

## SUMMARY OF MACH SUBMISSION FOR NHMRC ACCREDITATION AS A RESEARCH TRANSLATION CENTRE

The **Melbourne Academic Centre for Health (MACH)** was accredited as a NHMRC Advanced Health Research Translation Centre in 2015. MACH is now seeking (re-)accreditation as a Research Translation Centre; our 10 Health Service partners serve ~2.5 million people residing in central and suburban Melbourne north and west of the Yarra River. The grouping also represents Australia's largest concentration of medical research, typically winning about 25% of public funding.

### **MACH Structure and Purpose**

**Partners:** MACH is an unincorporated joint venture with the formal partnership comprised of ten metropolitan public Health Services, eight independent Medical Research Institutes (MRIs) and the University of Melbourne's Faculty of Medicine, Dentistry and Health Sciences, which serves as the administering organisation; La Trobe University has joined recently as an affiliate member. Together the partners employ ~40,000 staff and each year invest about ~\$7bn in health care, education and research.

**Agreed Purpose:** To bring together health services, health scientists and healthcare consumers to translate interdisciplinary research into improved healthcare and a stronger economy.

**Governance:** The joint venture's well-established governing body is the **MACH Council**. The Council has an independent Chair, Patricia Faulkner AO, who brings a consumer perspective, with the 19 formal partners being represented by their CEO (Health Services), Director (MRIs) and the Dean of the Faculty of Medicine, Dentistry and Health Sciences (University of Melbourne). The Council sets strategy and oversees the partnership's finances, including subscriptions providing an operating budget of \$915k per year, plus partner contributions to collaborative initiatives that will grow to over \$6m per year by 2026.

**Management:** The Council has established the **MACH Board** to deliver strategy, develop new ideas and oversee the MACH Executive. The Board is currently chaired by Professor Jane Gunn, the Dean of the University of Melbourne's Faculty of Medicine, Dentistry and Health Sciences and is comprised of 2 Health Service CEOs, 2 MRI Directors, the Head of the Melbourne Medical School, the MACH Executive Director and two external members, an Aboriginal Elder and a local GP (representing Primary Care). The Board is directly served by three committees, the Aboriginal Leadership Group, the Primary Care Committee and the Strategic Translational Research and Platforms (STRaP) Committee.

The 5.5 FTE **MACH Executive** is led by the Executive Director, Professor Sir John Savill. MACH has found that fostering new cross-disciplinary, cross-institutional collaborations is the most effective mechanism to drive beneficial change across the partnership, with over 100 leaders from across the MACH partnership volunteering to serve ten thematic collaborative committees (see below).

### **MACH Strategy and Plans**

MACH Council has committed to a 2020-2025 strategy

**"Tomorrow's Healthcare Today"**, see Figure to right:-

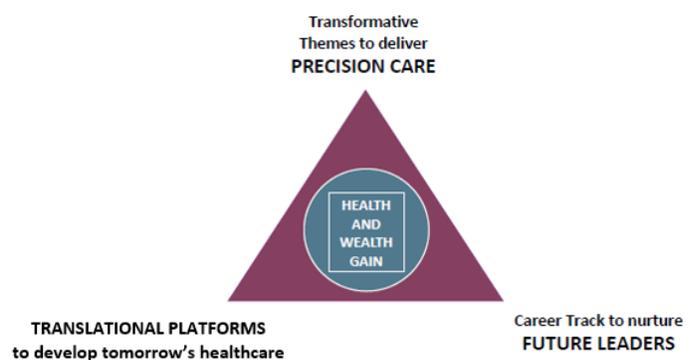
The strategy has three interdependent objectives:-

- 1) Nurture the **Future Leaders** of innovative healthcare;
- 2) Develop **Translational Platforms** that turn research into improved healthcare; and
- 3) Co-design and deliver **Precision Care**.

#### **Strategic priority 1: Nurture Future Leaders**

**1.1) The MACH-Track:** Across MACH successful translation of research and implementation into healthcare has been driven by Clinician Researcher-Translators also doing front line clinical work. Health Services prioritised integrated clinical/research training of such staff through the "first-in-Australia" MACH-Track. This started in 2020 as a structured, mentored, pre-PhD, PhD and initial post-PhD research career development program for **doctors undertaking vocational training** in accredited hospital specialties, general practice and public health, aimed at developing the future leaders of clinical innovation. The scheme is fully-funded by the partners through a collaborative commitment. All arrangements are in place to **expand the Track to nurses, midwives and physiotherapists** from 2022 bringing total partner commitment to ~\$2.9m pa by 2027, from when 40 trainees will be in post at any one time.

**1.2) MacHSR:** Health Services have invited clinical staff to propose innovative solutions to care problems, finding that many ideas require rigorous analysis through **health services research (HSR) approaches** including implementation science, but there is a dearth of clinical leaders with HSR skills. To address this need the MacHSR scheme will start in June 2022, giving established clinicians part-time fellowships to work with MACH's HSR leaders to prepare problem-solving proposals and set clinicians on a pathway to become leaders of evidence-based service improvement.



## **Strategic priority 2: Translational Platforms to develop Tomorrow's Healthcare**

**2.1) Clinical Trials and Clinical Research Platform:** MACH's Health Services staff are now provided with equal access to in-depth support in Biostatistics, Health Informatics, Clinical Trial design and sponsorship, Co-Design, Implementation Effectiveness and Health Economics thanks to the 2021 opening by the University of Melbourne of the \$1.2m *pa* **Methods and Implementation Support for Clinical and Health research hub (MISCH)**. The MISCH Hub and MACH Platform are now driving initiatives including a gene therapy trials hub (with \$1m start-up support from industry), streamlined governance arrangements and the Victorian Clinical Trials Education Centre (V-CTEC).

**2.2) Data-Driven Healthcare Improvement Platform:** In response to MACH's Health Service CEO priorities, in 2019 the University of Melbourne opened the ~\$2m *pa* Centre for Digital Transformation of Health. In partnership with MACH-affiliated Health Services, the Centre co-funds Professorial Chief Information Officers in MACH-affiliated health services. In 2022 the Centre will open the **Digital Health Validitron**, a simulator enabling digital health innovations to be built, implemented, tested, adapted, and clinically validated for wide adoption; and the **Learning Health System Academy**. Ongoing platform initiatives include state-wide virtual care and national data sharing collaborations.

**2.3) Towards a Precision Medicine Platform:** The Board's STRaP committee is driving clinical translation of genomics and other 'omics technologies, by enhancing the phenotyping of existing MACH-wide cohorts (including the exciting State-wide birth cohort, GenV) in alliance with MACH's **Molecular Imaging Platform**.

## **Strategic priority 3: Transformative Themes to deliver Precision Care**

Precision Care is based on implementation of the best research evidence into MACH health services; will be tailored to the personal needs of each patient and their family; will deliver improved safety and quality of care at lowest feasible cost; and is matched to the reach of the relevant health services, including alignment to Primary Care.

**3.1) Health Services Improvement and Implementation:** This committee has designed and will lead **MachHSR** (see above), organises the popular **implementation science seminars** for clinicians and E/MCRs, and have posted online high-quality **implementation resources** for all knowledge levels. The grouping is leading MACH's ongoing contributions to the **Victorian Collaborative Healthcare Recovery Initiative** by data-linkage analysis of disruption of non-COVID care, surveys of the acceptability to patients of telehealth and approaches to drive out low value care.

**3.2) Consumer Engagement:** All MACH partners prioritise community engagement so MACH's role has been to organise a thriving **Community of Practice** and partner Melbourne's innovative **Health Issues Centre** to encourage engagement of culturally and linguistically diverse communities with health research.

**3.3) Aboriginal Leadership Group:** This Board committee has developed a novel Culturally Adaptive Governance Framework (CAGF) for Indigenous Health Research and is leading MACH engagement with **Victorian Government's Aboriginal Research Accord Project** being led by the Victorian Aboriginal Community Controlled Health Organisation.

**3.4) Primary Care:** This Board committee leads engagement with the evolving Federal Government Primary Healthcare 10 year Plan, and has drawn on the University of Melbourne Department of General Practice PATRON database linking over 200 Victorian practices, to secure \$5m from the Ramsey Foundation to initiate the **Future Health Today** program. This digital health initiative empowers GPs to make earlier diagnoses of chronic disease and initiate collaborative management with hospital-based specialists.

**3.5) Women and Newborns Health:** Responding to concerns expressed by relevant MACH Health Services, this group has deployed MACH seed funding to co-design with consumers the F3 protocol "Find, Follow and Facilitate; 3 steps to Flourish", to streamline and standardise the follow up of infants born after a high risk pregnancy or neonatal period.

**3.6) Care of the Ageing:** This group have piloted a thriving **E/MCR Network**, developed a **Network for Clinical Innovation in the Dementias** that will accelerate diagnosis and care by standardising protocols across MACH's five state-funded Cognitive Dementia And Memory Services (CDAMS) clinics, and with leadership from La Trobe University, is evaluating falls prevention protocols.

**3.7) Infection:** This group co-ordinated MACH's research response to COVID, with successful translation into improved public health policy and is now defining the optimum patient journey across primary care and health services for patients diagnosed with community acquired pneumonia.

**3.8) Education and Workforce Planning:** At the request of Health Services, this grouping of expert educationalists has been pursuing "Safety and Rescue" as a project to enable sharing (and eliminate wasteful duplication) between health services of selected mandatory training such as hand hygiene and Basic Life Support.

**To conclude,** MACH is a well-established partnership meeting NHMRC requirements to promote health service leadership of research and translation to address local priorities; strengthen collaboration between the partners; and deliver training and education to build capacity and capability in health research and translation.

## **CRITERION 1: THE MACH PARTNERSHIP TRANSLATES RESEARCH FINDINGS INTO BENEFITS FOR PATIENTS AND THE HEALTHCARE SYSTEM**

**1A) FIVE EXAMPLES** demonstrate MACH's strengths in implementation driven by Clinician Researcher-Translators embedded in the relevant health systems (1,2), and by Australian health technology assessment, which requires key implementation science approaches, such as quantification of need, consumer involvement in the development of the innovation and rigorous health economic analysis.

### ***Example 1: Better Cancer Treatment: Establishing Venetoclax as a first-in-class therapy for leukaemias and lymphomas***

**The problem and the team:** Each year in Australia about 1,400 people receive a new diagnosis of Chronic Lymphocytic Leukaemia (CLL), making it the most common type of leukaemia. Poor outcomes required improved treatment. Professors Andrew Roberts and John Seymour have brought together a team of MACH-affiliated Clinician Researcher-Translators based at the Royal Melbourne Hospital, Peter MacCallum Cancer Centre, Walter and Eliza Hall Institute of Medical Research (WEHI) and the University of Melbourne. With NHMRC funding, national/international collaborators and consumer support (3, 4), the team has led a program of clinical research and successful translation into healthcare of a new medicine for CLL and other blood cancers, venetoclax. This agent was developed to target a cancer-causing protein Bcl-2, which had been discovered to be a powerful brake on cell death by WEHI researchers in 1988 (5). Five years ago, although it was known that venetoclax acted like BH3 proteins to stop Bcl-2 rendering cells resistant to death (6), it was not known if this new medicine would be active in blood cancers in which Bcl-2 overexpression had been implicated.

**The research:** The Roberts/Seymour team first demonstrated efficacy of venetoclax in a Phase I study in 116 patients with relapsed/refractory CLL or Small lymphocytic lymphoma (SLL) (7). They went on to demonstrate improved efficacy in CLL when venetoclax was combined with the CD20 monoclonal antibody rituximab (8). Furthermore, a Phase II study demonstrated efficacy for venetoclax combined with the BTK inhibitor ibrutinib in Mantle-cell lymphoma (9). These early phase studies led to a successful Phase III trial of venetoclax-rituximab in 389 patients with relapsed/refractory CLL, demonstrating that the combination was approximately twice as effective as the standard of care in promoting progression free survival (10) which has proved of remarkably long duration and was associated with a survival advantage (11).

**Successful translation:** The team's input was pivotal to a successful application to the Australian Pharmaceutical Benefits Advisory Committee in November 2018, which agreed that venetoclax-rituximab was non-inferior in terms of efficacy to ibrutinib monotherapy, with fewer adverse effects and a favourable health economic analysis; the Public Summary Document (12) has redacted economic tables, but substantial savings over ibrutinib have been confirmed in international analyses (13). Successful translation of the team's research into publicly-funded Australian healthcare was confirmed by the 1<sup>st</sup> March 2019 Pharmaceutical Benefits Scheme listing of venetoclax-rituximab for relapsing/refractory CLL with anticipated uptake by many hundreds of Australian patients per annum (3,4).

**Reach and significance:** World-wide the team's work has inspired over 300 trials of venetoclax (14) in CLL, various lymphomas, acute myeloid leukaemia, acute lymphocytic leukaemia, myeloma and various cancers. The drug has been approved by regulatory authorities for previously treated CLL and SLL in over 60 countries (including by the US FDA the European EMA and Australia's TGA); treatment-naïve CLL (in USA, Australia and Europe) and in aged or frail patients with Acute Myeloid Leukaemia (USA, Australia). There are multiple entries in international guidelines, such as the US National Comprehensive Cancer Network, NCCN (15). Estimates of the number of patients benefiting worldwide are not available, but this is substantial as worldwide sales of venetoclax have been estimated at US\$ 1.48bn for 2020.

**To conclude,** the success of the Roberts/Seymour translation program within MACH can be summarised by expert opinion labelling venetoclax as "a real game-changer" (16), and by consumers describing this as a "chemo-free" drug (4), that some consider to be "life-changing" and "a miracle drug" that has given them "hope for the future".

### ***Example 2: Better cancer staging: F-18 Fluorodeoxyglucose (18FDG) Positron Emission Tomography (PET) improves detection of breast cancer spread***

**The problem and the team:** Each year a new diagnosis of breast cancer is received by ~16,000 Australians (women and men; this is the commonest cancer in Australian women). Of these ~2,500 will have locally advanced disease at presentation, and a further ~4,500 will develop recurrent and/or metastatic disease after successful first-line treatment (17). Providing definitive staging evidence of breast cancer spread is beneficial because this directs patients immediately to the most (cost-)effective treatment protocols. To address this problem, Prof Andrew Scott, a NHMRC Senior Practitioner Fellow, brought together a team of MACH-affiliated Clinician Researcher-Translators at Austin Health, Peter MacCallum Cancer Centre, Olivia Newton-John Cancer Research Institute and the University of Melbourne. Prof Scott chairs the MACH

Molecular Imaging Platform Committee and was recently featured in the MACH newsletter (18) as a role-model Clinician Researcher-Translator.

**The research:** The team have led a program of research (19,20), evidence synthesis (19,21) and successful translation on the use of 18FDG-PET to detect breast cancer spread. With national and international collaborators and Federal Government funding, the MACH team have established 18FDG-PET as unequivocally superior to other imaging modalities (CT, MRI, Bone Scintigraphy) in ruling out breast cancer spread, because even very small tumour deposits emit detectable positrons due to increased glucose metabolism and uptake of the radio-pharmaceutical 18FDG- such sensitive imaging yields almost no false-negatives (22).

**Successful translation:** International breast cancer practice guidelines (eg NCCN in the USA and ESMO in Europe) now recommend 18FDG-PET in suspected advanced or metastatic disease. Definitive evidence of successful translation in Australia is provided by the 9/9/2019 Medicare Benefits Schedule (MBS) listings for new publically-funded uses of 18FDG-PET (61524, 61525; 23). The successful application (1357; 24) was written on behalf of the Australian Association of Nuclear Medicine Specialists (AANMS) by the MACH-affiliated lead investigator, Prof Scott, and was lodged by AANMS. It documents essential steps in successful translation leading up to MBS listing including regulatory approval for the Australian Register of Therapeutic Goods (e.g. 54521 sponsored by Austin Health); endorsement by relevant consumer organisations (such as Cancer Council Australia) and relevant professional bodies (e.g. Breast Surgeons of Australia and New Zealand Inc); and a favourable health economics analysis with, for example, an ICER of \$27,558 for suspected recurrence reflecting offset of additional costs incurred for subsequent correct treatment of false-negatives with CT *etc* (22).

**Reach and significance:** The MBS listing announcement (23) states that ~12,000 Australian patients with breast cancer will benefit from 18FDG-PET staging each year.

**To conclude,** the MACH team have successfully led research and translation to establish 18FDG-PET as an improvement in staging breast cancer spread that benefits patients and the health system.

### **Example 3: Better use of Health Technologies: Improving outcomes in acute ischaemic stroke**

**The problem and the team:** Stroke Foundation data indicate that over 56,000 Australians experience an acute stroke each year, with some 450,000 Australians currently living with disability caused by stroke. Better outcomes are desperately needed. Professors Geoffrey Donnan and Stephen Davis have brought together a team of MACH-affiliated Clinician Researcher-Translators based at the Royal Melbourne Hospital, Austin Health, Western Health, Florey Institute and University of Melbourne with the aim of improving patient outcomes after acute stroke. The team has focussed on acute ischaemic stroke due to arterial thrombosis, the cause of about 85% of acute strokes; about half of these are due to occlusion of large vessels from which intra-arterial clots can be retrieved by endovascular devices- “thrombectomy”.

**The research:** With funding from NHMRC, multiple philanthropies, industry and a Medical Research Future Fund (Rapid Applied Research Translation) award from MACH, the team has led national and international research consortia that have revolutionised the care of acute ischaemic stroke. This has been achieved by definitively evidencing and then, during the last five years, successfully translating into healthcare new protocols for thrombolysis and thrombectomy. The team led the NHMRC-funded EXTEND-IA trial (25) in patients with ischaemic stroke of less than 4.5 hours duration with major vessel occlusion proven by CT angiography. This study compared the thrombolytic agent alteplase alone with alteplase plus clot retrieval using Medtronic’s Solitaire flow-restoration (FR) stent retriever, directed by CT/MRI perfusion imaging employing novel RAPID software from iSchemaView, that identifies potentially salvageable brain tissue. The trial was stopped early because the clot retrieval protocol almost doubled the proportion of patients exhibiting early and sustained neurological improvement. At 90 days, 71% of patients receiving mechanical thrombectomy were functionally independent, compared with 40% with alteplase alone.

**Successful translation** was achieved following a 2016 application to Australia’s Medical Services Advisory Committee for mechanical thrombectomy in acute ischaemic stroke due to large vessel occlusion, based on the team’s EXTEND-IA trial (26). The detailed economic evaluation presented showed that the incremental cost-effectiveness ratio (ICER) was very favourable over conventional care at \$12,880 per QALY gain. With support from consumers (27), a Medicare Benefits Schedule (MBS- approval for public funding) listing was granted in 2017 (27) (35414) and launched by the Federal Health minister together with updated Australian clinical guidelines (27, 28).

**Reach, significance and ongoing implementation:** The team’s thrombectomy protocol has been strongly recommended in multiple international clinical guidelines, including by the European Stroke Association and the American Heart and Stroke Association. Good progress is being made with implementation in Australia. Largely because of the need to reach specialist treatment within 4.5h of onset of stroke symptoms (see below), only around 10% of all strokes are currently suitable for thrombectomy (28), ~ 5,000 Australians per year. Despite the need to build skills (28), a 2020 Deloitte audit (29) reported

that 3% (~1,500 per year) of Australians with acute stroke were already benefitting from thrombolysis with thrombectomy; the team are now working on improving access:-

Firstly, they are “taking the hospital to the patient”. The Royal Melbourne Hospital introduced Australia’s first Mobile Stroke Unit in 2017, with evaluations (30, 31) of the first 100 patients treated demonstrating a median time saving for thrombectomy of 51 minutes and median reduction of ~25 Disability Adjusted Life Years (DALYs) at a cost-effective investment of about \$31,000 per DALY avoided. To improve still further access for acute stroke patients to beneficial healthcare technologies, particularly in rural and remote settings, the MACH team have brought together the nation-wide Australian Stroke Alliance (32). This is a consortium of researchers, consumers (including Indigenous communities, patients and staff) and emergency patient transport and healthcare providers that has recently won a first-round Frontiers award of \$40m from MRFF for the Golden Hour project (32). This is researching the readily translatable benefits of light-weight, mobile brain scanning technologies that can be taken to patients by road or air, speeding effective therapy. The second approach is world-leading research to improve the use of thrombolytic drugs, with translation well-advanced as all the following protocols are already recommended in Australian and European guidelines. When the use of alteplase is guided by CT perfusion imaging with RAPID software to detect salvageable brain tissue, thrombolysis up to 9h after symptom onset improved outcomes (33) doubling the time window for rescue of ischaemic brain. Furthermore, recent work demonstrated clear advantage for tenecteplase over alteplase as a thrombolytic agent in acute ischaemic stroke. Tenecteplase is a genetic variant of alteplase that has a greater specificity for fibrin and a longer half-life, allowing bolus administration (with MACH-funded work in progress on administration as a bolus by paramedics in the acute stroke ambulance). The EXTEND-IA TNK trial (34) in patients with occlusion of major vessels and symptoms of less than 4.5 hours duration demonstrated that tenecteplase prior to thrombectomy was up to twice as effective as alteplase in securing reperfusion and was better at improving neurological function.

**To conclude**, Donnan, Davis and their MACH-affiliated team have successfully translated their research into care protocols that improve outcomes for patients with acute stroke. Furthermore, in a condition where “time is brain”, the group continue translation of new protocols that will improve still further patient outcomes, with emphasis on improving access.

#### **Example 4: Better Family Diagnosis: Genetic testing for childhood syndromes**

**The problem and the team:** Families with suspected inherited syndromes can be spared what was once often a “diagnostic odyssey” of clinical diagnosis and the misery of “not knowing” by accurate genetic diagnosis using evolving DNA-based diagnostic techniques. Additional benefits include information crucial for treatment and prognosis, with the added benefit of families receiving accurate reproductive advice. Interdisciplinary teams of MACH-affiliated health practitioners and scientists at the Royal Children’s Hospital (and its associated Victorian Clinical Genetics Service), Royal Melbourne Hospital, Austin Hospital, Royal Women’s Hospital, Peter McCallum Cancer Centre, and the University of Melbourne have been establishing the place of state-of-the-art molecular biology techniques developed for genomics research in care pathways for such families. Clinician Researcher-Translators at the Murdoch Children’s Research Institute (Prof Kathryn North, A/Prof Sue White, Prof Zornitza Stark and Prof Tiong Tan) have led an interdisciplinary team focused on testing of children.

**The research:** With funding from NHMRC, Victorian Government (for the Melbourne Genomics Health Alliance, led by Prof Clara Gaff) and a Medical Research Futures Fund (Rapid Applied Research Translation) award from MACH, the team compared new DNA sequencing approaches with standard investigations. Paediatric patients recruited received the then new technique of Exome Sequencing (ES) using Next Generation Sequencing platforms in parallel with their usual clinical investigations. Four times more diagnoses were made by ES than standard care (58% vs 14%) and one third of patients receiving a diagnosis had a change in the medical care as a result (Stark et al, 2016, 35). ES also outperformed to clinician-nominated phenotype-driven Gene panels, which missed 23% of diagnoses made by ES; at the most stringent level of 20x coverage, ES missed a clinically relevant variant in a candidate gene list in only ~8% of cases (36). Next, the team asked whether genomic sequencing early in the diagnostic trajectory made a difference by following up for a median period of 473 days 80 children who had undergone singleton Whole Exome Sequencing (WES). The results of WES did not increase hospital service use and changes in clinical management generated a cost saving of \$1,578 per QALY gained. “Cascade” WES testing of all parents and clinically indicated siblings generated benefits including increased ongoing pregnancies at a cost of \$8,118 per QALY gained (37). This work led to the first end-to-end cost-effectiveness analysis of WES in suspected genetic disease in the same cohort of 80 infants. The use of WES resulted in a gain of 7.39 QALYs and an incremental cost-effectiveness rate (ICER) of \$31,144, which fell to \$20,839 on a gain of 11.62 QALYs when cascade testing in first degree relatives was included. When parental reproductive outcomes were added, cost-effectiveness increased again with 36.0 QALYs gained with an ICER of \$14,235 (38).

**Successful translation:** To make the cost-effective benefits of WES diagnosis of suspected inherited rare disease available to all Australians, the team led (on behalf of the nationwide collaboration, Australian Genomics, 39) an application, number

1476, to the Medical Services Advisory Committee in 2019 (40) for next generation sequencing of exomes in children with the onset of clinical features/symptoms indicating a syndromic disorder in the first year of life. Explicit support is documented from a range of consumer organisations including Rare Voices Australia, Syndromes Without A Name and Genetic Alliance Australia. The public summary document dated August 2019 (41) recorded MSAC's recommendation to the Commonwealth Health Minister that Whole Exome Analysis (WEA; this includes bioinformatic analysis of WES) should be offered to infants with suspected childhood syndromes and their parents at the same time ("trio" testing) which increases the likelihood of making a diagnosis in the child. This recommendation was based on an extensive re-working of available data concerning diagnostic yield and cost-effectiveness, which was accepted by the Minister with Medicare Benefits Schedule listing being made on 20<sup>th</sup> May 2020 (42) for WES to identify childhood syndromes in affected individuals (73358) and items to cover reanalysis (73360) and aspects of trio and cascade testing (73359, 73361, 73362, 73363).

**Reach and significance:** The public summary document (41) projects that after clearing a "backlog" over the first three years, about 2,800 Australian children each year will benefit at a cost of \$2,400 per patient, with cascade testing of parents and siblings benefitting a further ~4,300 Australians at a cost of \$400 per patient.

**To conclude** – Through a rigorous analysis of implementation of a genetic testing service across MACH partners, the team has benefitted all Australian families with suspected genetic disease.

### **Example 5: Better Public Health Policy: Mathematical epidemiology drives the Australian Commonwealth response to the COVID-19 pandemic**

**The problem and the team:** From January 2020 the Australian Commonwealth Government has led the nation's public health response to the COVID-19 pandemic. No research team has had greater influence on Commonwealth pandemic policy than the Doherty Institute's Epidemiology Group, led by the public health physician Prof Jodie McVernon with the mathematician Prof James McCaw. The Doherty is a collaboration within the MACH collaboration, bringing various state and national Royal Melbourne Hospital Units (Victorian Infectious Diseases Reference Laboratory, VIDRL; Victorian Infectious Disease Service, VIDS; Victorian Healthcare-Associated Infection Surveillance System, VICNISS; and WHO Collaborating Centres in Viral Hepatitis and Influenza Reference and Research) together with various divisions in the University of Melbourne (see below). To strengthen clinical collaboration across all 10 MACH-affiliated health services, Doherty staff led the development of the MACH Infection Committee, which is chaired by the Doherty's A/Prof Steven Tong, with Institute Director Prof Sharon Lewin a member.

**The Research:** Since 2015 McVernon has led successive NHMRC Centres for Research Excellence (CRE) focused on capacity building for policy-relevant infectious diseases modelling (PRISM<sup>2</sup> and SPECTRUM; 43), and (with the Doherty Director Sharon Lewin) since 2016 has been one of four members of the Executive of the NHMRC CRE APPRISE (Australian Partnership for Preparedness Research on Infectious disease Emergencies). Important publications (reports in the case of a series of modelling projects commissioned by the Commonwealth Departments of Health and Prime Minister and Cabinet) have addressed control of spread of SARS-CoV2 and the influence on this of new vaccines (44,45,46,47).

**Successful Translation:** Because the McVernon/McCaw team had, through research contracts held between 2005 and 2019, developed a participatory working style with policy advisors, key stakeholders and the community on the threat of influenza pandemics, when the threat of COVID-19 to Australia became apparent in January 2020, they were invited by then Chief Medical Officer (CMO) Prof Brendan Murphy to join the Australian Health Protection Principal Committee (AHPPC) as expert members. Their work translated into policy very rapidly, not least because team members were embedded within national decision support structures and committees, enabling definition of questions that could usefully be informed by modelling and iterative development of nuanced and locally contextualised model-based advice. Projection of the anticipated health impacts of COVID-19 in Australia led to swift implementation of their recommendations to develop a strong suppression strategy underpinned by enhanced clinical and public health response capacity, combined with behavioural and social measures (48). Their early risk assessment of international arrivals, informed clinical case definitions, quarantine recommendations for arrivals, border restrictions and travel advisories (49). Their ongoing analyses of the pandemic in Australia informed estimates of the effective reproduction number ( $R_{eff}$ ) and transmission potential, including short-term forecasting of cases and hospital occupancy for all jurisdictions (50), assessments that have been reported weekly to AHPPC since April 2020 and remain a key monitoring tool to inform ongoing response. They undertook modelling commissioned by the Aboriginal and Torres Strait Islander Advisory Group on COVID-19 to support guidelines for initial outbreak response in remote First Nations and other communities (51,52). There was swift implementation of their model-based recommendations for the strategic use of laboratory testing in ongoing population level surveillance, outbreak response and risk mitigation within the quarantine system (53). Most recently, with widespread transmission of the Delta variant despite "lockdowns", the Commonwealth Government plotted a pathway towards "reopening Australia", announced by the Prime Minister on 30 July 2021 on the basis of their risk assessments of alternative international arrivals

pathways and quarantine arrangements for vaccinated and unvaccinated travellers; and their definition of vaccine thresholds and targets underpinning the four phases of Australia's national transition plan for living with COVID-19 (54).

**Reach and Significance:** Australia's internationally envied success with public health measures that eliminated SARS-Cov-2 transmission during the first year of the pandemic, saving tens of thousands of lives, was based on translation into policy of the team's work (55,56). Indeed "Doherty Institute modelling" has been referred to countless times in Australian public and political debate (57) and has been a major factor in generating unprecedented public interest in medical research, some in typically Australian tongue-in-cheek style (Jodie McVernon was recently identified by the Australian Financial Review as one of Australia's top 10 most covertly powerful people; 58).

**To conclude,** the McVernon/McCaw team's research has translated successfully to drive Australia's Public Health policy response to the COVID-19 pandemic.

## **1B: SUCCESSFUL CHANGE MANAGEMENT MECHANISMS**

Space constraints allow only brief descriptions here of three key mechanisms that have successfully driven beneficial change across MACH: details are presented in criterion 3, 4 and 5.

**i) New Configurations for Collaboration:** The formation of MACH in 2015 brought together health services, health scientists and healthcare consumers in cross-institutional, cross-professional configurations that engendered a spirit of collaboration that was completely new for our part of Melbourne; formerly there had been intense inter-institutional competition for patients, staff and research funding. The success of these new connections is illustrated throughout the application, from the examples above, through education and training developments such as the MACH-Track (59, 60) described in criterion 3 and 5, to the translational platform and precision care collaborations set out in criterion 4 and 5. A further demonstration of the success of MACH collaborations as a mechanism to change partner behaviour comes from recent applications to the Medical Research Futures Fund (MRFF). The 2021 Rapid Applied Research Translation (RART) competition allowed each eligible organisation to lead one bid only and excluded 8 of our 10 Health Service partners from leading a bid (as these were "State entities"). Rather than leaving these partners disenfranchised in a grant opportunity that put MACH partners in competition with one another, with co-ordination led by the MACH Executive team, MACH partners collaboratively generated 11 multi-institutional bids encompassing over 130 individual MACH-affiliated Chief Investigators and involving all but one of the Health Services ineligible to lead a bid (61). Three bids were successful, the most associated with any RTC, bringing ~\$12m to MACH partners. Furthermore, given that many in the sector see mature, impactful collaborations as essential for success in applications to all MRFF programs, evidence of the power of new MACH-mediated collaborations includes MACH's position as the leading AHRTC family in securing MRFF awards (see Fig 1, Criterion 2). Strengthening collaboration with consumers, including Indigenous communities has also been achieved (see Criterion 4).

**ii) Clinician Researcher-Translators:** In addition to the examples above, evidence is presented throughout the application that across MACH, alongside their patient care duties, front-line clinicians of all professions drive successful clinical research and translation, a model that MACH is championing nationally (59). Such "Clinician Researcher-Translators" have time funded by various means to involve consumers in research and recruit participants to suitable studies; provide translational expertise for partnership with industry; undertake research requested by health services and prove practical relevance of research to healthcare; and champion the adoption of public and private innovation by health services. These colleagues are key "change agents" across the MACH partnership.

**iii) Forging and delivering a MACH-wide Translational Strategy:** By 2019, the MACH partnership was sufficiently mature and confident in the leadership contributions of its 10 Health Service members to undergo an intense period of multilateral consultation that resulted in the MACH Council adopting "**Tomorrow's Healthcare Today**", a five year strategy (2020-2025), depicted in Figure 1 in the Summary above. This comprises three interdependent objectives:-

- 1) Nurture the **Future Leaders** of innovative healthcare, which has led to collaborative successes such as the MACH-Track program for training the leading clinician research-translators of the future;
- 2) Develop **Translational Platforms** that turn research into improved healthcare, with successful collaborative investments in platforms to support Clinical Trials and Clinical Research, and in Data-driven Healthcare Improvement; and
- 3) Co-design and deliver **Precision Care**, which will be based on implementation of the best research evidence into MACH health services; will be tailored to the personal needs of each patient and their family; will deliver improved safety and quality of care at lowest feasible cost; and will be carefully matched to the burgeoning capabilities of the relevant health services- in addition to the examples above change programs are well advanced in, for example, dementia care, maternity and neonatal services, prevention of falls in the elderly and early detection and management of chronic diseases at the community/hospital interface (see criterion 5).

**CRITERION 2: MACH DISPLAYS EXCELLENCE IN INNOVATIVE BIOMEDICAL, CLINICAL, PUBLIC HEALTH AND HEALTH SERVICES RESEARCH**

**Competitive Funding:** From the beginning of 2016 to October 2021 MACH’s full partners secured ~32% of all NHMRC awards, with a distribution across the 4 pillars similar to NHMRC’s total investment (see Table 2.1), demonstrating that criterion 2 was met. Medical Research Future Fund (MRFF) investments are aimed at securing impact and are believed by many in the sector to be more translational than NHMRC’s. In financial year 2020/21 MACH partners secured ~28% of the total awarded across Australia and ~43% of the total awarded to partners comprising the seven NHMRC-designated AHRTCs (see Fig 2.1). We now describe major research-led groupings in MACH.



Table 2.1:

	MACH data	All NHMRC
Biomedical	\$561 m (43.6%)	(41.4%)
Clinical	\$408 m (32.7%)	(29.1%)
Health Services	\$71 m (5.5%)	(7.7%)
Public Health	\$149 m (11.5%)	(15.2%)
<b>TOTAL</b>	<b>\$1,285 m (100%)*</b>	
* includes not allocated, about 6.7% of total		

**1) Bionics Institute**

The Bionics Institute of Australia is recognised by Victorian Government as a MRI, is a member of AAMRI and an Australian Public Company (ABN 56 006 580 883); it is affiliated to the University of Melbourne. Directed by the scientific commercialisation expert Robert Klupacs, a member of MACH Board’s Strategic Translational Research and Platforms (STRaP) committee, the Institute has more than 100 staff and students, with an annual budget of ~\$12m. The Institute is globally renowned for world-first cochlear implants that have given the gift of hearing to many thousands of profoundly deaf children in over 50 countries. The Institute originates and, with various MACH partners, develops, commercialises and implements into clinical practice novel medical devices that beneficially modulate human pathophysiology. Long term programs continue to refine “the bionic ear” and “the bionic eye” to restore hearing and sight respectively (62,63). There is also exciting work on devices to monitor and (with novel machine learning algorithms) predict epileptic fits (64); exploit the discovery of a specific evoked brain potential biomarker to improve deep brain stimulation treatment of Parkinson’s disease (65); and stimulate the vagus to reduce gut inflammation in Crohn’s disease (66) and improve blood glucose control in type II diabetes (67). The Institute is a driving force in the collaboration to develop, with Federal and State support, the \$100+m Aikenhead Centre for Medical Research at St Vincent’s Hospital Melbourne, as Australia’s first hospital-based biomedical engineering research centre (68).

**2) The Centre for Eye Research Australia (CERA)**

CERA is recognised by Victorian Government as a MRI, is a member of AAMRI and an incorporated entity (ABN 72 076 481 984 23); it also affiliated to the University of Melbourne. Directed by Prof Keith Martin, a member of MACH’s STRaP Committee, the Institute has over 120 staff and ~40 postgraduate students, with ~300 publications per year. In 2020, CERA’s income was ~\$7m from government sources, ~\$5m from commercial sources and ~\$1m from philanthropy. CERA is an international leader in eye research – ranking 4th globally for ophthalmology research in the World University Rankings, aiming to speed diagnosis of eye disease, prevent vision loss and find cures to restore sight. CERA’s current research strategy, co-developed with the institute’s strong consumer network, is to (i) develop innovative diagnostics (69) based on optical scanning and artificial intelligence (which has also provided a new diagnostic for dementia; 70); (ii) through Australia’s first National Eye Health Survey (71) track vision over time in 4,836 participants (including 1,738 Indigenous Australians); (iii) promote eye health in over 200,000 Australian diabetics through the Keepsight program (72); and (iv) develop regenerative therapies to restore lost sight, including gene therapy for dry age-related macular degeneration (73), and novel devices to replace lost sight, including a second-generation bionic eye (74).

**4) The Florey Institute of Neuroscience and Mental Health**

The Florey is recognised by Victorian Government as a MRI, is a member of AAMRI and an Australian Public Company (ABN 92124762027); it also has status as a Department in the University of Melbourne. Directed by Prof Steve Petrou, a

member of MACH's STRaP Committee, the Institute has over 500 staff and ~250 postgraduate students, with ~200 research projects underway. In 2020, the Florey's total income was \$86.4m including; \$47.9m from government sources, \$20.6m from commercial sources and \$6.6m from philanthropy; every year over 4.7 million Australians are affected by an illness that the Florey studies. There are world-leading programs, with exemplary consumer involvement, in neuro-degenerative diseases (eg 75); epilepsies, with a recent \$30m MRFF Frontiers award for The Australian Epilepsy Project, led by Prof Graeme Jackson, that will harness artificial intelligence to provide personalised decision support for patients with epilepsy and a powerful program on inherited epilepsies (76,77,78 and example 4 in criterion 1) including development of antisense oligonucleotide therapies (79); and in stroke (see Example 3, criterion 1), which include the recent \$40m MRFF Frontiers award for the Golden Hour, and the \$9.9m MRFF 2021 RART award to Prof Julie Bernhardt for "Building Australia's First Young Stroke Service". There are also clinically impactful programs in multiple sclerosis (80), schizophrenia (81) and neurological complications of systemic disease (82,83,84).

#### **5) The Murdoch Children's Research Institute (MCRI)**

MCRI is recognised by Victorian Government as a MRI, is a member of AAMRI and an Australian Public Company (ABN 21 006 566 972); it is affiliated to the University of Melbourne. Directed by Prof Kathryn North AC, MACH Board member and Chair of the Board's STRaP committee, the Institute has more than 1,600 staff and students, with an annual budget of ~\$200m funded from government, philanthropy and multiple other sources, generating over 1000 publications per year. MCRI is consistently ranked among the world's top three institutions for research into child health.

The Institute leads children's health research across all 4 NHMRC pillars: In **biomedical research**, there are internationally leading programs in stem cell biology (85), genomics and bioinformatics (86) which are already impacting clinical care of families affected by inherited diseases (see Example 4, Criterion 1). **Clinical research** is extremely strong and impactful, with over 2,500 patients involved in ~200 clinical trials each year; Prof Andrew Davidson heads the Institute's Clinical Trials Unit and chairs the MACH Clinical Trials Committee. There are prominent clinical research programs in allergy (87), infectious diseases such as Streptococcal disease and COVID (88) and childhood infestations including scabies (89). **Public Health research and translation** are also very strong, with Prof George Patton leading international thinking on adolescent health (90) and Prof Sharon Goldfeld translating her research into the Right@Home program providing in-home visits from Maternal and Child Health nurses to mothers needing additional support (91). Despite COVID, MCRI's world-leading GenV (Generation Victoria) birth cohort study has launched successfully with leadership from Prof Melissa Wake and will collect comprehensive health information by electronic records linkage and biobank key specimens from up to 170,000 babies born in Victoria during 2021 and 2022, with great long-term potential to improve child health (92). Finally, growth and impact of **Health Services Research** for paediatric care has been led by Prof Harriet Hiscock, Chair of the MACH Health Services Improvement and Implementation Committee, with significant achievements being reduction of unnecessary prescription of antibiotics (93) and evidence-based improvements in family mental health care (94).

#### **6) The National Ageing Research Institute (NARI)**

NARI is recognised by Victorian Government as a MRI, is a member of AAMRI and an incorporated entity (ABN 17 203 790 712). Directed by Prof Briony Dow, Co-Chair of MACH's Care of the Ageing Committee, the Institute has over 50 multidisciplinary staff (including public health experts, physiotherapists, psychologists, nurses, sociologists, anthropologists, and social workers) and ~25 postgraduate students with around 150 contracts, agreements and MOUs to administer and facilitate research, education and consultancies. In 2020, NARI's research income was ~\$4.2m from government sources and ~\$1.1m from philanthropy.

NARI is Australia's leading research centre in the area of translational ageing and aged care research, improving the lives of older people through rapid translation of research into aged and health care practice and policy development, and capacity building in these fields. NARI has extensive networks including primary care and policy-makers; partners with geriatricians, psychiatrists, health economists and statisticians; and has a consumer-led Community Advisory Group that provides input into all aspects of the design and implementation of research and the broader capacity building program. The four key research themes are (i) preventing falls (95,96); (ii) providing better dementia care (97,98); (iii) improving mental health and wellbeing (99,100,101); and (iv) enabling better end-of-life care (102).

#### **7) The Olivia Newton John Cancer Research Institute (ONJCRI)**

ONJCRI is recognised by Victorian Government as a MRI, is a member of AAMRI and an Australian Public Company (ABN 11 167 192 752); it also has status as a Department in La Trobe University. Directed by Professor Matthias Ernst, a member of MACH's STRaP Committee, the Institute has over 70 staff, over 20 research students and in 2020 had a research income from all sources of ~\$14.5m.

ONJCRI is the successor of the highly successful Melbourne/Austin Hospital branch of Ludwig Cancer Research (before that previously global organisation retrenched in the USA). The Institute is a leader in the development of breakthrough biological and immunological (103,104) treatments for cancers of the breast (105), bowel (106,107,108), liver and biliary tract (109,110) and brain (111). ONJCRI is integrated within the Austin Hospital with research laboratories only metres away from clinics and wards, proximity that inspires and enables the rapid translation of scientific discoveries into clinical trials of new, better, cancer treatments; currently the Institute's researchers and clinicians are running more than 200 clinical trials, usually co-designed with the Institute's committed consumer supporters. There is also a strong emphasis on novel imaging techniques to stage disease and track response (112; see Example 4 criterion 1).

#### **8) The Peter MacCallum Cancer Centre (PeterMac)**

PeterMac is recognised by Victorian Government as a public hospital and state entity (ABN 42 100 504 883), through its large research division is a member of AAMRI, and has status as the Sir Peter MacCallum Department of Oncology in the University of Melbourne. Prof Ricky Johnstone (113) is PeterMac's Executive Director Research and Head of the University Department, sitting on MACH's STRaP committee and leading over 500 research staff and ~200 postgraduate students grouped in over 40 laboratories. In 2020, there were 501 active clinical trials (eg 114,115); 1019 research publications in basic, translational and clinical/therapeutic cancer research; and total research income from all sources was ~\$51.6 m.

In 2020, clinical haematologist Prof Mark Dawson FAA received the Prime Minister's Prize for Science as the Frank Fenner Life Scientist of the Year and the Australian Academy of Science's Jacques Miller Medal for discovery of epigenetic drivers of cancer and work on novel epigenetic drugs now in clinical trials as a new class of cancer treatment (116,117). Prof Sarah-Jane Dawson jointly received the Jian Zhou Medal from the Australian Academy of Health and Medical Sciences for her pioneering work to develop novel diagnostic blood tests that detect fragments of tumour DNA, the basis for "liquid biopsy". Outstanding research in clinical medicine over the last decade was recognised by inclusion in the Clarivate Highly Cited Researchers 2020 list of Profs Sherene Loi (also receiving the American Association for Cancer Research's Outstanding Investigator Award for Breast Cancer Research; 118); Grant McArthur (melanoma immunotherapy); John Seymour (see Example 1 Criterion 1, also co-recipient with Andrew Roberts of the 2020 Ramaciotti Medal for Excellence); and Ben Solomon (therapy of lung cancer; 119). Director of the Centre of Excellence in Prostate Cancer Theranostics, Prof Michael Hofman, received the 2021 Australian Clinical Trials Alliance (ACTA) Trial of the Year Award for the ProPSMA trial (120), which has established PSMA PET/CT as a new standard-of-care for imaging prostate cancer. Finally, In 2019, the Commonwealth Government announced \$80 million in funding to establish the Centre of Excellence in Cellular Immunotherapy at Peter Mac, the only TGA-approved commercial manufacturing site for CAR-T cells in Australia for blood cancer patients, one of only 6 across the world.

#### **9) St Vincent's Institute of Medical Research (SVI)**

SVI is recognised by Victorian Government as a MRI, is a member of AAMRI and an Australian Public Company (ABN 52 004 705 640); it is affiliated with the University of Melbourne. Directed by Prof Tom Kay, a member of MACH's STRaP Committee, the Institute has ~200 staff and ~45 postgraduate students. In 2020, SVI's research income was ~\$17.3m. SVI is co-located on a hospital site (St Vincent's Hospital Melbourne), applying cutting-edge science capability (121,122) to the discovery of novel therapeutic targets in common disease and the developments of new treatments. Priorities include (i) bone diseases, including osteoporosis (123,124); (ii) obesity and type 2 diabetes, with special emphasis on the role of the AMP kinase enzyme (125); (iii) neuro-degenerative diseases (130) that share disease mechanisms with inherited diseases such as Fanconi Anaemia (126); and (iv) type 1 diabetes, including a world-first clinical trial co-designed with consumers and commenced in late 2020 (127,128,129), now being translated through a ~\$2.7m MRFF 2021 RART award on the "Pathway to use of immunotherapy in clinical practice for type I diabetes".

#### **10) WEHI (formerly Walter and Eliza Hall Institute of Medical Research)**

WEHI is recognised by Victorian Government as a MRI, is a member of AAMRI and an Australian Public Company (ABN 12 004 251 423); it also has status as a Department in the University of Melbourne. Directed by Prof Doug Hilton AO, a member of MACH Board and MACH's STRaP Committee, the Institute has more than 1,200 staff and 200 students, with an annual budget of approximately \$180 million (AUD) funded from government, philanthropy and industry. WEHI is one of Australia's leading biomedical research organisations, with a strong national and international reputation for performing highly influential basic and translational research; it was the top-ranked Australian research institute and 25th globally in the 2020 Nature Index for not-for-profit biomedical research institutes. Other recent recognition includes a 2019 Lasker Award (for Jacques Miller) and the 2019 Australian Prime Minister's Prize for Innovation (for the team that developed Venetoclax).

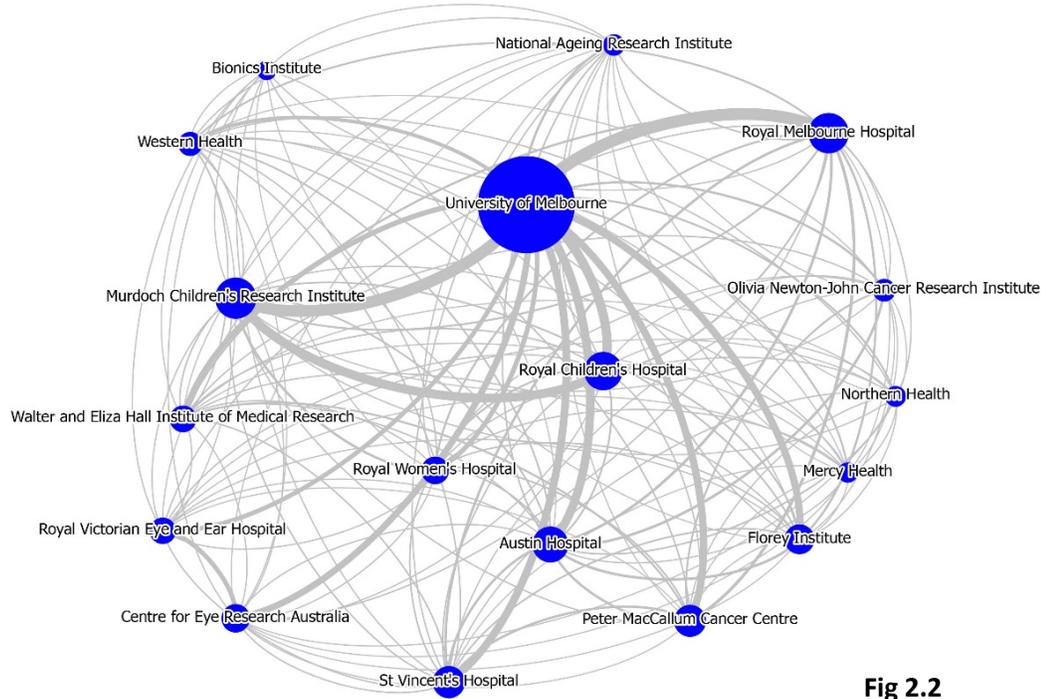
WEHI is organised around five themes; (i) Cancer Research and Treatments (131-134); (ii) Infection, Inflammation and Immunity (135-138); (iii) Healthy Development and Ageing (139,140); (iv) New Medicines and Advanced Technologies (see example 1 in criterion 1) ; and (v) Computational Biology. Within these themes sit 13 scientific divisions, more than 80 laboratories and a Clinical Translation team, underpinned by investments into cutting-edge platform technologies. These include the state- and federally funded National Drug Discovery Centre, state-of-the-art mass spectrometry facilities, high-throughput computing platforms and genomics. Research at WEHI is the basis of over 100 clinical trials and has led to the development of therapies that have benefited more than 30 million people worldwide; the WEHI Buddy Program (141) is a field-leading initiative in consumer engagement for a laboratory-based research institute.

**(11) University of Melbourne Faculty of Medicine, Dentistry and Health Sciences**

FMDHS is led by the Dean Prof Jane Gunn, Chair of the MACH Board. The Faculty has over 1500 salaried researchers and almost 5000 honorary research staff linked through the MACH partnership.

**Collaborative publications in 2020 are depicted to the right in Figure 2.2,**

with size of circles and thickness of lines approximating to publication number. A MACH-wide Scival analysis by Scopus classification of journal title showed that from 2015 to 2020 there were 22313 publications in biomedical science, 35302 in clinical medicine and science, 6325 in public health and 5001 in health services research; with the latter two figures likely underestimates as research in these fields may also be published as part of clinical research papers. Key



**Fig 2.2**

areas of critical mass are in neuroscience and mental health, immunology and infectious disease, cancer, child and maternal health and public health, with over \$384M in HERD-C research income in 2020. The Faculty hosts the Centre for Digital Transformation of Health (see 3.2.2 below), directed by Prof Wendy Chapman (Chair of MACH’s Data-Driven Healthcare Improvement platform committee). Through collaboration key to the success of a MRFF 2021 RART program the latter centre will receive ~\$2m of the ~\$9m awarded to a consortium led by the Western Alliance AHSC for “Delivering enhanced healthcare at home for older people in rural Australia”. Other groupings key to MACH are:-

**11.1) Melbourne Medical School (MMS)** headed by MACH Board Member Prof John Prins, is the largest School in the University with over 600 research staff, over 600 postgraduate students and more than 2,600 Honorary clinical staff spread across 13 clinical departments (Baker Department of Cardiometabolic Health, Clinical Pathology, Critical Care, General Practice, Medical Education, Infectious Diseases, Medicine, Obstetrics and Gynaecology, Paediatrics, Psychiatry, Radiology, Rural Health and Surgery). There are academic appointments in every recognised clinical specialty from Anaesthesia to Vascular Surgery, and across all 10 MACH-affiliated health services. The School is the **home of the clinician researcher-translator** and is largely responsible for MACH partner success in the NHMRC clinical research pillar (see Table 2.1). MMS is ranked 11th in the world (Times Higher Education World University Rankings 2021 for clinical, pre-clinical and health). MMS staff and units feature throughout the application.

**11.2) MMS Department of General Practice** is led by Prof Lena Sancic, co-Chair of the MACH Board Primary Care Committee, and has 68 (FTE) staff and ~20 postgraduate students. The core annual budget is ~\$7m, with research income ~\$11 m generating ~120 publications per year. The core research capabilities are **clinical trials, implementation science, clinical informatics, co-design, and health services research**. Strengths include improving early diagnosis and care of cancer (142,143) and diabetes (144); data-driven decision support (145-147); and promotion of family mental health (147,148), especially where there is family violence (149,150). The Department’s key research assets are (i) the nationally-leading, secure **PATRON database** (151), contributed to by 200+ Victorian practices and providing trustworthy

real-time access to anonymised primary care data on ~3m Victorians; and (ii) **the Co-Design Living Lab**, a research registry of >2000 people with mental health needs (including carers) who take part in end to end research co-design for design to translation. This has recently received \$10m NHMRC Special Mental Health Initiative funding for national expansion to establish ALIVE: a national research translation centre to implement mental health care at scale in primary care and community settings, providing Co-Design Living Labs and an Academy of Lived Experience. Significant personal achievements include the 2016 Victorian Premier's Award for Excellence in Cancer Care for Prof Emery; and the 2019 and the 2020 RACGP Peter Mudge Medal for A/Prof Manski-Nankervis.

**11.3) The Doherty Institute** is a joint venture between the Royal Melbourne Hospital (including its various Victorian and National infectious disease units) and the University of Melbourne, particularly microbiology and immunology in the School of Biomedical Sciences. Doherty is an AAMRI member, although research is managed through the University, The Director, Prof Sharon Lewin (winner of the 2020 NHMRC Outstanding Contribution Award), sits on both the MACH STRaP and the MACH Infection committees and leads over 700 research staff and ~170 postgraduate students grouped in over 40 laboratories. In 2020 the Doherty had external grant income of ~\$88m, published over 570 papers, was named in the media over 20,000 times and its staff received 13 prestigious national awards. The Institute is multidisciplinary and its biomedical, clinical and public health research and service laboratories impact diagnostic services, clinical care and policy development. Strengths in fundamental immunology (152-155); infectious diseases of high significance, including HIV, influenza, TB, viral hepatitis, malaria; and in antimicrobial resistance and infection control (156) catalysed an internationally leading research and translation response to the SARS-CoV-2 virus, which was cultured for the first time outside of China (157) with the world's first description of the human immune response to the virus (158,159) and enormously impactful mathematical epidemiology (see Criterion 1). The Institute's technical innovation program in **public health diagnostics for SARS-CoV-2** supported new testing platforms around Australia, including saliva testing (160), 3D printed swabs and batch pooling. Victorian Government provided >\$20m in the development of new testing modalities, disseminated through the Public Health Laboratory Network. Significant personal achievements include the award to Prof Laura Mackay of both the Eureka Prize for Outstanding Early Career Researcher (2019) and the Prime Minister's Prize for Science - Frank Fenner Prize for Life Scientist of the Year (2019) for identifying immune cells that protect against both infection and cancer.

**11.4) Melbourne School of Population and Global Health (MSPGH)** is headed by Prof Nancy Baxter, houses ~160 researchers and ~125 RHD students, averages ~900 publications and ~\$45m research income per year and is globally ranked 16th for public health research in the 2021 Shanghai (ARWU) analysis. Key strengths are in research to reduce health disparities and disadvantage (161-163); data science for disease modelling (164,165); and cost-effective prevention, screening, early detection and management of chronic disease, cancer and disorders of mental health (166-169). The School is closely engaged with MACH through co-hosting with MMS the Methods and Implementation Support for Clinical and Health research hub (MISCH; see 3.2.1 below) directed by Prof Julie Simpson (member of MACH's Clinical Trials platform committee).

**11.5) School of Health Sciences (SHS)** is headed by Prof Linda Denehy and undertakes practitioner-led research in its six core disciplines of Audiology, Speech Pathology, Nursing, Optometry & Vision Sciences, Physiotherapy and Social Work, being viewed as the Faculty's **second home for the Clinician Researcher-Translator**, as will be explained in 3.1.2 below. There are ~55 research-only staff and ~130 RHD students clustered into 3 hubs, (i) Healthy Start to Life (170-171); (ii) Disability and Inclusion (172-174); and (iii) Optimising Health and Wellbeing (175-177) with strong cross-cutting capability in implementation science and health services research (178). In 2020 research income was ~\$12.2m and there were 539 publications. Significant personal achievements include NHMRC's 2020 Elizabeth Blackburn Investigator Award to Prof Angela Morgan (Speech Pathology) for being the highest ranked female Investigator Grant awardee.

**To conclude**, as befits Australia's largest concentration of health and medical research, the MACH partnership demonstrates excellence in all four pillars of research recognised by NHMRC. The internationally-leading strengths in the clinical pillar across MACH reflect the fact that research infuses all 10 Health Service partners, although unlike the UK system with which the MACH ED is familiar, governments in Australia do not invest in quantifying the number of participants actively involved in clinical research. The relative strengths in clinical and biomedical research do capture more international attention than less prominent but nevertheless absolute strengths in public health and health services research, with the latter generating at least 5,000 publications across MACH over the last five years. Nevertheless, MACH-affiliated Health Services are unanimous in wanting to increase research strengths at the clinical frontline, as now demonstrated in Criterion 3.

### CRITERION 3: MACH PROVIDES EXCELLENCE IN EDUCATION AND TRAINING FOR HEALTH RESEARCH AND TRANSLATION

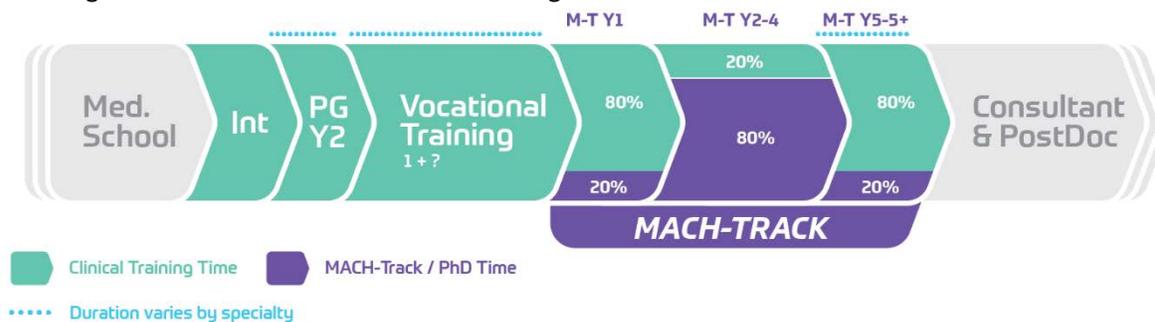
**Education and training are central to MACH's purpose**, which is to bring together health services, health scientists and healthcare consumers committed to translation of interdisciplinary research that will benefit patients and strengthen the economy. Indeed, **every MACH partner has a very active program of career development** for its community, which depending on the partner includes undergraduate and research higher degree students, clinical staff of all grades and disciplines, and researchers of all grades and disciplines. Therefore **MACH aims to add value to build capacity and capability in health research and its translation**. This a major activity in each of the key themes in MACH's 3-cornered strategy (see Figure in Summary above):-

#### 3.1 Future Leaders – Education and Training

##### 3.1.1 The MACH-Track

As exemplified in Criterion 1, MACH has developed a strong model of successful translation of research and its implementation into healthcare based on Clinician Researcher-Translators embedded in the clinical front line, leading national promotion of this model (1). MACH's affiliated Health Services strongly encouraged the development, and establishment in 2020, of the MACH-Track (59,60). This is a structured, mentored and fully-funded career development program for exceptional research-minded doctors, undertaking vocational training in accredited hospital specialties, general practice and public health. The program seeks to develop the future leaders of clinical innovation by offering an opportunity to integrate pre-PhD, PhD and initial post-PhD research training with completion of vocational training of the highest standard. The PhD period can be spent in any research discipline of interest to the applicant. Bespoke and tailored towards the research direction of each successful candidate, MACH-Track is flexibly designed to adapt to any specialist college-accredited discipline. A key principle is that once on the scheme a trainee is "never out of either research or clinical training" to prepare for life as a Clinician Researcher-Translator. The organisation of the scheme is shown in Figure 3.1:-

Figure 3.1



The scheme represents delivery of an exciting new program, seen as a national pilot (59), that required no new external monies for delivery. Instead the necessary funding is provided through collaboration and goodwill between partners. MACH-affiliated Health Services will allow trainees to work 20% of time on the Track in the pre-PhD year 1 and in post PhD years 5 and 5+, without reduction in salary, and will offer paid work for a minimum of 8h per week in Track years 2, 3 and 4 when the trainee undertakes a full time PhD. The University of Melbourne has provided 5 PhD scholarships each year and its Schools and MACH-affiliated Medical Research Institutes will top up the tax-free stipend to reach a competitive 175% of the UoM standard annual stipend (increasing \$31k to ~\$56k in 2021). This addresses the disincentive, felt particularly keenly by doctors with family responsibilities, of diminished income during a PhD scholarship.

The MACH-Track is a strong example of a Criterion 1 **change management mechanism through new collaboration configurations**. Immediately after appointment and ahead of commencement of Year 1 the following February, the trainees enjoy an orientation week with interactive presentations given by ~40 research and translation leaders from right across MACH. This helps trainees select three "mini-projects" undertaken during the first year in diverse research disciplines relevant to their interests – this has already generated new co-supervision collaborations for the definitive PhD phase for each trainee. Furthermore, the MACH-Track builds a cohort of trainees and trainers across MACH – monthly meetings are hosted by the Director (and MACH ED), Professor Sir John Savill FRCP FAHMS FRS and the current Co-Directors (see Table 3.1).

Table 3.1: MACH-Track Co-Directors

Professor Sir John Savill	Director MACH-Track; Executive Director MACH; Former Director Edinburgh Clinical Academic Track (UK)
Associate Professor Margie Danchin	Group Leader, Vaccine Uptake, Murdoch Children’s Research Institute; Paediatrician, Department of General Medicine, The Royal Children’s Hospital; A/Prof and David Bickart Clinician Scientist Fellow, Department of Paediatrics and School of Population and Global Health, The University of Melbourne; Director Clinician Scientist pathways, The University of Melbourne Chair, Collaboration on Social Science and Immunisation (COSSI)
Professor Mark Dawson	Associate Director for Research Translation; Consultant Haematologist; Program Head, Cancer Biology & Therapeutics; Head, Cancer Epigenetics Laboratory, Peter MacCallum Cancer Centre
Professor Kate Drummond AM	Professor of Neurosurgery, University of Melbourne; Director of Neurosurgery, RMH; Head of Central Nervous System Tumours, Victorian Comprehensive Cancer Centre, Parkville Precinct
Professor Hui K. Gan	Director, Cancer Clinical Trials Unit, Austin Health; Clinical Research Lead and Co-Director, Centre for Research Excellence in Brain Cancer Research, Olivia Newton-John Cancer Research Institute
Associate Professor Jo-Anne Manski-Nankervis	Academic General Practitioner and Lead, Data Driven Quality Improvement Research Theme, Department of General Practice, University of Melbourne; Chair, RACGP Expert Committee – Research

We have now completed two rounds of recruitment (June – November 2020; June – November 2021), receiving a total of 26 excellent eligible applications from which 11 outstanding vocational trainees have been appointed; please see Table 3.2 for details of their specialties.

Table 3.2: Specialties of MACH-Track Trainees

Appointed 2020	Appointed 2021
- General Practice	- Anaesthesia
- Haematology	- Infectious Disease
- Nuclear Medicine/Endocrinology	- Ophthalmology
- Radiation Oncology	- Paediatric Endocrinology
- Respiratory Medicine	- Paediatric Gastroenterology*
	- Paediatric Metabolic Medicine

\*MACH’s MRI members are so supportive that for targetted opportunities they are prepared to fund additional 3year PhD scholarships at the 175% stipend; the paediatric gastroenterologist above will be fully funded by the Murdoch Children’s Research Institute, WEHI has places available in brain cancer and Parkinson’s disease, whilst the Olivia Newton John Cancer Research Institute has committed to a trainee in cancer care in the 2022 recruitment round. Finally, the MACH-Track represents a very substantial investment by partners across MACH; as yet there is no external funding. Over a five year period (and noting that some programs may be longer) the total expenditure on the special elements of the program (20% release in years 1 and 5; 20% supernumerary registrar post in years 2, 3, 4; PhD stipend; PhD top-up) is ~\$330k per trainee, with the result that over the next five years the total annual commitment from partners will rise to ~\$2m per year.

**3.1.2 Expanding MACH-Track to Nurses, Midwives and Physiotherapists**

From the start of planning in 2019, MACH’s 10 Health Service CEOs (a community that includes nurses with doctorates) were very keen to expand the MACH-Track to Nurses, Midwives and Allied Health Professionals (NMAHPs). It was essential to define a way in which this could be done equitably. In addition to guaranteeing that the same “topped-up” stipend was available to all, “professional equity” has been achieved by designing a program that

provides NMAHPs with clinical career development aimed at a specialist, extended role (just as the MACH-Track doctors integrate their research career development with specialist training). MACH's governing body, Council (see criterion 4) has now approved advertisement in June 2022 for a February 2023 start of a pilot program for nurses, midwives and physiotherapists. The University of Melbourne will deliver an additional three PhD studentships hypothecated for NMAHPs, with all relevant research partners committed to the PhD stipend top-up. Five years after the first NMAHP trainees join the scheme (2022 with a 2023 start) the total partner investment will be ~\$0.9m pa, which together with ~\$2m for medics, will support 40 trainees at any one time.

**MACH-Track for physiotherapists will incorporate on-the-job, post-registration training for a specialist clinical career role.** As for doctors, the end product will be a clinician researcher-translator capable of both independent practice as a specialist and independent development and leadership of a research and translation program. Most MACH-affiliated Health Services have roles for senior specialist physiotherapists (typically at Grade 3) and organise in-house training programs to prepare early career practitioners (typically at Grades 1 or 2); for example, Austin Health has senior specialist clinical roles for physiotherapists in ICU, Orthopaedics and Rehabilitation.

To provide equitable access to MACH-Track for physiotherapists, our relevant health services are prepared to integrate such specialist clinical training with the research elements of the Track, planning to advertise a specialist clinical physiotherapist role around the time the trainee completes the MACH-Track. Trainees appointed in competition to the Track are, during periods of specialist clinical training (Years 1, 5 and 5+), guaranteed by their CEO an average of a day per week for research career development without loss of clinical salary; and their post will be converted **to 0.2 FTE for the three years of PhD studentship** undertaken in years 2, 3 and 4 of the MACH-Track. This ensures that, just like the medics, the MACH-Track trainee in physiotherapy is "never out of clinical training and never out of research training."

**MACH-Track for nurses and midwives** will operate to the same principles as the medics and physios: The equivalent career stage for nurses would take a Masters-qualified, research minded-nurse currently at the Clinical Nurse Consultant or Nurse Practitioner stage towards Nurse Clinician Researcher roles that combine specialist, advanced clinical practice with research leadership; examples of such posts are already in place across the MACH partnership. For midwives, the equivalent program will be provided for Masters-qualified Clinical Midwifery Consultants.

**Co-Directors** will be appointed to join the five medical Co-Directors, one from each discipline (nursing, midwifery, physiotherapy). Candidates from these disciplines will go through the same interview process, although hypothecated places will allow for the different career opportunities to demonstrate aptitude for research when compared with medics.

### **3.1.3 MacHSR (pronounced max-er)**

All arrangements are in place to commence MacHSR in July 2022. This is a one year, part-time "starter" Future Leader Fellowship scheme for established clinicians from all disciplines. It aims to put clinical staff on a pathway that will build the health services research (HSR) skills, including implementation science, needed by staff aiming to become leaders of service improvement.

The scheme arose from MACH Health Services inviting clinical staff to propose innovative solutions to care problems that have arisen during the COVID-19 pandemic; recently one call at each of Western Health and the Royal Melbourne Hospital generated over 120 applications in total. Many of these ideas clearly require analysis through health services research and implementation science approaches, but there is a dearth of clinical leaders with HSR skills. MACH has responded to this need by developing the MacHSR scheme, which builds on the goodwill and job-plan flexibility offered by Health Services to MACH-Track trainees.

MacHSR will be a Future Leaders Fellowship scheme for established clinicians in career posts, overseen by the MACH Health Services Improvement and Implementation Committee and directed by its Chair, Prof Harriet Hiscock. Competitively selected MacHSR Fellows will be released from clinical duties on a 0.2 FTE basis. In addition to undertaking formal HSR training through special registration for the HSR elective within the University of Melbourne Master of Public Health (MPH) course (worth 12.5 credit points), Fellows will work with (an) academic supervisor(s) to prepare a formal co-designed, collaborative HSR project proposal that will provide an evidence-based solution to the problem of interest. The proposal would include funding to buy the clinician out of full-time service. Alternative positive outcomes from a MacHSR Fellowship could include progression to completion of the MPH part-time or successful competition for schemes such as full-time Safer Care Victoria Quality Improvement secondments. The 2022 pilot, with five Fellows, is feasible because MACH partners have made a collaborative commitment of ~\$200k.

## **3.2 Translational Platforms – Education and Training**

### **3.2.1 Clinical Trials and Clinical Research Platform**

The **Methods and Implementation Support for Clinical and Health research hub (MISCH)**, was developed after the MACH Clinical Trials and Clinical Research Platform Committee consulted widely to identify the gaps in clinical research support. The priorities identified were sponsorship of multi-site clinical research (see Criterion 5) and research methodological design and conduct support. With guidance from the MACH Committee, to address these gaps the University launched in 2020 the new MISCH Hub co-hosted by the Melbourne Medical School and the Melbourne School of Population and Global Health (179). Directed by the expert biostatistician Prof Julie Simpson, with an annual core financial commitment from the University of ~\$1.2m, the Hub offers support to investigators employed by MACH partners under terms identical to University employees to address these gaps. The platform supports health and clinical research including the design of clinical trials and quantitative studies through coordinated access to Biostatistics, Health Economics, Health Informatics, Co-Design and Implementation Effectiveness and research governance. The Platform also offers other key services including the design and implementation of clinical and translational research in addition to workshops and training within these fields.

**Research Co-ordinator Symposia:** To bridge the silos of research units, MACH has conducted four annual symposia to bring together research coordinators from across our network. Each symposium was attended by over 150 research personnel and addressed key changes in research regulations and provided opportunities for networking. In addition to the annual symposia, bespoke training workshops are coordinated by MACH to address clinical research training needs.

**The Investigator-initiated Trials Toolkit** (180) was developed by MACH in partnership with the Victorian Comprehensive Cancer Centre to provide guidance and share resources for conducting clinical trials. This toolkit has been accessed by more than 13,500 users over 30,000 times in its first 12 months. Even though the majority of users are based in Australia there has been significant traffic from USA, UK and Europe.

**The Victorian Clinical Trials Education Centre (V-CTEC)**, has been developed to respond to a need for access to affordable clinical research training identified by MACH partners. MACH invited Monash Partners and Western Alliance to co-design a “free at the point of contact” online V-CTEC training resource which draws on exemplar training materials from Victorian institutions to share these, with \$250k Victorian Government funding, state-wide on an open access platform. V-CTEC will be launched in February 2022 on an independent Learning Management System, developed through extensive consultation with key stakeholders. The platform will contain competency based training for clinical research personnel including research coordinators, research offices, pharmacy and other supporting departments.

### **3.2.2 Data-driven Healthcare Improvement Platform**

**The Centre for Digital Transformation of Health** was opened in 2020 in response to MACH-affiliated CEOs identifying Digital Health as a key priority (181). With core funding of ~\$2m per year from the University of Melbourne, the Centre is directed by the natural language processing expert Prof Wendy Chapman (formerly Head of the University of Utah Division of Biomedical Informatics). In partnership with MACH-affiliated Health Services, the Centre co-funds Professorial Chief Information Officers in MACH-affiliated health services, such as Prof Graham Hart at Austin Health and Prof Jim Buttery at the Royal Children’s Hospital. The Centre sits across all schools in the Faculty of MDHS and the School of Computing and Information Systems in the Melbourne Faculty of Engineering. The Centre is bringing together two key educational initiatives:-

**The Learning Health System Academy** will launch in February 2022, providing healthcare professionals with the skills to work with data and digital health technologies to improve patient outcomes. The vision is that MACH will over time build a Learning Healthcare System. This is defined by the US Institute of Medicine as a system in which “science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of the delivery experience”. In this model the key features of a Learning Healthcare System are: using data to generate new knowledge (D2K); using knowledge to inform clinical practice (K2P); and evaluating changes in clinical practice (P2D).

**The Digital Health Validitron** is a \$1m simulated digital and physical health training environment that encompasses the complete range of clinical settings—from patient homes to acute and primary care—so that digital health innovations can be built, implemented, tested, adapted, and clinically validated for broad adoption.

### **3.3 Precision Care – Education and Training**

#### **3.3.1 Health Services Improvement and Implementation**

This committee is MACH’s “engine room” for collaborative deployment of health services research and implementation science to drive translation. It devised and will lead **MachSR** (see above). Starting in 2018 the committee has organised popular **navigating implementation science seminars/webinars** for clinicians and E/MCRs, typically attracting over 150 attendees, initially face-to-face and recently at distance. The 2021 series combined theory with practical applications as demonstrated by leading health services researchers. The seminars are chaired by senior researchers and a health service Chief Executive. The group has also created and posted a high-quality **implementation resources directory** for all knowledge levels, to assist researchers with problem identification to implementation, scale-up, dissemination, evaluation and more. This directory compiles online resources that guide MACH clinicians through the ‘how to’ of implementation science and the implementation process.

#### **3.3.2 Consumer and Community Involvement Network**

**Resources:** MACH has developed a comprehensive website resource that includes detailed information to support and guide researchers seeking to engage with consumers and community. The resource includes the AHRA/WAHTN handbook, links to key organisations’ publications including the NHMRC statement on CCI and key CCI contacts within the MACH partner health services and research organisations. A **Consumer Engagement webinar** in Nov 2021 was attended by over 100 researchers, most E/MCRs. The webinar was co-designed by consumers and researchers and was delivered to acclaim by a combination of experienced and highly regarded researchers together with consumers who are engaged in MACH activities. The webinar content covered the “why, what, when and how” of successful consumer engagement.

#### **3.3.3 Aboriginal Leadership Group**

Following MACH’s 2018 Aboriginal health workshop (Hearing Our Voices: The Importance of Community Engagement and Innovation in Indigenous Health Research), this Board committee, with MACH funding, developed a novel **Culturally Adaptive Governance Framework** (CAGF; 182) for Indigenous Health Research which is being used to empower Indigenous knowledge, voice and leadership in two NHMRC-funded studies. As a consequence the ALG has identified a further priority, the need to provide guidance on ethical conduct and practice for all researchers wanting to conduct research in indigenous health. The group have developed and posted (183) an online training resource to empower researchers to engage in a culturally safe manner with Aboriginal communities, to which will be added “how to” guides.

#### **3.3.4 Care of the Ageing Committee; E/MCR Network**

In 2020 this committee mapped ageing and aged care research across MACH partners, producing the MACH Ageing and Aged Care Research Review – an extensive collection of research highlights and trends, ongoing research studies and trials, which articulates the need to support the early and mid career researchers who will develop new and innovative solutions to improve patient care (184). The E/MCRs consulted were supported to develop a new Network which was established in early 2021. The participants elected as co-chairs Dr Anita Goh (NARI/UniMelb/Royal Melbourne Hospital) and Dr Samantha Clune (La Trobe University). The Network consists of over 60 members and provides a voice for emerging research leaders in the field of ageing and aged care, opportunities to expand inter-institutional networks, a platform to share knowledge and a pilot for other MACH thematic groupings, such as the Women and Newborns Health committee (see criterion 5).

#### **3.3.5 Education and Workforce Planning**

At the request of Health Services, this grouping of expert educationalists has been pursuing the “Safety and Rescue” project to enable sharing of selected mandatory training such as hand hygiene and Basic Life Support between health services so that the training does not need to be wastefully repeated as health practitioners move between health services.

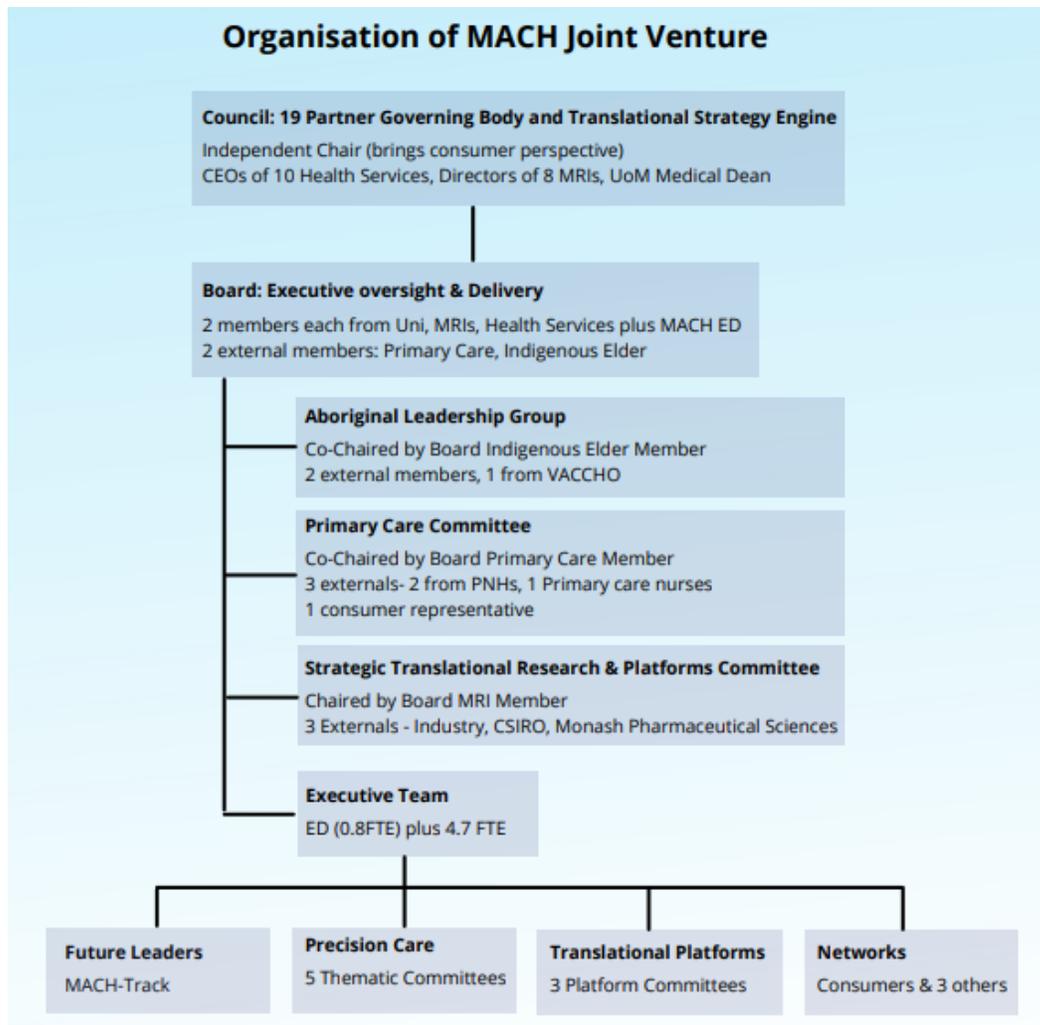
**Conclusion:** Excellent education and training aimed at building capacity and capability in health research and translation pervade all three priorities in MACH’s strategy, with examples of Australia-leading innovation.

## CRITERION 4: MACH's ORGANISATION ARRANGEMENTS

### 4.1) MACH IS A JOINT VENTURE

The Melbourne Academic Centre for Health was accredited as a NHMRC Advanced Health Research Translation Centre in the first round competition of 2015. MACH is an unincorporated joint venture, organised according to a detailed joint venture agreement (JVA) most recently updated in early 2021. The organisational chart is shown as Figure 4.1:

Figure 4.1:



At the heart of MACH are 10 Health Services in central, west and north Melbourne that provide a full range of services to over 2.5 million people. In Victoria, although public funding for hospital care comes from the State Government, each health service is an independent legal entity, so that there are over 80 such bodies in Victoria (for UK readers a Victorian health service has many parallels with an English Foundation NHS Trust). MACH brings the 10 health services together with 8 Medical Research Institutes, independent legal entities recognised as research organisations by Victorian Government, and – as administering organisation – the University of Melbourne Faculty of Medicine, Dentistry and Health Sciences. The 19 full partners in MACH were joined in early 2021 by La Trobe University as an affiliate member.

**MACH Council** is the governing body of the joint venture and has membership as shown in Table 4.1. The Council has an independent Chair. The retirement of Professor Richard Fox AM in 2020 enabled the collaboration to seek a Chair who could bring a consumer perspective and we were fortunate to appoint Patricia Faulkner AO, who not only brings a perspective as an end-user of health research from her time as Secretary for Health in Victorian Government, but also provides the view of a participant in health research. The Council brings together the leaders of all 19 partners (10 CEOs of health services; 8 Directors of MRIs and the Dean of the Faculty at the University of Melbourne). Its role is to set high level strategy and to provide the collaboration with appropriate governance, which it does by meeting twice per year.

**TABLE 4.1: MACH COUNCIL**

<b>ORGANISATION</b>	<b>REPRESENTATIVE</b>
Independent Chair	Patricia Faulkner AO
<b>HEALTH SERVICES</b>	
Austin Health	CEO: Adam Horsburgh
Melbourne Health <sup>1</sup>	CEO: Prof Christine Kilpatrick AO
Mercy Health	CEO: Adj Prof Jason Payne
Northern Health	CEO: Siva Sivarajah
Peter Mac <sup>2</sup>	CEO: Prof Shelley Dolan
RCH <sup>3</sup>	CEO: Bernadette McDonald
RVEEH <sup>4</sup>	CEO: Brendan Gardner
St Vincent’s Melbourne	CEO: Angela Nolan
The Royal Women’s Hospital <sup>5</sup>	CEO: Dr Sue Matthews
Western Health	CEO: Prof Russell Harrison
<b>MEDICAL RESEARCH INSTITUTES</b>	
Bionics Institute	Director: Robert Klupacs
CERA <sup>6</sup>	Director: Prof Keith Martin
Florey <sup>7</sup>	Director: Prof Steve Petrou
MCRI <sup>8</sup>	Director: Prof Kathryn North AC
NARI <sup>9</sup>	Director: Prof Briony Dow
ONJCRI <sup>10</sup>	Director: Prof Matthias Ernst
SVI <sup>11</sup>	Director: Prof Tom Kay
WEHI <sup>12</sup>	Director: Prof Doug Hilton AO
<b>ADMINISTERING UNIVERSITY</b>	
University of Melbourne <sup>13, 14</sup>	Dean: Prof Jane Gunn

FOOTNOTES: 1 – Incorporates Royal Melbourne Hospital (RMH); 2 – Peter MacCallum Cancer Centre; 3 – Royal Children’s Hospital; 4 – Royal Victorian Eye and Ear Hospital; 5 – RWH; 6 – Centre for Eye Research Australia; 7 – The Florey Institute of Neuroscience and Mental Health; 8 – Murdoch Children’s Research Institute; 9 – National Ageing Research Institute; 10 – Olivia Newton-John Cancer Research Institute; 11 – St Vincent’s Institute of Medical Research; 12 – Walter and Eliza Hall Institute of Medical Research; 13 – Faculty of Medicine, Dentistry and Health Sciences; 14 – La Trobe University is an affiliate member

**The MACH Board** has membership and responsibilities codified in the JVA. The Board meets every 6 weeks to provide oversight of the MACH Executive, ensure delivery of Council’s strategy, and serve as the key forum for discussion and generation of new strategic ideas. The membership of MACH Board is given in Table 4.2. The JVA assigns two members each to the University of Melbourne (which because it is the administering organisation holds the chair), Health Services and MRIs – appointments are made by the Council. The Board has over time, with Council support, established positions for two distinguished external members each of whom co-chairs a relevant Board Committee. One external member is an **Aboriginal Elder** and the other is an active local GP representing **Primary Care**. The MACH Executive Director is the final formal member of the Board, but custom and practice have seen the MACH Council Chair and the MACH Manager attending Board meetings at the Chair’s invitation.

**TABLE 4.2: MACH Board**

<b>Position</b>	<b>Holder and Affiliation</b>
Chair (University of Melbourne 1)	Prof Jane Gunn, Dean, Medicine, Dentistry and Health Sciences
Health Service CEO 1	Prof Christine Kilpatrick AO, CEO Melbourne Health
Health Service CEO 2	Prof Russell Harrison, CEO Western Health
Medical Research Institute 1	Prof Kathryn North AC, Director MCRI
Medical Research Institute 2	Prof Doug Hilton AO, Director WEHI
University of Melbourne 2	Prof John Prins, Head of Melbourne Medical School
Aboriginal Elder	Uncle Graham Atkinson
Primary Care	Dr Mukesh Haikerwal AC, GP Altona North
MACH Executive Director	Prof Sir John Savill
In attendance	Patricia Faulkner AO, Chair MACH Council
In attendance	Michelle Iddles, MACH Manager

**Four groups report directly to the MACH Board**, reporting to every meeting. **(1) The MACH Executive** is comprised of 5.5 FTE staff whose salary costs are charged against the MACH subscription budget of \$915k (see Table 4.3); the current post-holders are shown in Table 4.3, below. The University provides services to MACH and the MACH Executive for free, which amount to ~\$350k per year. Thus the University employs the executive and provides all financial, legal and commercial support. **(2) The Aboriginal Leadership Group** is co-chaired by the Board Aboriginal Elder Member and Gabby Ebsworth, Aboriginal Liaison Officer, RMH (recommended to the Chair of the Board by the Group). The ongoing work of the Group being undertaken to advise the Board is described below under Criterion 5. **(3) The Primary Care Committee** is co-chaired by the Board Primary Care member, together with Prof Lena Sancu, Head of UoM Dept of General Practice. The committee has as members senior figures from two local Federally-funded Primary Health Networks, and a senior representative of Primary Care nurses. Overseas readers should note that public funding to primary care is provided by the Australian Commonwealth (Federal) Government for historical reasons, so a key function of this committee is to improve co-ordination at the Federal/State and Community/Hospital interfaces. Again, ongoing work aimed at advising the Board is described in Criterion 5. Lastly, the **(4) Strategic Translational Research and Platforms Committee** is chaired by Prof Kathryn North AC. This group brings together the leaders of all the major translational research operations across MACH. There is a strong contribution to the “translation into healthcare” mission required by NHMRC for Research Translation Centres going forward – the rapid translation of new genomic technologies into family diagnosis is given as an example of successful translation in Criterion 1 above. However, at the request of Victorian Government’s Department of Jobs, Precincts and Regions, this committee has also taken on co-ordination across MACH partners of bench to bedside “translation to strengthen the economy” from the now discontinued Victorian Government investments in the Melbourne Biomedical Precinct located at Parkville. This has stimulated the highly beneficial recruitment to the group of other major research operations at Parkville, including Australia’s largest biopharmaceutical company, CSL; the Federally-funded CSIRO and Monash University Institute of Pharmaceutical Services – ongoing work is described below in Criterion 5. For membership of the last 3 groups described please go to Reference 185.

**TABLE 4.3: MACH Executive**

<b>ROLE/FTE</b>	<b>APPOINTEE</b>
Director (0.8 FTE)	Prof Sir John Savill FRCP FAHMS FRS
Associate Director (0.1 FTE)	Prof David Story FANZCA
Manager	Michelle Iddles
Senior Project Officer	Nick Walsh
Senior Project Officer (0.8 FTE)	Lauren Wallis
Senior Project Officer (0.8 FTE)	Meredith Bickley
Executive Assistant	Eleanor Bonikowski

**MACH Executive Committees** have been created, often at the request of Health Services, to bring diverse groups of researcher-translators together from across the MACH partnership to collaborate and advise the MACH Executive, Board and Council. The ongoing activities for each grouping are described below in Criterion 5: The committees are listed in Table 4.4 below, and membership (over 100 colleagues) laid out in Reference 185.

**TABLE 4.4: MACH EXECUTIVE COMMITTEES**

<b>COMMITTEE</b>	<b>CHAIR and AFFILIATION</b>
<b>Precision Care</b>	
Health Services Improvement & Implementation	Prof Harriet Hiscock, Royal Children’s Hospital
Women’s and Newborns Health	Prof Sue Walker, Mercy Health
Infection	A/Prof Steve Tong, Royal Melbourne Hospital
Care of the Ageing <i>Co-Chaired</i>	[ Prof Briony Dow, National Ageing Research Institute A/Prof Peter van Wijngaarden, Centre for Eye Research Australia
Education and Workforce Planning <i>Co-Chaired</i>	[ Prof Liz Molloy, University of Melbourne A/Prof Amy Gray, Royal Children’s Hospital
<b>Translational Platforms</b>	
Clinical Trials and Clinical Research	Prof Andrew Davidson, Royal Children’s Hospital
Data-driven Healthcare Improvement	Prof Wendy Chapman, University of Melbourne
Molecular Imaging	Prof Andrew Scott, Austin Health
<b>Networks</b>	
Consumer and Community Involvement	Dr Meredith Bickley, MACH
Health Service Research Directors	Prof Peter Rogers, Royal Women’s Hospital
Librarians	Peta Humphreys, University of Melbourne
Clinical Innovation in the Dementias	A/Profs Rosie Watson/Nawaf Yassi, Royal Melbourne Hospital

#### **4.2) CRITERIA SET BY NHMRC**

**4.2.1) Governance and Leadership Arrangements.** These are set out in section 4.1, with **(4.2.2) Key Personnel** listed in Tables 4.1, 4.2, 4.3 and 4.4 above and in Reference 185.

**4.2.3) Prioritisation Framework:** Priorities are ultimately set by the MACH Council, which has majority Health Service representation, generally after co-design and consensus development through the MACH Board, which is in close touch with local and national Health Service needs. The Board takes account of suggestions for each year’s work made in the Executive Director’s annual report (185), which arise from the work and advice of Board Committees and MACH Executive Committees (Table 4.4). Examples are given in ongoing work of committees documented in Criterion 5 below, and later in this section (4.2). In early 2020 (fortunately just before COVID) there was a **formal survey of Health Service CEO priorities** which has been published (181) and has informed priorities as set out elsewhere in this document. The views of patients and communities are assimilated into strategy through the community engagement arrangements (see 4.2.6 below) and the Board’s Aboriginal Leadership Group.

**4.2.4) Activity Reporting Arrangements:** The MACH Board oversees delivery of the Council’s strategy, holding the Executive to account at 6-weekly meetings focused on tracking and assessing activity across the partnership. The Executive Director makes a formal annual report (see 185). The MACH community is kept informed through the website (<https://machaustralia.org/>) and monthly newsletter which has a high opening rate in excess of 40%.

**4.2.5) Standardisation of Processes:** MACH is a joint venture of 19 independent legal entities so it is unrealistic of NHMRC to expect “standardisation” of arrangements for managing intellectual property. However, good progress has been made to harmonise **clinical research ethics approvals**, with MACH partners closing two ethics committees and coordinating sitting dates of the 5 remaining MACH partner National Mutual Acceptance (NMA) human ethics committees to ensure that investigators across MACH have access to an NMA- certified ethics committee sitting each week. Attention has now turned to **clinical research “governance”**, the approval processes that each Health Service requires to ensure that the research can be delivered without compromising patient care resources to meet Victorian

Government's requirement for a Site Specific Agreement before a project can proceed in that Health Service. At the request of front-line clinicians assessing patients with suspected dementia in the five Cognitive Disorder And Memory Services (CDAMS) clinics associated with MACH, the MACH Executive is leading work on so-called "**Single Sign-off Governance.**" Whilst serving as Chief Scientist Health in Scotland, the MACH ED established NHS Research Scotland (186) to speed research governance across all the nation's 14 Health Boards (equivalent to the Victorian Health Services), with research governance approval in one Board automatically being recognised by all other Boards without further wasteful process. Such simplification may not be possible across MACH's Health Services, but valuable streamlining is in progress.

**4.2.6) Community Participation:** MACH seeks to add value to extensive consumer engagement led by each partner, ensuring consumer representation on our Precision Care committees; co-design of our consumer engagement activities with consumers; and consultation with our MACH-wide Consumer and Community Network and its thriving community of practice for all MACH initiated projects including state-wide (see below) and national collaborations with the Australian Health Research Alliance (AHRA), with an excellent Toolkit document arising (187). MACH Health Services have asked for help to engage with culturally and linguistically diverse (CALD) populations. MACH is partnering with Melbourne's Health Issues Centre (188) to pilot and evaluate new social media tools for engagement, initially with the Italian and Vietnamese communities, with delivery already of in-language videos to help Health Service staff explain research to CALD communities. **Gender diversity** amongst the partnership's research and translation workforce is a responsibility of the partners, but MACH disseminates excellent practice such as Strategic Grants for Outstanding Women and Indigenous Development Grants (189).

**4.2.7) Sustainability:** The \$915k *pa* subscription budget that funds the MACH Executive generally runs a healthy surplus equating to ~12 months running expenses. Audited accounts can be presented to NHMRC if required. Valuable in-kind contributions are received; ~\$350k *pa* from the administering organisation, the University of Melbourne, for free legal, commercial and HR services, plus multi-partner contributions to collaborative initiatives (MACH-Track; MachSR; MISCH; Centre for Digital Transformation of Health) that will grow to about \$6m *pa* by 2027.

**4.2.8) Relationship to Victorian Government.** Victoria has three RTCs – MACH, our sister NHMRC-accredited AHRTC Monash Partners (190), which serves the Central, South and East parts of metropolitan Melbourne, and the Western Alliance Academic Health Sciences Centre (191) that brings together health services in Western regional Victoria with a base at Geelong. In November 2019 the **Victorian Department of Health and Human Services (DHHS)** awarded \$400k over 2 years to each centre to enable joint working such as streamlining clinical research governance across the state (14). In May 2020, as the first wave of COVID-19 subsided in Victoria, having disrupted routine care whilst stimulating virtual care, at the request of our health services the three centres jointly proposed a **Victorian Health Care Recovery Initiative (VCHRI)** (192). DHHS awarded a pilot of \$800k over 2 years to the three centres to undertake a joint program of health services research focused on (i) driving out low-value care (the example being unnecessary colonoscopy) and (ii) virtual care for emergency presentations, which underpinned the \$9m 3-centre MRFF 2021 RART award led by the Western Alliance to deliver virtual care for rural elderly patients. The three centres formalised collaboration by forming the independently-chaired **Victorian Research Translation Centre Collaborative (VRTCC)** (192a) with consumer, health service CEO, primary care and government representation; this group provides governance of all "3 centre" projects. In August 2020 Victorian Government moved their Medical Research team and funding to a new ministerial brief (Medical Research, Innovation and the Digital Economy) in the **Department of Jobs, Precincts and Regions (DJPR)**. The DHHS was relieved of its Human Services function and reverted to being the **Department of Health**, which has nevertheless retained some translational research investments, notably in cancer (through the Victorian Comprehensive Cancer Centre, VCCC) and genomics (through the Melbourne Genomics Health Alliance). The VRTCC has now become a mechanism that contributes to cross-government co-ordination as both DJPR and DoH are represented; the latter has provided the **letter of support** for this submission.

Finally, **La Trobe University is welcomed as a valuable affiliate member by both MACH and Monash Partners** because its Academic and Research Collaborative in Health (ARCH; 193) includes Health Services from both AHRTCs, further strengthening state-wide collaboration and co-ordination.

## CRITERION 5: MACH'S STRATEGY FOR IMPROVING HEALTH AND HEALTHCARE

### 5.1 Comments on the criterion:

In establishing RTCs, NHMRC's strategy has rested heavily on securing involvement and leadership from **Health Services**. In Victoria these deliver hospital-based and outreach community-based healthcare services. Victorian Health Services do not generally delivery primary care, in which much health-promoting preventative care is given, and until very recently have not had units dedicated to improving public health (although some health services are now being funded to develop such units that for the time being will be exclusively focussed on COVID).

Therefore MACH's primary sphere of influence is on **hospital-based and community outreach care**, for example as evidenced by four of the five examples of successful translation described above (1A, examples 1-4). These multi-partner collaborations illustrate development of a new and widely adopted medicine to improve outcomes in blood cancers; implementation of improved diagnostic imaging for staging cancer and guiding care; demonstration and dissemination of new healthcare technologies- some deployed in outreach care- that have transformed the outcomes of acute ischaemic stroke; and implementation of new genetic testing protocols to improve diagnosis and reduce distress in families affected by inherited disease. Furthermore, to help improve **public health policy** various MACH partners have forged collaborations with Australian Commonwealth and State governments, exemplified above (1A, example 5) by outstanding MACH partner leadership of the policy response to the COVID-19 pandemic. At the request of Health Services, MACH has also developed mechanisms (4.1 above) to **improve alignment with primary care** with future plans outlined below.

Nevertheless, it seems important to clarify that the MACH partnership's influence is likely to be greatest upon the comprehensive healthcare services delivered by Health Service partners to ~2.5 million Melburnians, with gains in health deriving from that influence.

### 5.2 MACH's greatest challenge – a powerful but highly fragmented local system for healthcare and research:

Criterion 1B briefly highlights the details of MACH's "change management mechanisms" as requested by NHMRC. It is difficult to overstate that the greatest gain from forming MACH has been to replace competition between Victorian healthcare/research entities with a spirit of collaboration. Prior to the formation of MACH there was no formal mechanism for our 10 independent Health Services to discuss and agree priorities, let alone meet with Research Organisations to convey priorities for research. Similarly, amongst our partners focused on health research, collaborations grew in a transitory, opportunistic manner rather than according to any strategy, and relationships with Health Services were haphazard. Consequently, we see MACH's greatest success in its first 6 years as being able to present a collaborative strategy for the future that has the support and buy-in of all our partners.

### 5.3 MACH's 2020-25 Strategy, "Tomorrow's Healthcare Today":

As detailed above (Summary, Criterion 3), by November 2019 MACH partners had built mutual trust to the extent that the Council was able to agree and launch our three-cornered strategy to promote translation of research into improved healthcare and a stronger economy. This will be achieved by nurturing future leaders of innovative healthcare; co-developing translational platforms that help turn research into healthcare; and collaborating to develop systems that deliver precision care. The strategy is depicted in the Figure in the Summary.

We now outline how, over the next four years, our strategy aims to deliver improvements in health and healthcare:-

### 5.4 Nurturing Future Leaders of innovative healthcare:

**5.4.1 Training Clinician Researcher-Translators** is a major focus for MACH because we have seen the greatest successes in research translation and implementation into healthcare (5 examples given in Criterion 1) led by front-line clinicians who also lead clinical research and translation. We explain in 3.1.1 above that the **MACH-Track** was successfully established in 2020 as a first-in-Australia integrative program to prepare doctors in advanced post-graduate training as clinician researchers. Over the next 5 years, we hope to find adaptations to the program that attract trainees from all major specialties, particularly **surgical trainees**. Although we have appointed an Ophthalmologist and an Anaesthetist we have so far had only one (out of 26) applications from a surgeon, whereas the surgical disciplines are a major cost centre in our Health services.

We also explain (in 3.1.2) that the MACH will from 2022 **be expanded to include physiotherapists, nurses and midwives**. Longer-term we hope to find funding and pathways for all Allied Health Professionals, Pharmacists, clinical laboratory scientists and clinician managers. It must be re-emphasised that MACH-Track is currently funded solely by internal re-deployment of existing resources – by the time steady state is reached after the planned expansion, partners will be committing ~\$2.9m per year. External funding may be necessary to expand further.

**5.4.2 Building capability and capacity in translation and implementation:** Going forward we will invest time and our own resources in various programs outlined in Criterion 3. As detailed above in 3.1.3, 2022 will also see the start of **MachSR** as a future leader fellowship program to enable trained clinical staff to bring health services research (HSR) skills, including implementation science, to the solution of practical healthcare problems. We anticipate strong interest as we already have around 150 colleagues routinely participating in MACH's **Navigating Implementation Science Seminars** and from 2022 will establish an **Implementation Science Community of Practice** as a new MACH-supported network (see below). Furthermore, following the success of our Precision Care committee for Care of the Ageing in establishing a network for **Early/Mid Career Researchers**, which is providing support in developing translational skills, including **consumer and community involvement**, we will explore developing E/MCR networks in other domains, such as Women and Newborns Health (see below).

## **5.5 Translational Platforms to turn research into improved healthcare:**

**5.5.1 Clinical Trials and Clinical Research:** The University of Melbourne has invested on behalf of the partnership at least \$1.2m per year in establishing the Methods and Implementation Support for Clinical and Health research (MISCH) Hub as described in 3.2.1 in above. Furthermore, as explained MACH Partners (Peter MacCallum Cancer Centre, Royal Melbourne Hospital and Royal Women's Hospital) have funded the development of a **(i) Victorian Clinical Trials Education Centre (V-CTEC)** that, with \$250k support from Victorian Government and contributions from Monash Partners and the Western Alliance AHSC will be rolled out during 2022 to be accessible, without charge, to all interested clinical staff in any Victorian Health Service. MACH is also ready to progress **(ii) further work on clinical trial governance harmonisation**, funded by all 10 Health Services at \$120k for 2022, aimed at establishing implementation of harmonised processes that will meet the requirements of the ASCQHC National Clinical Trials Governance Framework that will become, by 2023, a compulsory part of Health Service accreditation for delivery of healthcare. Lastly, negotiations are well advanced with sponsors with industrial sponsors to secure \$1m to pilot a MACH-wide **(ii) gene therapies trial hub** starting at the Royal Children's Hospital in 2022 but expanding in 2023 to the Royal Victorian Eye and Ear Hospital (to support gene therapy trials for eye disease) and the Peter MacCallum Cancer Centre (to support gene therapy trials in cancer).

**5.5.2 Data-driven healthcare improvement:** The University of Melbourne investment of ~2m per year to establish a MACH-wide Centre for Digital Transformation of Health is now poised (see 3.2.2) to deliver in 2022 **(i) The Digital Health Validatron**, a simulator to develop digital health tools suitable for all settings; and the **(ii) Learning Health System Academy**. The Platform committee are nationally networked and will play a major role in a node of the **(iii) Health Studies National Data Asset (HeSANDA)** program funded with \$3m from the Australian Research Data Commons to build national infrastructure to support the sharing and reuse of health research data (such as clinical trials data), work allied locally to Melbourne's Australia-wide health data connectivity resource BioGrid (194) and the Centre's leadership of the Australian Health Research Alliance (AHRA, 195) Transformative Data Collaboration (196). Finally, the group will continue to lead MACH's involvement in the **(iv) Victorian Collaborative Healthcare Recovery Initiative Virtual Emergency Department**, building on the innovation of virtual triage pre-ED by Northern Health in MACH, and (v) the \$9m MRFF Western Alliance-led work on virtual care of the elderly.

**5.5.3 Towards a Precision Medicine Platform:** The Board's STRaP committee (see 4.1) is driving clinical translation of genomics and other 'omics technologies, through initiatives such as enhancing the phenotyping of existing MACH-wide cohorts (including the exciting State-wide birth cohort, GenV, REF). The **Molecular Imaging Platform** has a strong track record of successful translation, and its work plan for 2022/23 is to develop a roadmap for sharing and enhancing capability and infrastructure for cutting edge molecular imaging techniques, including collaboration with the School of Chemistry in the University of Melbourne on developing novel radioactive tracers for Position Emission Tomography of patients to make accurate, molecular diagnoses of cancer and neurodegenerative diseases.

## **5.6 Co-design and delivery of Precision Care**

**5.6.1 Health Services Improvement and Implementation:** As explained above in 3.3.1 and 5.4.2 this committee will lead and develop **MachSR** as it goes forward from opening in July 2022, continue to organise the highly valued **navigating implementation science seminars** for clinicians and E/MCRs, and in 2022 will bring together an **implementation science community of practice** for all knowledge levels across MACH, as a new Network. The grouping will continue to lead MACH's ongoing contributions to the **Victorian Collaborative Healthcare Recovery Initiative** by data-linkage analysis of disruption of non-COVID care, surveys of the acceptability to patients of telehealth and approaches to drive out low value care.

**5.6.2 Consumer Engagement:** All MACH partners will continue to prioritise community engagement through expert and well-resourced teams, with MACH bringing together a Community of Practice focussing on **educating researchers in consumer engagement** (see 3.3.2 above), to ensure that the consumer voice is heard and incorporated into MACH’s collaborative research and translation. A second priority going forward is to continue to expand MACH’s repertoire of **in-language CALD research engagement videos** to increase the number of languages in which it is possible to address the low engagement of culturally and linguistically diverse communities in health research.

**5.6.3 Aboriginal Leadership Group:** This Board committee’s work on developing a novel **Culturally Adaptive Governance Framework (CAGF)** for Indigenous Health Research has been described above in 3.3.3, and over the next two years will be evaluated for impact as part of two NHMRC-funded studies. The Group’s main focus for the next two years will be to support and help lead **Victorian Government’s Aboriginal Research Accord Project** being developed by the Victorian Aboriginal Community Controlled Health Organisation (VACCHO), with Mishel McMahon (a Yorta-Yorta woman) from VACCHO joining the all-Aboriginal group.

**5.6.4 Primary Care:** This Board committee has mapped Practice Based Research Networks across Australia and led MACH input to the **Federal Government Primary Healthcare 10 year Plan** aiming to strengthen translational research at the community/hospital interface. To address this gap, MACH partners have drawn on the formidable data science strengths of the University of Melbourne Department of General Practice, and its PATRON database linking over 200 Victorian practices, to secure \$5m from the Ramsey Foundation to initiate the **Future Health Today** program. This digital health initiative empowers GPs to make earlier diagnoses of chronic disease and initiate collaborative management with hospital-based specialists.

**5.6.5 Women and Newborns Health:** Responding to concerns expressed by relevant MACH Health Services, this group deployed MACH seed funding to co-design with consumers the **F3 protocol** “Find, Follow and Facilitate; 3 steps to Flourish”, to streamline and standardise the follow up of infants born after a high risk pregnancy or neonatal period; competitive funding is now being sought to implement and evaluate the program. The **AHRA Women’s Health Research Translation Network** is funding the committee’s work on data analytics for the COVID Maternity and Newborn Dashboard (CoMAND) (197), creating an interactive digital visualisation of maternal perinatal outcomes in Melbourne for the use of maternity health services. Furthermore, AHRA-derived funding will help MACH pilot an **E/MCR Network** in this field.

**5.6.6 Care of the Ageing:** MACH Health services are keen to accelerate diagnosis and support of patients with dementia by standardising care protocols across MACH’s five state-funded Cognitive Dementia And Memory Services (CDAMS) clinics, so the committee has brought together the clinician-researchers involved in a new MACH **Network for Clinical Innovation in the Dementias**, to pursue this task. A second interdisciplinary subgroup, led by La Trobe University, and involving Monash Partners and Western Alliance is evaluating **falls prevention** protocols.

**5.6.7 Infection:** This group has led MACH’s research response to COVID, with an example of successful translation into improved public health policy being described above (1A, example 5). At the request of Health Services wishing to improve care at the community/hospital interface, the committee is currently planning a project to understand the patient journey across primary care and health services for patients diagnosed with **community acquired pneumonia**. The project will also map the different presentation and journey of children with severe respiratory tract infections vis-à-vis the usual demographic of older patients.

**5.6.8 Education and Workforce Planning:** At the request of Health Services, this grouping of expert educationalists will evaluate the “Safety and Rescue” (198) project to enable sharing of selected mandatory training such as hand hygiene and Basic Life Support between health services described above in 3.3.5. The committee is now developing thinking on **“education for implementation”**, which involves the interesting problem of how to “unlearn” inefficient, outmoded or unacceptably dangerous care strategies.

## **5.7 The Request: Re-accreditation**

Accreditation of MACH by NHMRC as a Research Translation Centre is sought as this will reinforce the partnership’s legitimacy to build still further the collaborations and partner contributions needed internally to improve healthcare delivered by its members. Such legitimacy will also be beneficial externally as MACH improves alignment with primary care, helps governments improve public health policy and participates in national dissemination of best translational practice through membership of the Australian Health Research Alliance.

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The method of referencing must include the following minimum information: Surname, Initials [all authors], Year, Title, Journal Title, Volume, Page(s), DOI [if assigned], and web link [where relevant]. Web-links can only be used as part of this referencing.

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