

# Antibiotic resistance and brain pathways underpinned by a massive engine

February 29 2016

---



Australian research has been given a boost today through a new and major investment into MASSIVE - a five-year collaboration between Monash University, CSIRO and the Australian Synchrotron.

MASSIVE (Multi-modal Australian ScienceS Imaging and Visualisation Environment) is a high performance computing facility designed specifically to process complex data. Since 2010, MASSIVE has played

a key role in driving discoveries across many disciplines including biomedical sciences, materials research, engineering and geosciences.

High performance computing helps to build bridges between industry and academia while accelerating research translation. To support both, Monash University has invested a further \$4.1m in this new \$5.7m project to fund a new high performance computing capability, M3.

"M3 will be particularly important to the Faculty of Medicine by providing computing capacity that is malleable, connected and can be shaped to support the needs of Monash's strategic research domains," said Professor Christina Mitchell, Dean, Faculty of Medicine, Nursing and Health Sciences.

Alan Finkel AO, Australia's Chief Scientist, will join Professor Mitchell, to "switch on" M3.

According to Dr Finkel, our nation needs superb science, and superb science only emerges when our scientists are able to access first-class infrastructure such as MASSIVE.

"You cannot understand what you cannot see," the Chief Scientist said.

"MASSIVE provides specialised processing power to build three dimensional X-ray images at micrometre resolution or complex maps to summarise the interconnections between millions of [brain](#) cells. At a glance, scientists can now visualise and understand these complex structures."

Over five years, MASSIVE has built a reputation as a leader in coordinating imaging informatics infrastructure across Australia, and as such works closely with many national initiatives and this new investment will therefore have a significant impact, for example in life

sciences research.

MASSIVE welcomes two new contributing affiliate partners, the Australian Research Council Centre of Excellence in Advanced Molecular Imaging and the Australian Research Council Centre of Excellence for Integrative Brain Function. The CSIRO and the Australian Synchrotron have both committed funds to continue their support.

Dr Marta Garrido is a neuroscientist working at the University of Queensland in the Australian Research Council Centre of Excellence for Integrative Brain Function; she is interested in the brain mechanisms and the connectivity underpinning perception.

"The research done in my lab focuses on understanding what we can learn about brain activity patterns to try and understand which brain pathways are engaged when something unexpected happens," Dr Garrido said.

"The brain is wired in an extremely complex way. To make sense of the pathways engaged in perception and action we need to use brain imaging techniques that result in vast amounts of data. We then use mathematical modelling to decipher this data—these analyses require a lot of computing power and so access to supercomputers like M1, M2 and now M3 is critical."

Professor Trevor Lithgow, a Monash researcher, is using a range of next generation microscopes to understand how bacteria develop resistance to antibiotics.

"The knowledge gained from the application of ultra-high resolution imaging techniques coupled with a data processing engine like MASSIVE not only enlightens us on how bacteria become antibiotic

resistant but also guides the development of the next generation of antibiotics," Professor Lithgow said.

"As the Chief Scientist says, 'you cannot understand what you cannot see' and in order to make drugs able to control and kill bacteria we need visual knowledge of how these molecular machines work," Professor Lithgow concluded.

M3 is pioneering and building high performance computing upon Monash's specialist Research Cloud fabric. It has been supplied by Dell with a Mellanox low latency network and NVIDIA GPUs.

Provided by Monash University

Citation: Antibiotic resistance and brain pathways underpinned by a massive engine (2016, February 29) retrieved 25 April 2024 from <https://medicalxpress.com/news/2016-02-antibiotic-resistance-brain-pathways-underpinned.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.