

Submission to the Strategic Review of Health and Medical Research

Dr Mathew P Dafilis

April 23, 2012

Abstract

Health and medical research can be an interdisciplinary endeavour, drawing on sciences such as physics and mathematics as well as biology. In this submission we discuss this interdisciplinary nexus and how it can be better developed and resourced. Finally we engage in a pie-in-the-sky idea for research funding.

1 Introduction

I am an early-career-researcher working at the interface of physics, mathematics, biology and medical research.

I obtained my PhD in theoretical modelling of the mammalian electroencephalogram — basically this means that I studied equations that describe the behaviour of brain-waves.

I am a first-generation Australian. I am the first in my extended (migrant) family to complete post-graduate studies.

2 Physics, mathematics, biology and medical research

Those of us working at the interdisciplinary nexus (henceforth “the nexus”) between physics, mathematics, biology and medical research apply our knowledge of all of these branches of science to profitably combine to produce beneficial research outcomes which aim to improve the health of this country.

Working at the nexus can be very rewarding intellectually and practically. Take for example the development of a novel depth-of-anaesthesia monitor by my PhD-supervisor, colleague and friend Professor David Liley at Swinburne and also at Cortical Dynamics¹. This innovative Australian invention combines ideas from the nexus to solve a very important problem.

¹<http://www.corticaldynamics.com>

3 Training at the nexus

Whilst those of us working at the nexus value its rewards, getting into working in an area which combines those from the nexus can be difficult.

There are many researchers from around the country who work at the nexus, and many of those researchers train PhD students in their particular area of work. However there is no systematic training program in mathematical biology in this country.

Take for example the Australian Mathematical Sciences Institute (AMSI) Summer Schools in the mathematical sciences that are held every Summer for Honours and post-graduate students. Over the past few years there have been hardly any Summer courses in Mathematical Biology-related areas which could develop capability in mathematical biology in this country.

Recommendation 1: Enhance the capability of PhD students to be trained in mathematical-biology related areas, possibly by enhancing capability through the AMSI Summer Schools.

4 Funding the nexus

Funding the nexus has recently been widely discussed, see for example the article in the *Australian Life Scientist* by Professor Douglas Hilton, Director of the Walter and Eliza Hall Institute of Medical Research²

There should be a mechanism by which grants which are applied for to the NHMRC are being capable as being identifiable as belonging to the nexus.

Recommendation 2: Enhance the capability of grants at the nexus to be readily identified, allowing them to be considered for special funding.

Equally as important is the idea of “Nexus Fellowships” which are early-career-researcher grants specifically for those (in particular for those who have submitted their PhD and recent PhD graduates (up to 7-years post-PhD graduation)) working at the nexus. Note that these grants are specifically aimed in mind for those who have just submitted their PhD and onwards in order to maintain career-continuity. I envisage that there would be just a small number of Nexus Fellowships with a twice-yearly rapid-turnaround application cycle.

Recommendation 3: Nexus Fellowships – early-career-researcher fellowships for those working at the nexus should be introduced, with a twice-yearly rapid-turnaround application cycle for those who have just submitted their PhD thesis and onward, up to 7-years post-PhD graduation.

²http://www.lifescientist.com.au/article/414864/comment_medical_research_doesn_t_numbers/

5 Equilibrating staffing numbers

Two recent reports on the Australian academic workforce^{3 4} discuss the Australian academy and its future.

Could it not be possible to “tune” the academic workforce to maintain relative equilibrium, so that the number of fellowships and scholarships made available is approximately equal to the combination of those retiring from the system and those PhD graduates entering the system, so that there is minimal unemployment amongst those of us early-career-researchers who have invested so much effort, time, and money into their education ?

6 Speculative idea: a medical research lottery

Let’s make some simple assertions. Let’s assume (without foundation) that there are approximately 10,000 health and medical researchers, each earning at minimum annual average earnings of \$65,000 per annum.

Let’s now assume that each of these medical researchers pays a 2% levy via the taxation system. This money would raise at least 13 million dollars per year.

Assume now that this money was placed into a lottery for medical researchers. This money could be used to fund 200 post-doctoral researchers every year, which any medical researcher could nominate to enter the lottery to receive funding to employ a post-doctoral researcher.

Pure speculation I know (who wants to pay more tax ?) but an idea nonetheless.

³http://www.cshe.unimelb.edu.au/people/bexley_docs/The_Academic_Profession_in_Transition_Sept2011.pdf

⁴ http://www.cshe.unimelb.edu.au/people/bexley_docs/RAW_Combined.pdf