

Overview of The Milner Therapeutics Institute

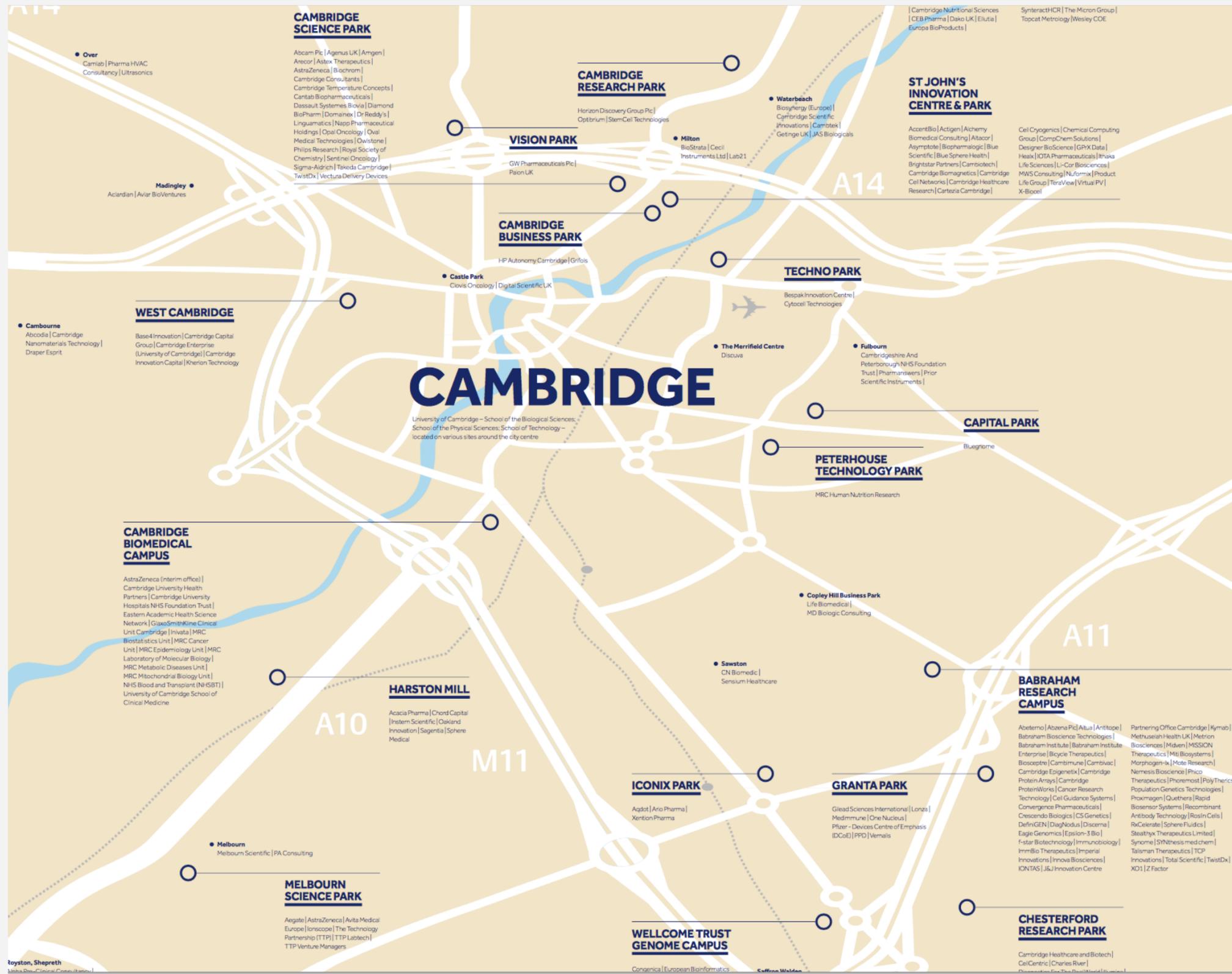
for KPBMA

May 2021



**OUR MISSION:
TO TRANSFORM PIONEERING
SCIENCE INTO THERAPIES
BY CATALYSING PARTNERSHIPS
BETWEEN ACADEMIA
AND INDUSTRY**

R&D Clusters in Cambridge



Mission: To transform pioneering science into therapies by catalysing partnerships between academia and industry

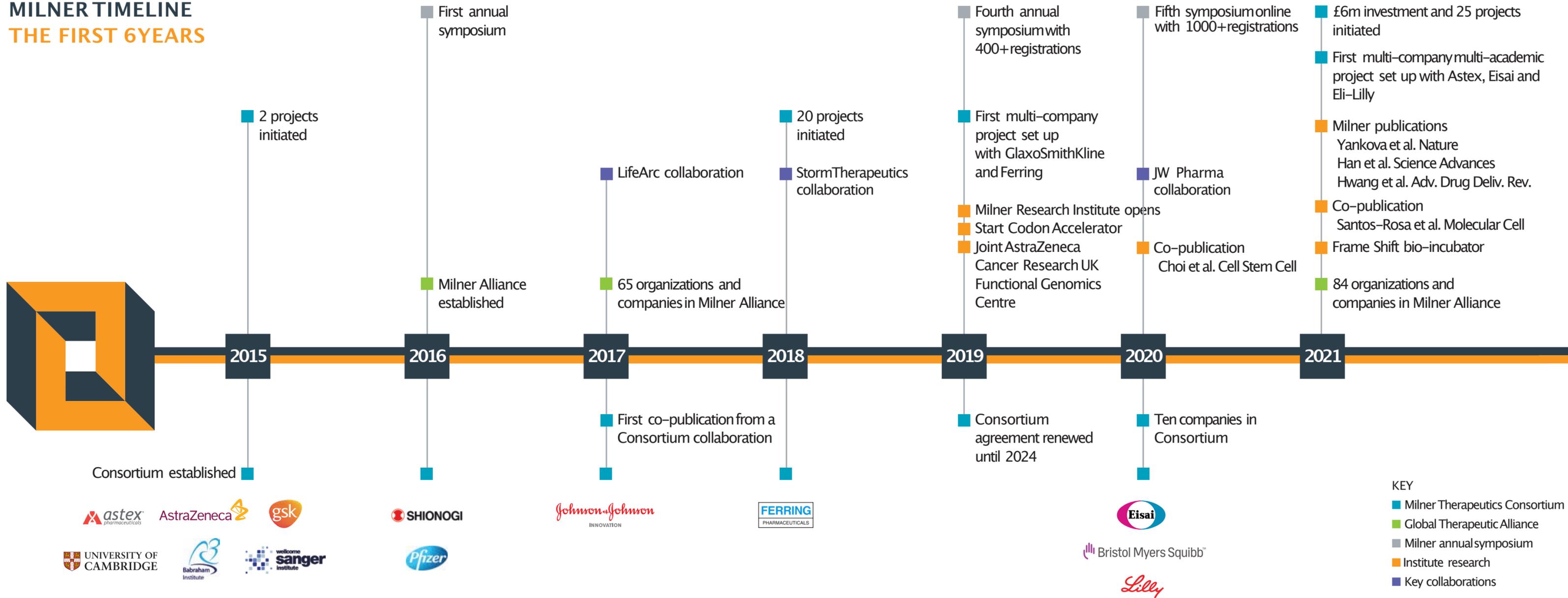
The Milner Therapeutics Institute (MTI) is a:

- **Physical hub for co-location of** pharma partners, academic research scientists and start-up companies to **drive** and **accelerate** therapeutic research
- **Headquarters for a global outreach programme** to **connect** academia to industry, and **enable** collaborative research through our Consortium

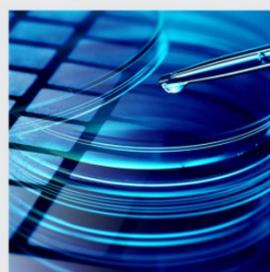


Timeline

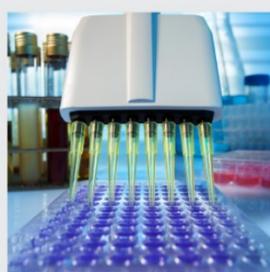
MILNER TIMELINE THE FIRST 6 YEARS



Four ways to **connect** to the **Milner Therapeutics Institute** and into the wider Cambridge community



CENTRE FOR
PATHWAY ANALYSIS



FUNCTIONAL
GENOMICS CENTRE



ACADEMICS &
COMPANIES IN
RESIDENCE

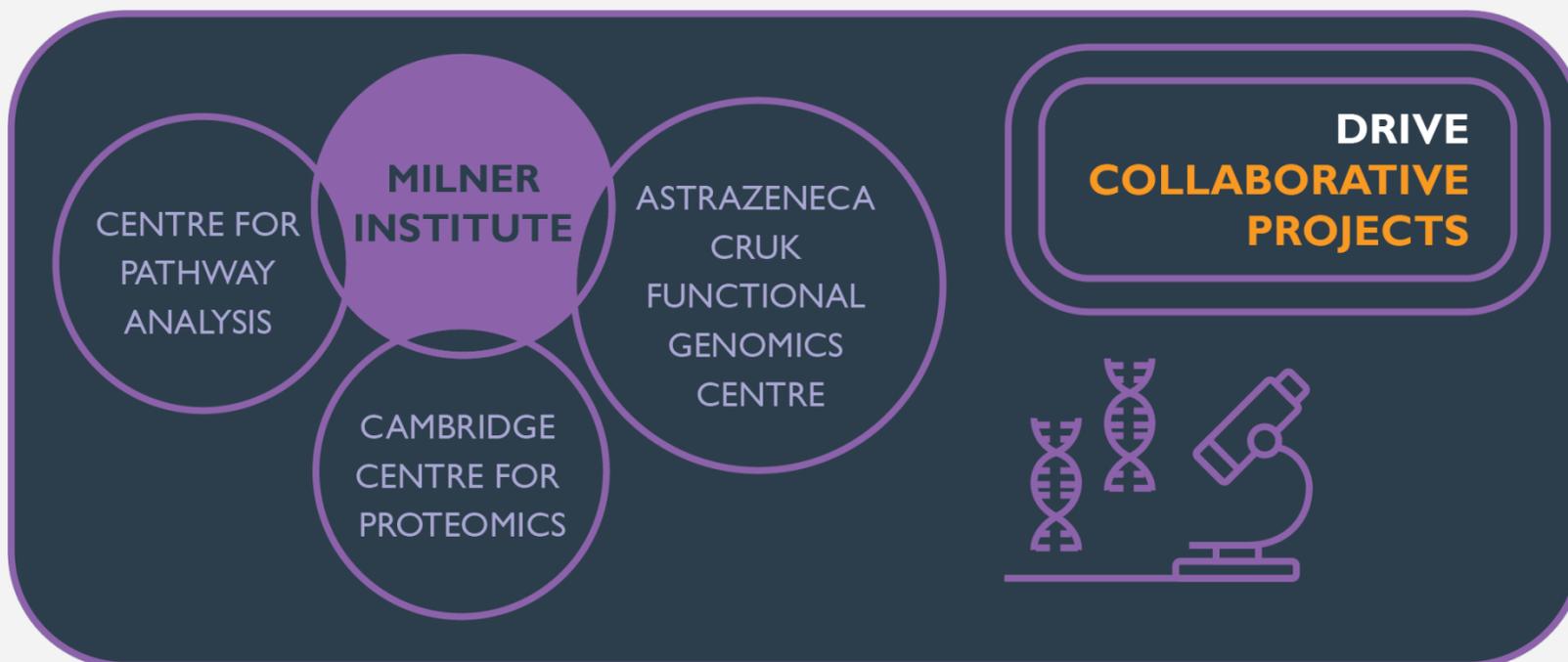


START CODON
ACCELERATOR

- 1.** Direct collaboration with Milner Therapeutics Institute in-house research programme *
- 2.** 1:1 interactions with Cambridge academics *
- 3.** Pre-competitive projects between multiple industry partners and Cambridge academics *
- 4.** Wider interaction throughout the Cambridge cluster and beyond

Direct **collaboration** with the **Milner Therapeutic Institute** in-house research programme

- **Milner Therapeutics Institute**
- Embedded in the University of Cambridge
- School of Biological Sciences and School of Clinical Medicine
- Donation from Jonathan Milner and University of Cambridge



- **New purpose built space and location**
- Access to the new MTI target discovery pipeline
- Access to a unique academic and clinical community in the Jeffrey Cheah Biomedical Centre

Direct **collaboration** with the **Milner Therapeutic Institute** in-house research programme

- **Centre for Pathway Analysis** (~50 people) where academics, pharma and biotech work side-by-side to identify and interrogate disease signatures and validate potential drug targets.
- **Joint AZ-CRUK Functional Genomics Centre** (~20 people) will deliver state of the art functional genetic screens, cancer modelling and big data processing – all aimed at accelerating the discovery of new cancer medicines.
- **Start Codon Accelerator Programme** (~14 people) is a new life science accelerator providing significant funding, mentorship and support for up to 10 innovative start-up companies per year.



Tony Kouzarides



Kathryn Chapman



Greg Hannon



Ultan McDermott



Jason Mellad

Mission

Development of computational methods and tools to **identify new or better therapies** from the analysis of biological data

New Targets

**Drug/Target
(Re)positioning**

**Therapeutic
Markers**

**Cancer
(IO)**

**Neuro-
degeneration**

**Metabolic
Disorders**

**Respiratory
Diseases**

**Infectious
Diseases**

**Inflammatory
Diseases**



Namshik Han

Group Members & Collaborators



Namshik Han



Georgia Tsagkogeorga



Woochang Hwang



Méabh MacMahon



Sanjay Rathee



Gehad Youssef



Anika Liu



Nicholas Katritsis



Winnie Lei



Louise Lecointre



Lilly Wollman



Mark Wong



Rebecca Marrow



Soorin Yim

Noah Collins

Ming Zeng

Seungbeom Lee

Sophia Ramani



Kostas Tzelepis



Rebecca Harris



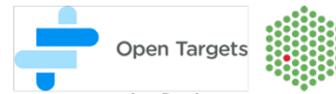
Manav Pathania



David Rubinsztein
Maurizio Renna
So Jung Park



Frank McCaughan
Linsey Porter, Daniel Kottmann
Kourosh Saeb-Parsy
John Gamble
Matthias Zilbauer
Kamal Nayak



Ian Dunham
Miguel Carmona



Justin Bryans
David Pardoe
Jenny Cook



Oliver Rausch
Dan Leggate
Hendrik Weisser



Onco Innovation Programme



John Skidmore
James Duce



Joo-Hyeon Lee
Jinwook Choi
Dan Hodson
Hendrik Runge



Christian Frezza
Christina Schmidt
Charlie Massie
Radoslaw Lach



Friedemann Weber
Patrick Scherer



Young Jik Kwon
Rebecca Lee



Jordi Munoz-Muriedas



David Wold
Tae Hyun Hwang



Jaeho Cheong
Jaemyun Lee



Doheon Lee
Soorin Yim



Andrew Owen



Jinhan Kim
Heejung Koo



Chan-hee Park
Jinsuk Kang
Kyung-won Cho



ANTIBODY ALLIANCE LABORATORY

Julie Little
Maria Groves

ScienceAdvances *in press*

Identification of SARS-CoV-2 induced pathways reveal drug repurposing strategies

Namshik Han^{1,8*}, Woochang Hwang^{1,8}, Konstantinos Tzelepis^{1,8}, Patrick Schmerer^{2,8}, Eliza Yankova¹, Méabh MacMahon^{1,3}, Winnie Lei¹, Nicholas M Katritsis⁴, Anika Liu⁵, Alison Schuldt¹, Rebecca Harris¹, Kathryn Chapman¹, Frank McCaughan⁶, Friedemann Weber² and Tony Kouzarides^{1,7,9*}

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²Institute for Virology, FB10-Veterinary Medicine, Justus-Liebig University, Gießen 35392, Germany

³Centre for Therapeutics Discovery, LifeArc, Stevenage, UK

⁴Department of Chemical Engineering and Biotechnology, University of Cambridge, Cambridge, UK

⁵Department of Chemistry, University of Cambridge, Cambridge, UK

⁶Department of Medicine, University of Cambridge, Cambridge, UK

⁷The Gurdon Institute and Department of Pathology, University of Cambridge, Cambridge, UK

⁸These authors contributed equally

⁹Lead contact

* Correspondence to: n.han@milner.cam.ac.uk and t.kouzarides@gurdon.cam.ac.uk

This is a timely report of general interest, which uses Computational Biology and Artificial Intelligence to predict the repositioning of 200 already approved drugs against SARS-CoV-2. We are confident our approach has identified potential targets, since 20% of these drugs are currently in COVID-19 clinical trials. We present the mechanism of action of the 200 drugs and demonstrate the efficacy of two of these in cellular assays. This huge dataset of SARS-CoV-2 induced pathways, already approved drugs to target them, along with their mechanism of action, defines a resource for repurposing of drugs against COVID-19, either in monotherapies or in combination therapy.



Contents lists available at ScienceDirect

Advanced Drug Delivery Reviews

journal homepage: <http://ees.elsevier.com>



Current and prospective computational approaches and challenges for developing COVID-19 vaccines

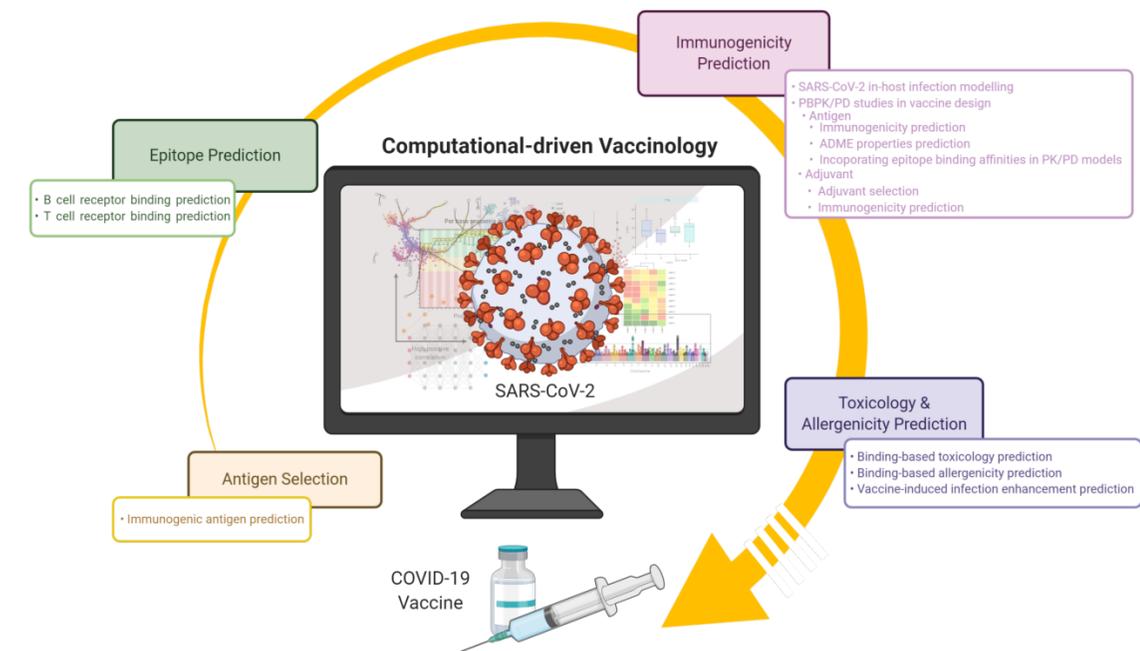
Woochang Hwang^{a,1}, Winnie Lei^{a,d,1}, Nicholas M Katritsis^{a,c,1}, Méabh MacMahon^{a,b,1}, Kathryn Chapman^a, Namshik Han^{a,*}

^a Milner Therapeutics Institute, University of Cambridge, Cambridge, UK

^b Centre for Therapeutics Discovery, LifeArc, Stevenage, UK

^c Department of Chemical Engineering and Biotechnology, University of Cambridge, Cambridge, UK

^d Department of Surgery, University of Cambridge, Cambridge, UK



Cell Stem Cell



Article

Inflammatory Signals Induce AT2 Cell-Derived Damage-Associated Transient Progenitors that Mediate Alveolar Regeneration

Jinwook Choi,¹ Jong-Eun Park,² Georgia Tsagkogeorga,^{3,4} Motoko Yanagita,⁵ Bon-Kyoung Koo,⁶ Namshik Han,³ and Joo-Hyeon Lee^{1,7,8,*}

¹Wellcome-MRC Cambridge Stem Cell Institute, University of Cambridge, Cambridge, UK

²Wellcome Sanger Institute, Cambridge, UK

³Milner Therapeutics Institute, University of Cambridge, Cambridge, UK

⁴STORM Therapeutics Ltd., Cambridge, UK

⁵Department of Nephrology, Kyoto University Graduate School of Medicine, Kyoto, Japan

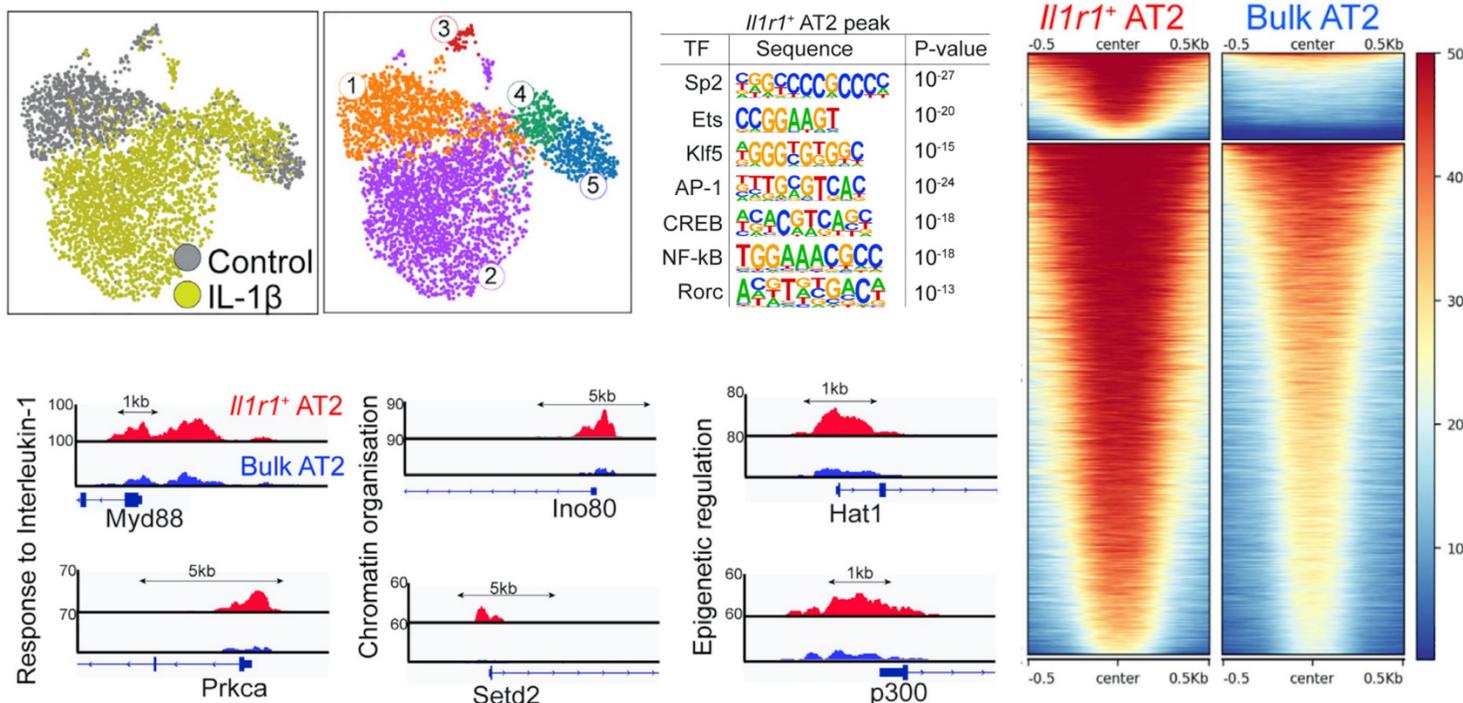
⁶Institute of Molecular Biotechnology of the Austrian Academy of Science (IMBA), Vienna, Austria

⁷Department of Physiology, Development and Neurobiology, University of Cambridge, Cambridge, UK

⁸Lead Contact

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<https://doi.org/10.1016/j.stem.2020.06.020>



Molecular Cell



Article

Methylation of histone H3 at lysine 37 by Set1 and Set2 prevents spurious DNA replication

Helena Santos-Rosa,^{1,8,*} Gonzalo Millán-Zambrano,^{1,2,8} Namshik Han,^{1,3,8} Tommaso Leonardi,^{1,4} Marie Klimontova,¹ Simona Nasiscionyte,⁵ Luca Pandolfini,^{1,6} Kostantinos Tzelepis,^{1,7} Till Bartke,⁵ and Tony Kouzarides^{1,9,*}

¹The Gurdon Institute and Department of Pathology, University of Cambridge, Tennis Court Road, Cambridge CB2 1QN, UK

²Centro Andaluz de Biología Molecular y Medicina Regenerativa (CABIMER), 41092 Sevilla, Spain

³Milner Therapeutics Institute, University of Cambridge, Cambridge CB2 0AW, UK

⁴Center for Genomic Science Istituto Italiano di Tecnologia (IIT), 20139 Milano, Italy

⁵Institute of Functional Epigenetics, Helmholtz Zentrum München, 85764 Neuherberg, Germany

⁶Istituto Italiano di Tecnologia (IIT), Center for Human Technologies (CHT), 16152 Genova, Italy

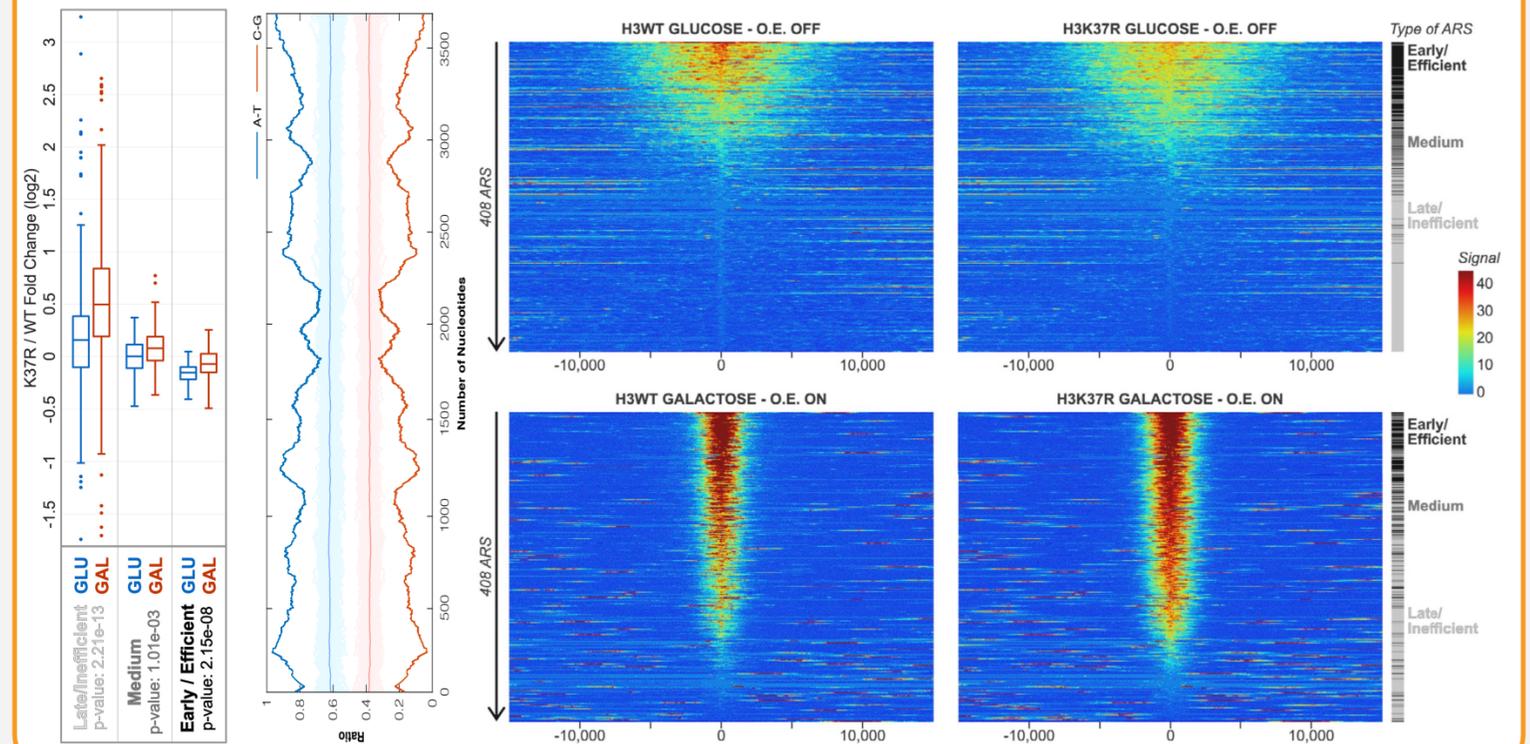
⁷Wellcome Sanger Institute, Wellcome Genome Campus, Cambridge CB10 1SA, UK

⁸These authors contributed equally

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<https://doi.org/10.1016/j.molcel.2021.04.021>





**Artificial
Intelligence**

Centre for Pathway
Analysis

**Target Identification
&
Validation**



1. Expansion in AI

**Disease Diagnosis
&
Prevention**

2. Expansion in Functional Genomics

**Functional
Validation**



3. Expansion of Physical Footprint

e.g. at the MIT or elsewhere on campus

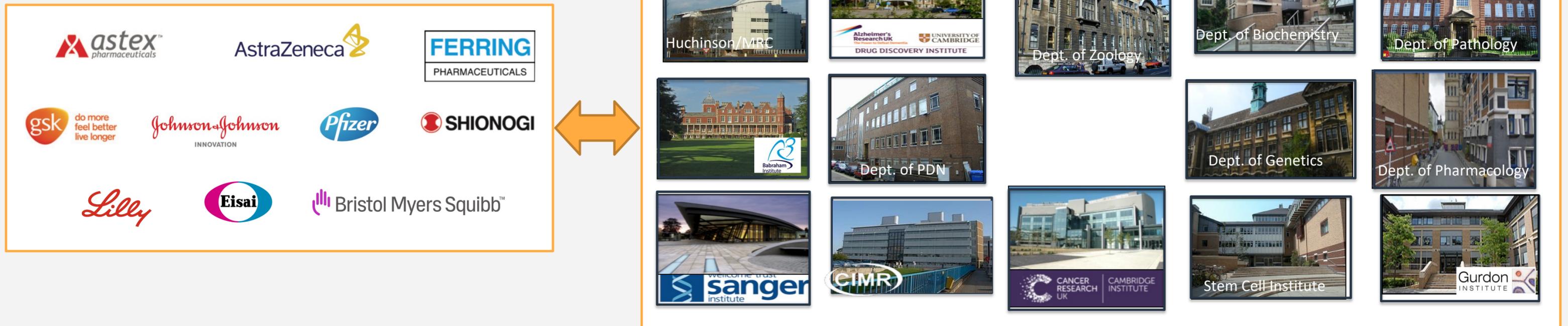


CAMBRIDGE DEPARTMENTS AND INSTITUTES

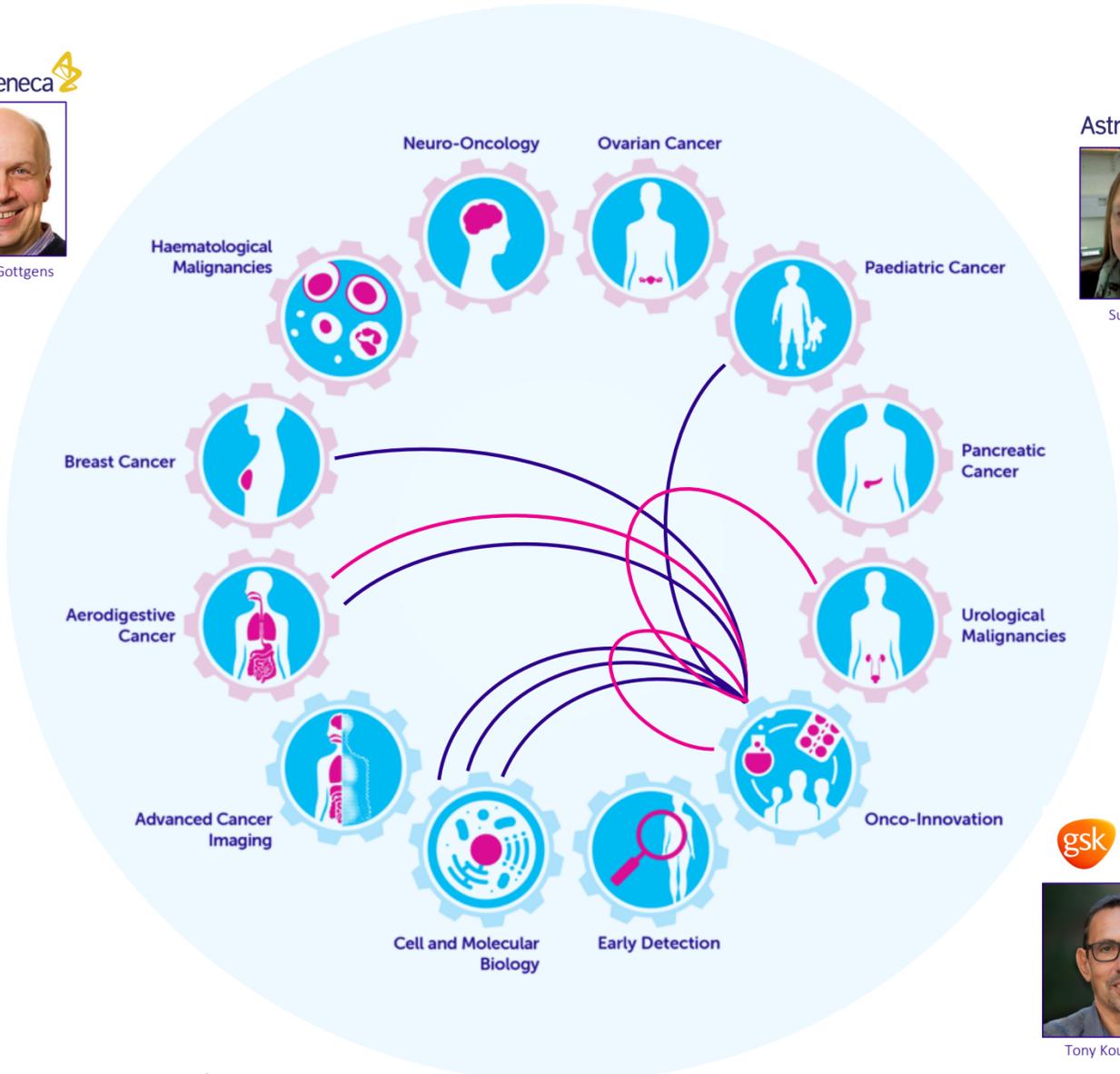


2. 1:1 interactions with Cambridge academics *

- **Milner Therapeutics Consortium** enables:
 - 1:1 partnerships between one company and one academic
 - Pre-clinical NOT clinical projects
 - Use of Consortium agreement
 - Currently 25 projects throughout Cambridge in 11 different Departments – oncology, neuro, infectious diseases, chemistry and AI



Provide opportunities for industry partners to **connect** with Cambridge researchers and **enable** pre-clinical **research collaborations: CRUK Cambridge Centre**



- **ONCOLOGY: Investigating modulators of the ERK/MAPK pathway**

- **Simon Cook, Babraham Institute**



- A detailed study of the ERK pathway and how it changes in response to different modes of cancer cell growth inhibition. The aim is to understand better how ERK modulation affects cancer cell proliferation and apoptosis and how this may guide preclinical cancer research and drug discovery.

- **Publications:**

- Siphthorp J et al. Bioconjugate Chem. (2017)
- Kidger A et al. Pharmacol Ther. (2018) (Review)
- Kidger et al. Mol. Cancer Therapy (2019)

Dual-mechanism ERK1/2 inhibitors exploit a distinct binding mode to block phosphorylation and nuclear accumulation of ERK1/2

Andrew M Kidger^{1*}, Joanne M. Munck², Harpreet K. Saini², Kathryn Balmanno¹, Emma Minihane¹, Aurelie Courtin², Brent Graham², Marc O'Reilly², Richard Odle¹ & Simon J Cook^{1*}

¹Signalling Laboratory, The Babraham Institute, Babraham Research Campus, Cambridge CB22 3AT,

UK

²Astex Pharmaceuticals, 436 Cambridge Science Park, Cambridge CB4 0QA, UK

Membership of **Milner Therapeutics Consortium:**

A **case study**

- **Shionogi joined the Milner Therapeutics Consortium in 2016**
- **Highlights:**
 - Established and used **Consortium agreement** for CDAs, MTAs & research projects
 - Shionogi company name & researchers **embedded throughout Cambridge**
 - **Dedicated company profiling** and stands at three Milner Annual Symposia
 - Bespoke workshops and partnering events
 - **5 funded research projects** with two extensions due to successful results
 - Establishment of **new partnership** with **Nemesis Bioscience** (£1.4m total investment)



Dr Kai Stoeber



Dr Takeshi Shiota



Membership of **Milner Therapeutics Consortium:**

A **case study**

- **Antibiotic resistance workshop** with Cambridge University and Sanger Institute
- **Format:** A one-day workshop including three sessions focused on particular challenges, facilitated by academic and Shionogi co-chairs in each case
- **Challenges:**
 - Pathogen genomics and epidemiology
 - Attractive targets for discovery of novel antibiotics
- **Outcomes:**
 - Joint Innovate UK application and award for £750K
 - phenotypic screening platform
 - 3 year research project with Martin Welch



Professor Gordon Dougan



Professor Andres Floto



Dr Martin Welch

Pre-competitive projects between multiple industry partners and Cambridge academics

Genomics, Artificial Intelligence, Chemistry

Oncology

Neuro

Cardio-
respiratory

Infection
&
Immunity

UNIVERSITY OF
CAMBRIDGE

astex
pharmaceuticals

AstraZeneca

FERRING
PHARMACEUTICALS

wellcome
sanger
institute

Babraham
Institute

gsk
do more
feel better
live longer

Johnson+Johnson
INNOVATION

Pfizer

SHIONOGI

Lilly

Eisai

Bristol Myers Squibb™

3. Pre-competitive projects between multiple industry partners and Cambridge academics *

Pre-competitive projects between multiple industry partners and Cambridge academics

- **Non-Alcoholic Steatopic Hepatitis**
 - First pre-competitive project
 - One academic, number of companies
 - Academic with complex model to screen
 - Functional genomics experience in the model and also potential to challenge the model e.g. +/- fructose
 - Post-doc immersed in MTI environment but also integrated into Stem Cell and Jeffrey Cheah Biomedical Centre
 - **Second pre-competitive project in neurodegeneration being announced Jan 2021**



milner.cam.ac.uk

UNIVERSITY OF CAMBRIDGE Study at Cambridge About the University

MILNER
THERAPEUTICS INSTITUTE

First pre-competitive project initiated

Sep 26, 2019 | News

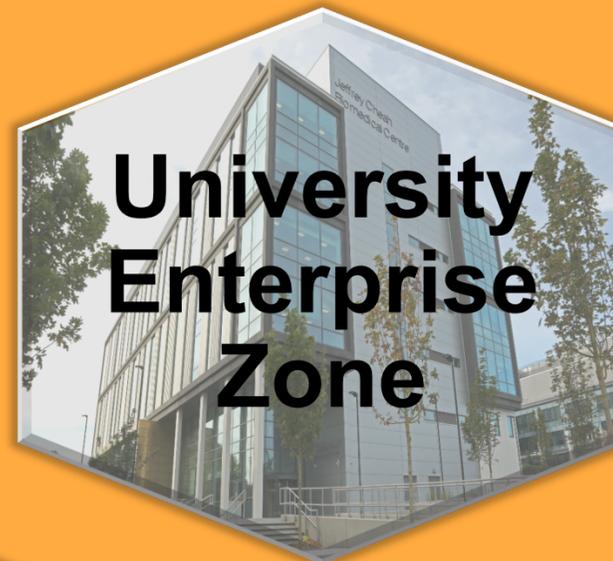
A key goal of the Milner Therapeutics Consortium is to enable collaborations between Cambridge academics and our Consortium companies using forward-thinking pre-competitive models. We can now announce that the first such project has been established with [Ludovic Vallier](#) at the Wellcome MRC Cambridge Stem Cell Institute, focused on the identification of new therapeutics for liver disease. Working with GlaxoSmithKline and Ferring Pharmaceuticals, this project will bring together a novel in vitro human model for non-alcohol fatty liver disease/non-alcoholic steatohepatitis developed in the Vallier group and NASH/NAFLD expertise from the two companies. Through establishment of novel CRISPR/Cas9-based genetic screens in this model, the project aims to identify and validate new therapeutic targets.

Read more about [current projects](#).



  ...

Wider **interaction** throughout the **Cambridge cluster** and beyond



Why Cambridge?

- **Unparalleled breadth**

- Biology, clinical medicine, technology, social science
- Bring together unique expertise to tackle healthcare problems from any angle

- **Scale**

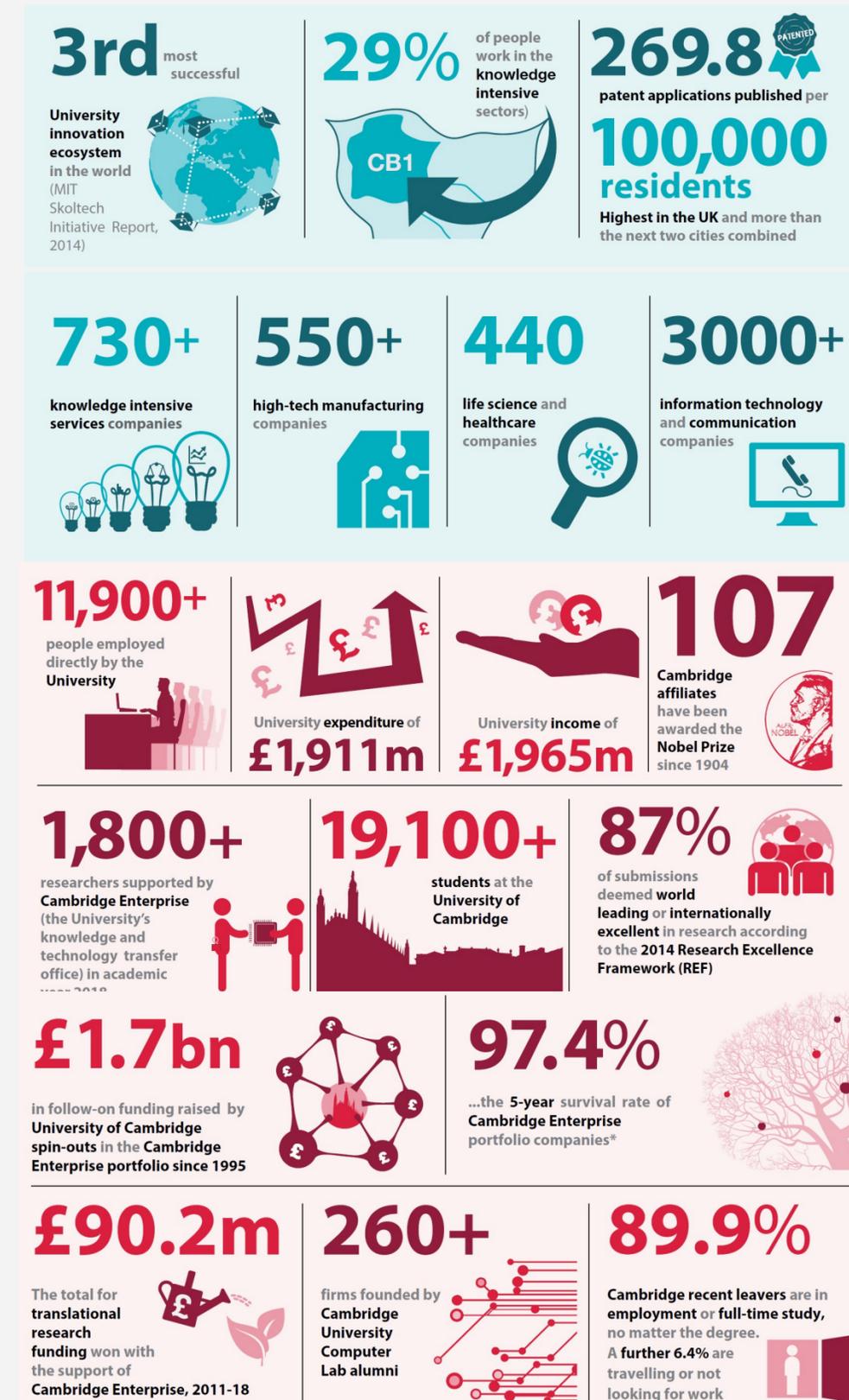
- Largest biomedical campus in Europe with room to expand
- Largest biotech community outside of US
- More successful than MIT in terms of income from spin-outs (97.4% 5-year survival rate)

- **Connection and concentration**

- Unique juxtaposition of research, clinical, healthcare delivery and start-ups in a small geographical area

- **Culture, heritage**

- Community of accessible, helpful and talented people
- Fertile environment for breakthroughs – 22 Nobel prize winners since 2000



Cambridge in numbers, 2019

- We **connect** academics and businesses through our Global Therapeutic Alliance
- Affiliated companies have access to affiliate
- lecture series, events and **annual Symposium**



Wider **interaction** throughout the **Cambridge cluster** and beyond

AFFILIATED COMPANIES

The Affiliated Company scheme, established in October 2016, now includes 54 organizations which bring diverse expertise and resource to the Milner network.



AFFILIATED INSTITUTIONS

The Affiliated Institutions programme, established in October 2017, now includes 14 academic institutions across four continents. These partners share our vision of developing new models for research collaboration across industry and academia to transform pioneering science into therapies. They have free access to our annual symposium and themed events; we also provide them with contacts throughout the Global Therapeutic Alliance, fostering research opportunities and supporting engagement with industry in their own institutions.



VENTURE PARTNERS

The Affiliated Venture Partners programme, operational since October 2017, provides mentoring and potential funding opportunities for the Milner Therapeutics Institute and its Global Therapeutic Alliance, and especially for our in-house company accelerator Start Codon.

Wider **interaction** throughout the **Cambridge cluster** and beyond

- **Growth of the Milner Annual Therapeutics Symposium to 900 attendees online in 2020**
- **Sandpits** which focus on **industry-led challenges** for Consortium members e.g. difficult targets and network biology in oncology
 - **How can network biology be applied to:**
identify opportunities for synthetic lethal effects and combination therapies; and rationalize the genetic segmentation of disease?



Events and networking opportunities



MILNER
THERAPEUTICS INSTITUTE

Milner seminars online

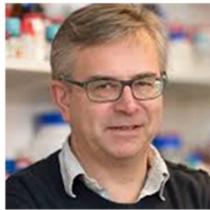
Monthly talks from academic and industry scientists on disease understanding and therapeutic approaches



MILNER
THERAPEUTICS INSTITUTE

Online Seminar Series 2021

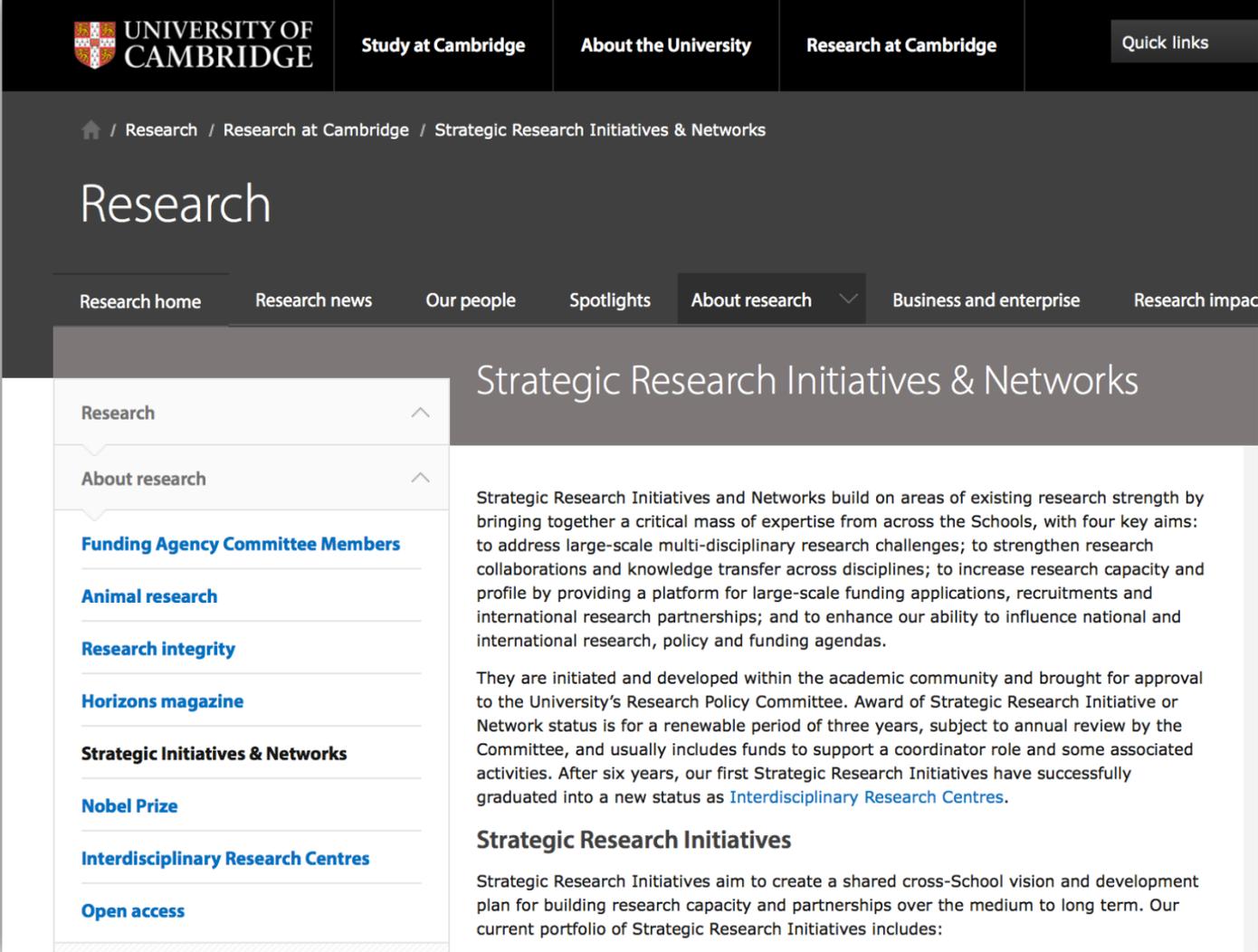
#MilnerEvents

 Nicola Wallis Astex Thursday 25th Feb	 Mike Murphy MRC Mitochondrial Biology Unit Thursday 25th	 Fiona Gribble Wellcome MRC Institute of Metabolic Science Thursday 29th April	 Chris Torrance Phoremost Thursday 27th May
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#MilnerEvents

Strategic Research Initiatives and Networks

- Address large scale inter-disciplinary challenges
- Strengthen research collaborations across disciplines
- Increase research capacity and profile in selected areas
- Enhance ability to influence national and international research and policy agendas
- **Cambridge Academy of Therapeutic Sciences**
- **Cardiovascular disease**
- **Reproduction**
- **Metabolism**
- **Immunology**
- **Sensors**
- **Big data & Trust and Technologies**



The screenshot shows the University of Cambridge Research website. The header includes the University of Cambridge logo and navigation links: Study at Cambridge, About the University, Research at Cambridge, and Quick links. The breadcrumb trail is: Home / Research / Research at Cambridge / Strategic Research Initiatives & Networks. The main heading is "Research". A secondary navigation bar includes: Research home, Research news, Our people, Spotlights, About research (dropdown), Business and enterprise, and Research impact. The "About research" dropdown menu is open, showing a list of links: Research, About research, Funding Agency Committee Members, Animal research, Research integrity, Horizons magazine, Strategic Initiatives & Networks, Nobel Prize, Interdisciplinary Research Centres, and Open access. The main content area is titled "Strategic Research Initiatives & Networks" and contains the following text:

Strategic Research Initiatives and Networks build on areas of existing research strength by bringing together a critical mass of expertise from across the Schools, with four key aims: to address large-scale multi-disciplinary research challenges; to strengthen research collaborations and knowledge transfer across disciplines; to increase research capacity and profile by providing a platform for large-scale funding applications, recruitments and international research partnerships; and to enhance our ability to influence national and international research, policy and funding agendas.

They are initiated and developed within the academic community and brought for approval to the University's Research Policy Committee. Award of Strategic Research Initiative or Network status is for a renewable period of three years, subject to annual review by the Committee, and usually includes funds to support a coordinator role and some associated activities. After six years, our first Strategic Research Initiatives have successfully graduated into a new status as [Interdisciplinary Research Centres](#).

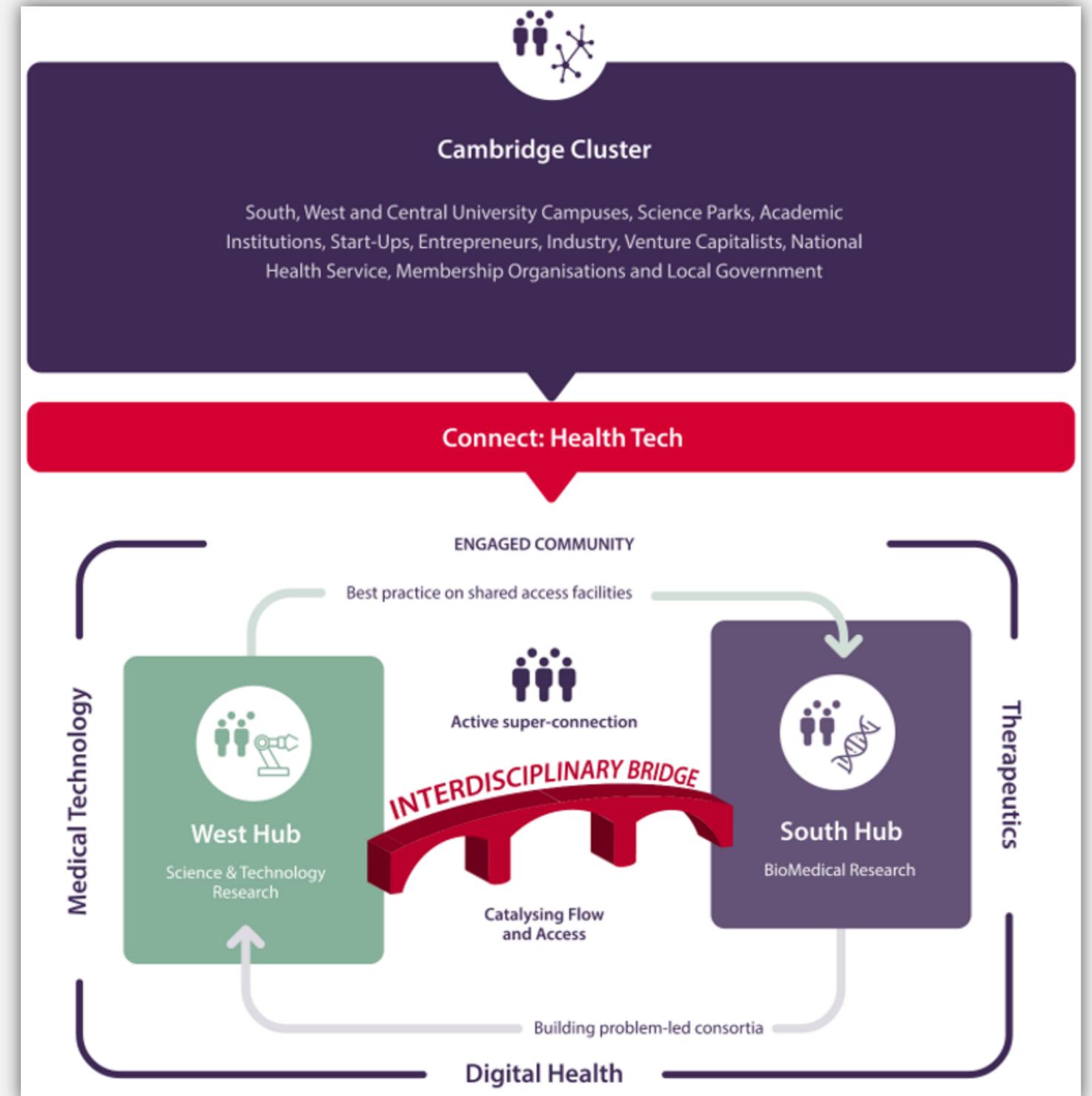
Strategic Research Initiatives

Strategic Research Initiatives aim to create a shared cross-School vision and development plan for building research capacity and partnerships over the medium to long term. Our current portfolio of Strategic Research Initiatives includes:

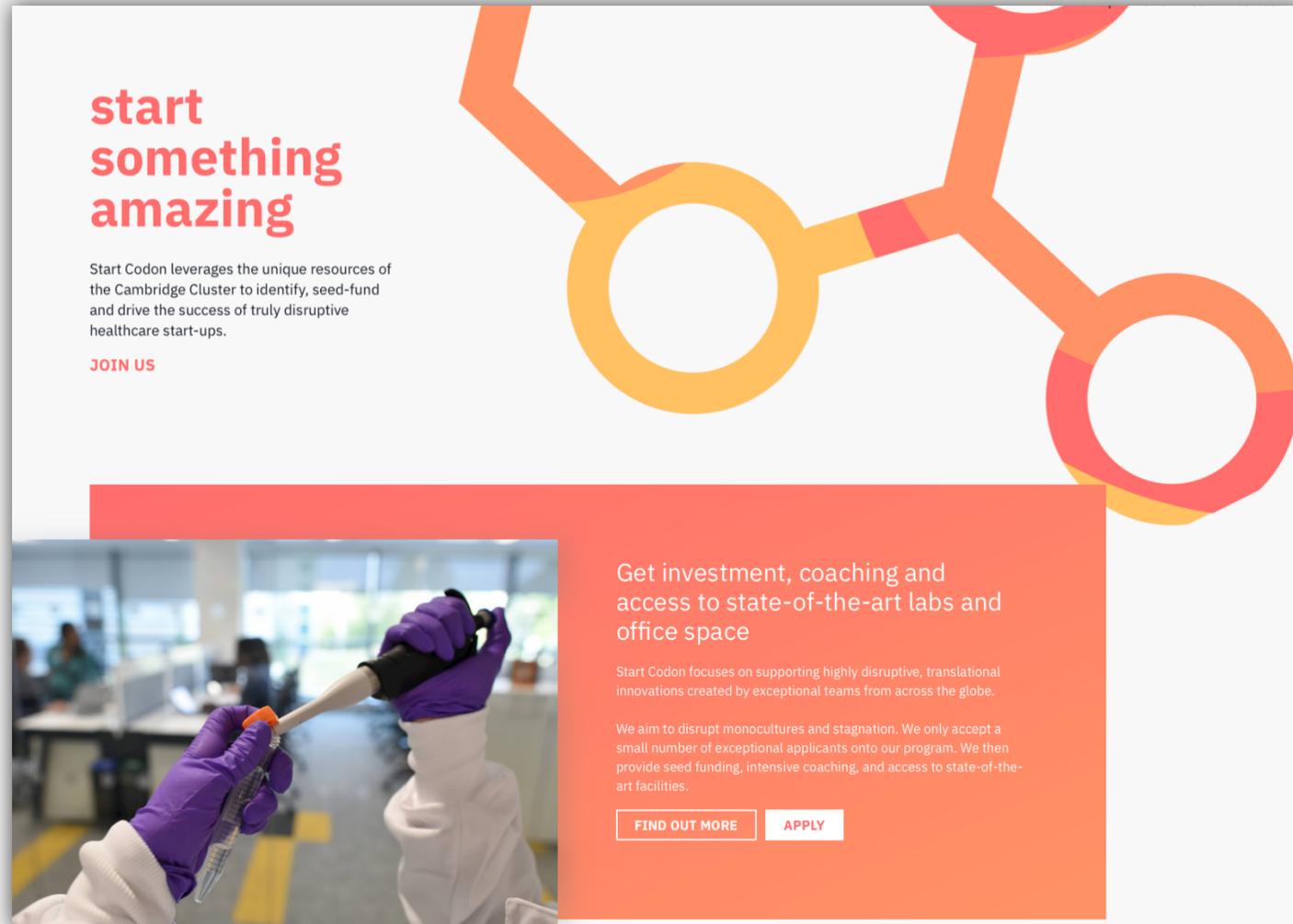
University Enterprise Zone

Greater Cambridge Health Tech Connect: Vision

To create a future Greater Cambridge cluster with natural cross-fertilisation of scientists, companies, entrepreneurs, research-exchange, acceleration and incubation activities between innovation hubs.



Start Codon Accelerator



start something amazing

Start Codon leverages the unique resources of the Cambridge Cluster to identify, seed-fund and drive the success of truly disruptive healthcare start-ups.

[JOIN US](#)

Get investment, coaching and access to state-of-the-art labs and office space

Start Codon focuses on supporting highly disruptive, translational innovations created by exceptional teams from across the globe.

We aim to disrupt monocultures and stagnation. We only accept a small number of exceptional applicants onto our program. We then provide seed funding, intensive coaching, and access to state-of-the-art facilities.

[FIND OUT MORE](#) [APPLY](#)

ACCELERATOR PROGRAMME

A new life science accelerator, Start Codon, will be based in the Milner Therapeutics Institute, providing significant funding and support for up to ten innovative start-ups each year.

This initiative will be aimed at driving the translation of world-class research into commercially successful companies. It has been launched this year with funding from keystone investors including Cambridge Innovation Capital, Babraham Bioscience Technologies, Genentech, a member of the Roche Group, Dr Jonathan Milner and Dr Ian Tomlinson. Start Codon's executive team will be led by Dr Jason Mellad, previously CEO of Cambridge Epigenetix.

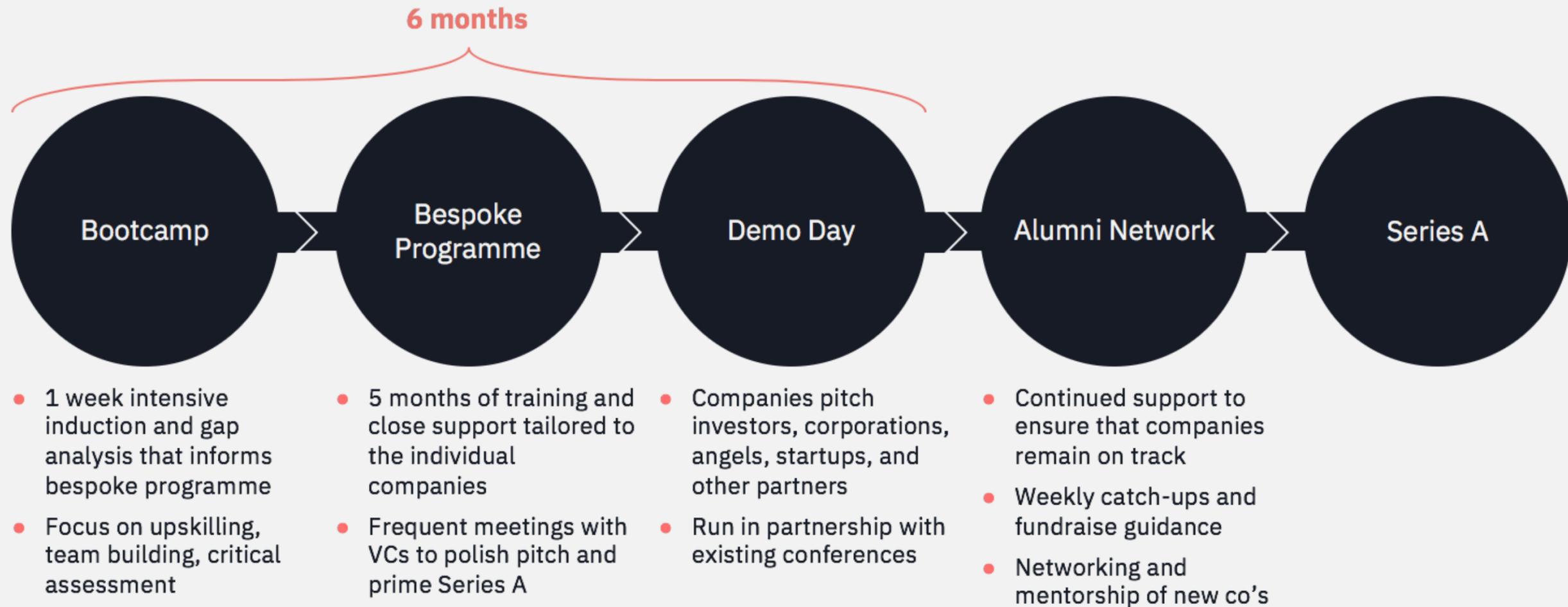
Start Codon will identify and recruit high potential life science and healthcare companies from across the UK and beyond, provide seed-funding, and leverage the world-class resources of the Cambridge Cluster to reduce risk and prepare them for a successful Series A fundraise. The accelerator will be the first within the Cambridge Cluster to provide life science start-ups with significant investment (up to £250K), a full-time dedicated team of experienced and active mentors, and office and lab space located at the Milner Therapeutics Institute. Start Codon plans to raise a venture fund with the goal of investing in and supporting up to 50 start-up companies over the next 5 years.



Dr Jason Mellad, CEO

Based at the Milner Therapeutics Institute

Start Codon provides 12 months of continued support



Ongoing investor meetings, business development, market research, experiments, product development

The Milner Therapeutics Institute: in Summary

- **Milner Therapeutics Consortium active since June 2015**

- Bespoke scouting and partnering activities as required
- Enables 1:1 collaborations between a member company and a Cambridge academic in any Department
- Enables pre-competitive collaborative opportunities between 2 to 3 member companies and a Cambridge academic in any Department
- Bespoke scouting and partnering activities as required

- **Milner Affiliated Companies active since March 2016**

- Access to the Cambridge academic and company network
- Free marketing and partnering at annual Therapeutics Symposium
- Access to community groups on online networking platform Connect: Health Tech

- **Milner In-house Research active since January 2018**

- Active computational biology and machine-learning target discovery pipeline (genomics)
- Focussed on oncology, expanding into other disease areas (e.g. respiratory, neuro).

Our Funders



Thank you

