beyond their own horizons and keep an open mind. Research groups at IMBA are interdisciplinary. I want to provide an open "candy store" for scientists with central infrastructure, cutting edge technology and core technicians, infiltrate the 'store' with proven clever people and allow them complete freedom to lift their vision by playing in peace and jumping into the technologies available. Its also important to pay people well.

Q How do you think prioritised research fits into this model?

A There are great benefits to human health in strengthening the links between academic research, industry and the public sector. The basic research must be done before the translational outcomes can be delivered to patients. Most translational research should be left to the big companies who have the money to develop the basic findings.

Q Do you think scientists talk to each other enough?

A There can be a lot of fear around revealing research, not only due to the possibility of losing the credit for it, but also because the competition for funding support is so great. I believe that if a scientist talks to ten people, even if there's a chance that one of them might steal an idea, the other nine may be able to suggest even better ideas of how to take the work forward, and this is how science works best.

Q What impact has the European Research Council had on research in Europe?

A I believe it is the best thing to ever happen to European research. It is a commitment to research which brings prestige for people and governments and, adds to the scientific output for the benefit of all. It is a template for funding which fosters collaborations and is extremely powerful.

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Heart and lung diseases

Prof Penninger's research group was the first to show that the Ace2 gene controls heart function (Crackower et al., *Nature*, 2002). Additionally, AC2 is a receptor for the virus that causes the infectious lung disease SARS. SARS can be extremely lethal, but further understanding of how AC2 leads to the accumulation of fluid on the lungs ("pulmonary oedema") will hopefully lead to effective drug treatments for SARS and other similar lung diseases such as bird flu and the Spanish flu (Imai et al. *Nature* 2005; Kuba et al. *Nature Med.* 2005; Imai et al. *Cell* 2008).

Bone loss

Prof Penninger's team was the first to prove that a gene called RANKL is the key osteoporosis gene (Kong et al. *Nature* 1999) that regulates bone loss in arthritis (Kong et al. *Nature* 1999) or tooth loss (Teng et al., *J Clin. Invest.* 2000) and his group explained why females are more likely than males to suffer from bone loss (Fata et al., *Cell*, 2000). His group also showed that RANKL might control bone metastases in cancer (Jones et al. *Nature* 2006). Based on these findings, a novel drug is under development to potentially block bone loss in millions of patients.

Autoimmune Diseases

In autoimmune diseases such as multiple sclerosis and diabetes, people's white cells can attack their own bodies. Prof Penninger's research team identified a molecular gatekeeper known as "Cbl-b" that permits these white cells to still attack infections, but not their own body (Bachmaier et al., *Nature*, 2000; Krawczyk et al., *Immunity*, 2000; Jeon et al., *Immunity*, 2004). Recently his group could show that Cbl-b controls rejection of cancer cells by the own immune system (Loeser et al. *JEM* 2007), that is Cbl-b could be used to activate the immune system to kill tumors.

Dream Gene

Prof Penninger's team isolated the "DREAM" gene as the master gene controlling the perception of pain (Cheng et al., *Cell*, 2002). Mice that lack the DREAM gene show greatly reduced sensitivity to all kinds of pain, and interestingly can learn faster and remember things better. Prof Penninger's research is following up the DREAM gene, hoping to find information that could assist sufferers of chronic pain, and also those that have deficits of memory (eg Alzheimer's disease). His group is currently constructing the first ever systemic map of pain perception.