# NCRIS Health Group

## Enabling health innovation and translation

NCRIS National Research Infrastructure for Australia An Australian Government Initiative Health Group

Australian Government

Together, we tackle complex, multidisciplinary medical challenges using world-class national research infrastructure. Our experts, data and tools shepherd health discoveries toward better prevention, diagnosis and treatments for Australians. The NCRIS Health Group accelerates Australian health research and industry innovation, reducing the time and costs of getting new health solutions to patients.

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# Advancing RNA treatments and vaccines

## Australian science advances global access to mRNA vaccines and next-gen therapies

mRNA vaccines have transformed global health, but rely on lipid nanoparticles (the stable carriers that protect and deliver mRNA) that need ultra-cold storage and tend to accumulate mostly in the liver. This limits their effectiveness, restricts transport and increases cost. NCRIS Health Group providers are working to lift these constraints.

ANSTO's National Deuteration Facility enabled an international collaboration to study how lipid nanoparticles behave under different conditions by supplying specially modified lipids to increase their stability while maintaining vaccine performance. A biotech giant has since taken up the customised lipids to commercialise individualised mRNA treatments.

Researchers also used the NCRIS Health Group providers to direct the lipid nanoparticles to places other than the liver. Phenomics Australia supported access to the mouse lines used for the in-vivo imaging of mRNA-lipid nanoparticle distribution, Australian National Fabrication Facility imaging checked the mRNA went where it needed to, high-resolution imaging at Microscopy Australia confirmed the size and shape of the lipid nanoparticles which influences where they go in the body and how effectively they deliver mRNA, National Imaging Facility advanced imaging tracked successful delivery, and a Therapeutic Innovation Australia-supported facility manufactured the nanoparticles.

Through these unique materials, innovative measurement and national coordination, NCRIS Health Group providers helped Australian science strengthen the world's access to next-generation vaccines and mRNA therapies.



**200+**
human RNA vaccines and therapeutics under development globally

**~$8 billion**
Australia's RNA sector could add to our GDP over 10 years to 2033

"ANSTO's National Deuteration Facility has been the only facility worldwide supplying many of the lipids used in the lipid nanoparticles of mRNA vaccines in their deuterium-labelled form, enabling researchers and industry to trace and investigate the structure and function of these drug-delivery vehicles under diverse conditions."

*Dr Tamim Darwish, National Deuteration Facility Director*

# Advancing RNA treatments and vaccines

## Closing the gap in Australia's ability to test home-grown RNA treatments and vaccines

mRNA vaccines have recently transformed the fight against infectious diseases such as COVID-19, and RNA therapeutics are now showing significant promise for treating conditions such as cancer, auto-immune and metabolic diseases. But Australian researchers face a critical gap in their local capability to test and assure the quality of Australia's emerging RNA medicines.

EMBL Australia scientists led the establishment of an RNA mass spectrometry platform that coordinates expertise across universities, hospitals and industry to define and work towards meeting that national need. The platform enables long-term and international collaboration and skills development. Bioplatforms Australia provides access to advanced molecular analysis and mass spectrometry infrastructure, allowing detailed assessment of RNA structure, stability and safety.

Together, these NCRIS Health Group providers support domestic development of next-generation RNA technologies and vaccines. It reduces our reliance on overseas services, accelerates translation to clinical trials, and helps deliver safer, faster pathways to new treatments across cancer, infectious, autoimmune and metabolic diseases.

The new RNA mass spectrometry platform, awarded

**$4 million**

by the Medical Research Future Fund (MRFF) brings together

**16 investigators**

from

**6 Australian universities and research institutes**

and

**2 hospitals**

"The surge in RNA therapeutic development and investment since the COVID-19 pandemic has created a demand for domestic services for RNA mass spectrometry. Before, if you wanted to find a place that provided a full package of analytical services for people developing RNA therapeutics and studying RNA, you would likely have had to collaborate with someone outside of Australia."

*Prof Chen Davidovich, Monash Biomedicine Discovery Institute*

