UCL School of Pharmacy ULLA – ExCo Parma 2019:

Research 2010

Michael Heinrich

Research Group

'Pharmacognosy and

Phytotherapy'

UCL School of Pharmacy,

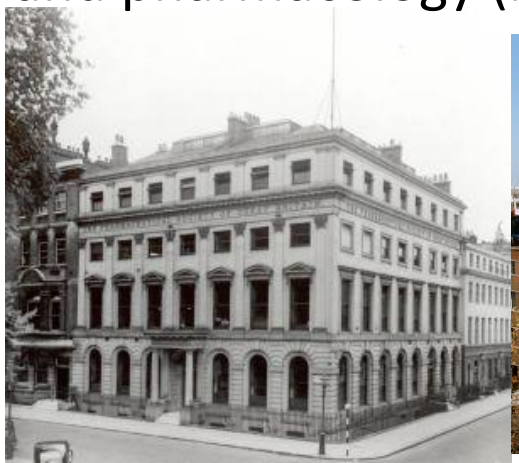
Univ. London

29 - 39 Brunswick Sq.

London WC1N 1AX

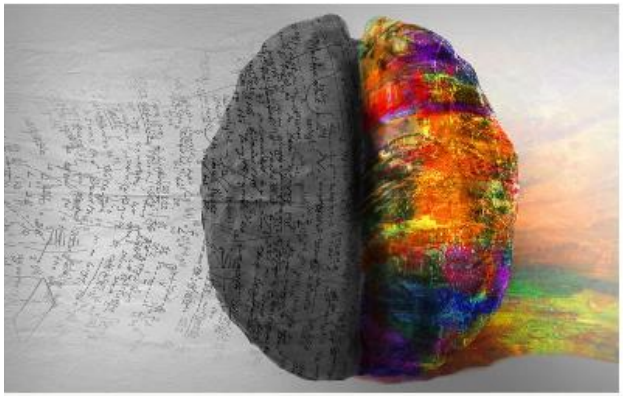
London
02/03/2018

- Created in 1842 as the “School of Pharmacy of the Pharmaceutical Society of Great Britain”
- In 1926, it was incorporated into the University of London and was known as the School of Pharmacy, University of London (“The Square”)
- A very special School – not just in terms of achievements but also in terms of flagship status and professional outreach
- Since 2012 part of University College London
- Currently rated 7th in world for pharmacy and pharmacology (both QS and Shanghai)

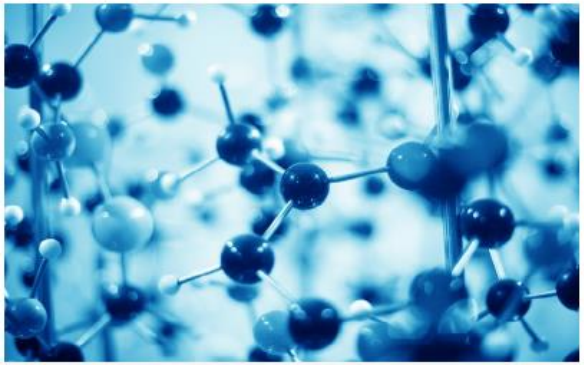


Age-Related Medicines Development And Use

Drug Discovery And Therapeutic Target Identification



Translational Neuroscience



Fabrication And Synthetic Technologies For Advanced Drug Delivery

Medicines Use And Optimisation

Pharmacoepidemiology And Medication Safety

Age Related Medicines Development and Use

- Age appropriate formulation design (Orodispersibles, Multiparticulates, Taste masked formulations)
- Fixed dose combinations
- Age and gender related oral biopharmaceutics
- Preventive interventions (herbal substances)

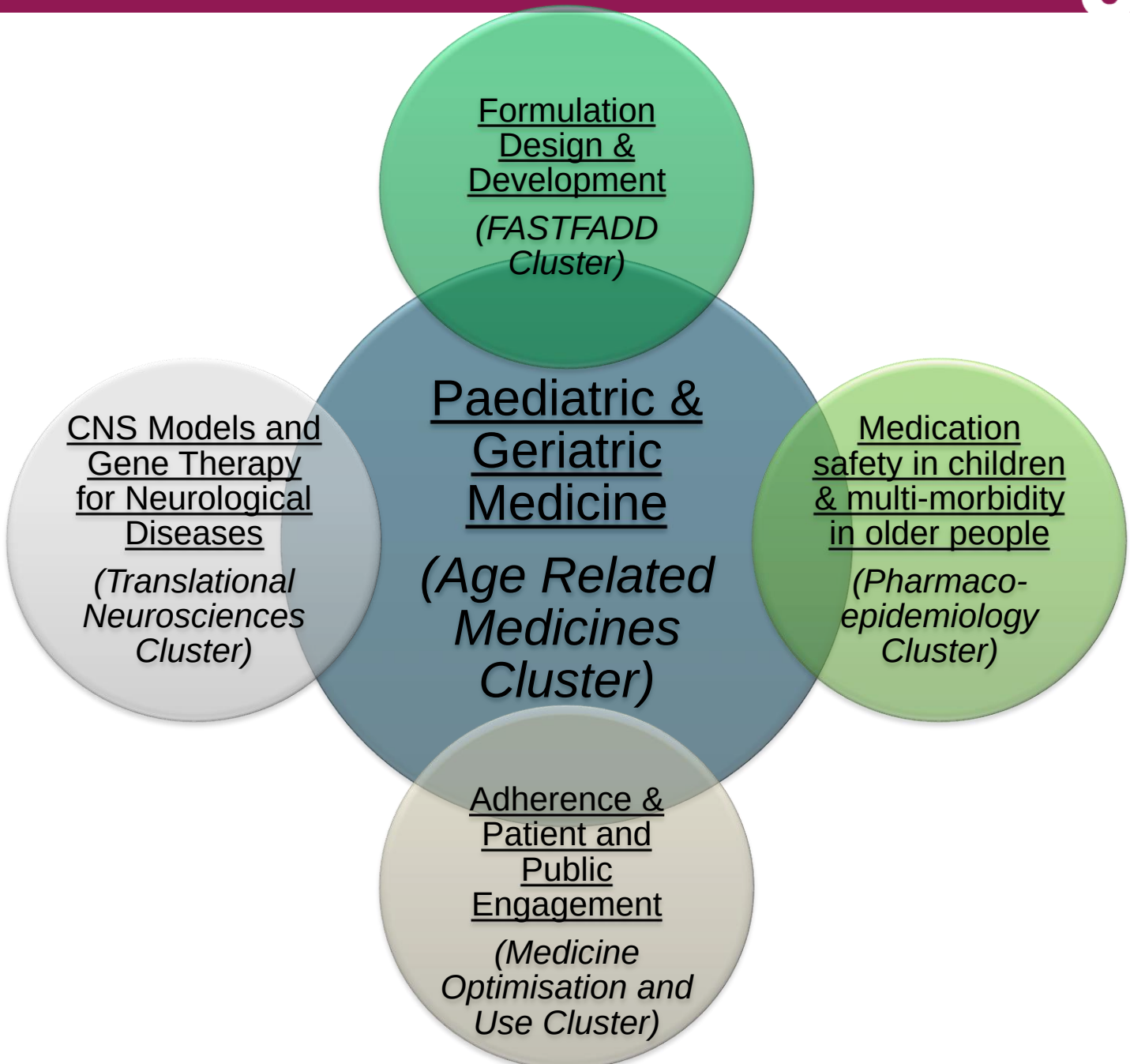
Formulation Development & Biopharmaceutics

Formulation Testing

- In vitro sensory evaluation of formulations
- Brief Access Taste Aversion (BATA) model
- Human panel studies

- Pharmacometrics and paediatric PKPD modelling
- Dose rationale and clinical trial design for novel therapeutic interventions in special populations, paediatrics, geriatrics and rare diseases

Clinical Pharmacology & Translational Research


Formulation Design & Development
(FASTFADD Cluster)
CNS Models and Gene Therapy for Neurological Diseases
(Translational Neurosciences Cluster)
Paediatric & Geriatric Medicine
(Age Related Medicines Cluster)
Medication safety in children & multi-morbidity in older people
(Pharmaco-epidemiology Cluster)
Adherence & Patient and Public Engagement
(Medicine Optimisation and Use Cluster)

Projects (recently completed & ongoing)

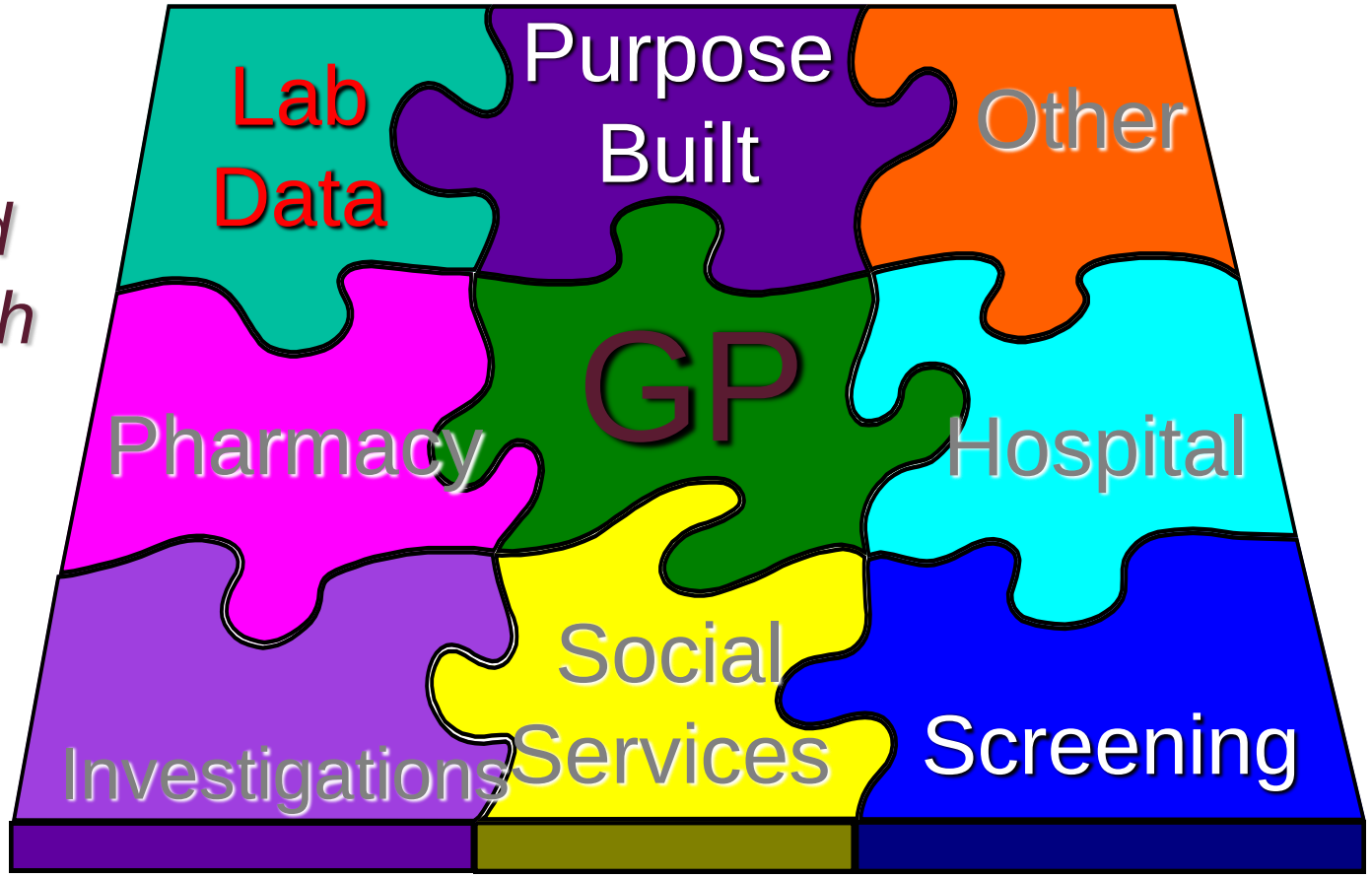
- Assessing the taste of medicines with the rat “BATA” model; insight into the physiological aspect of taste
- Effective administration of multiparticulates to paediatric patients
- Advanced Therapeutics for Parkinson’s Disease Using Cell and Tissue Engineering and Biomaterials Technology
- Development of 3D printing technology for in-situ verification of dose
- Biopharmaceutics of excipients in paediatric medicines
- …….

Pharmacoepidemiology and medication safety

Informing and influencing policies to improve safety and benefit outcomes in the use of medicines

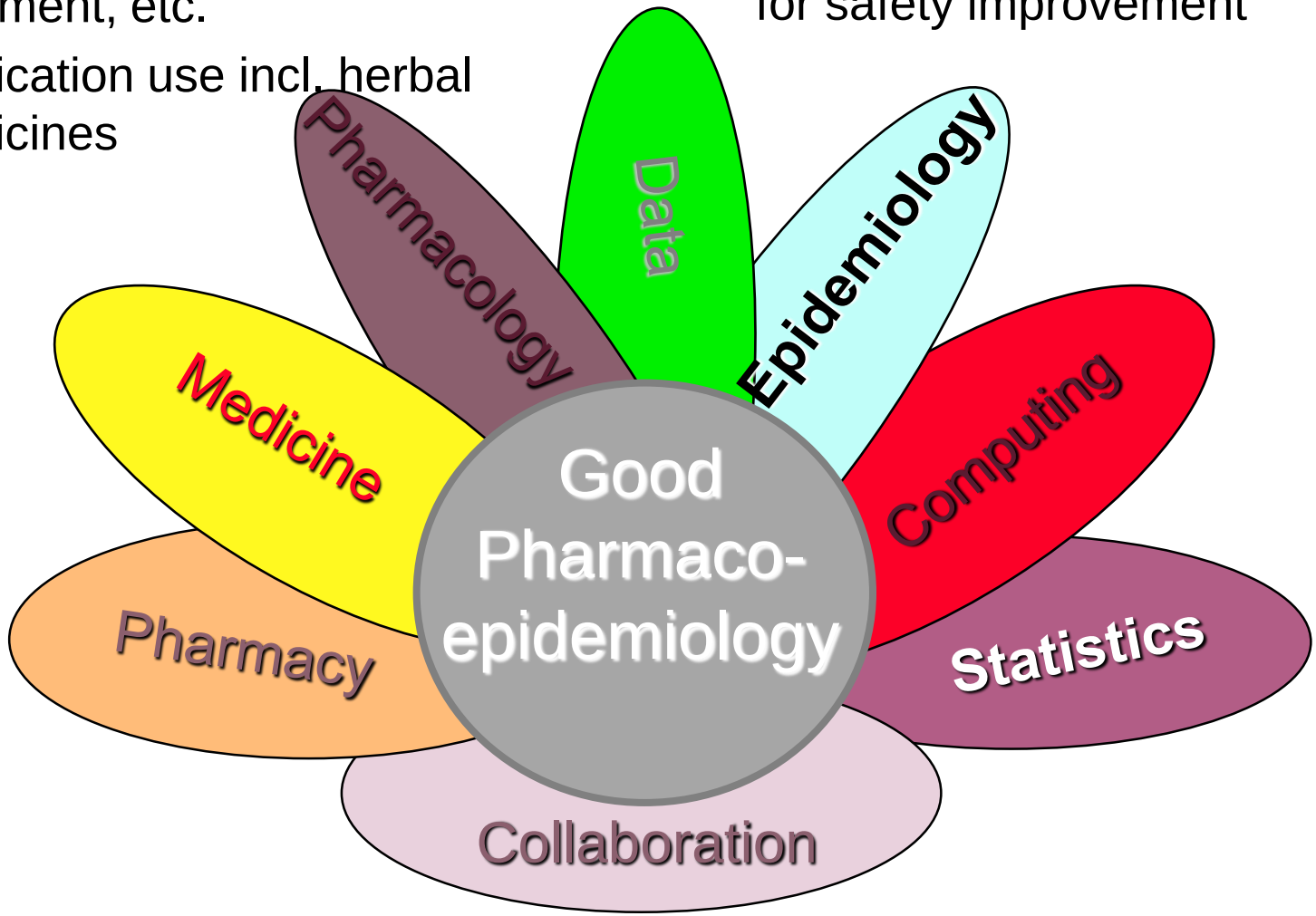
through

record-linked data research



Research focus

- Cardiovascular disease, diabetes and mental health disorders and treatment, etc.
- Medication use incl. herbal medicines
- Medication errors and evaluation of pharmacy practice and technologies for safety improvement



Quality and safety of medicines, herbal medicines and related substances

Key c Tweets Tweets & replies Media erns

UCL Fight The Fakes Retweeted

Oksana Pyzik @OksanaPyzikUCL · 19h

Great to meet with passionate professionals in #politics #healthcare & #tech dedicated to improving #healthsystems & #patientsafety at @EUParl_EN
Mike Isles ED of @ASOP_Europe keep fighting the good fight @FightTheFakes @EU_Health @GiraudSylvain @School_Pharmacy @IAPOvoice

Vytenis Andriukaitis, José Inácio Faria, Aaron C and 7 others

3 7

Tomat

Potatoes

Rice

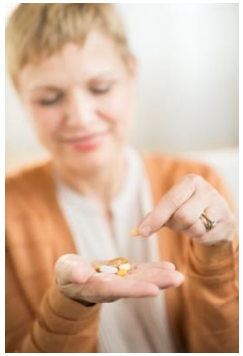
Simvastatin

Codeine

Medicines Use And Optimisation / Behavioural Medicine

Creating new knowledge to make healthcare more efficient and sustainable by understanding and addressing the psychosocial and behavioural factors explaining variation in response to treatment.

Behaviour
(engagement)
E.g. uptake, prescribing, adherence



Direct effects
Through non-specific 'placebo & nocebo' effects of active treatments

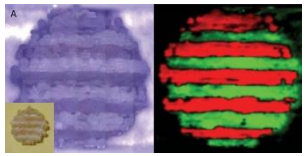
Research programme

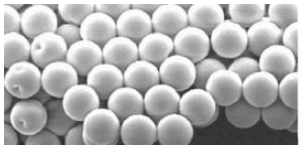
- Arange of validated assessment tools for quantifying patients' perspectives of illness and treatment
- Application of these tools in explanatory studies has identified the key modifiable determinants of treatment engagement (initiation, adherence and persistence) across long-term conditions

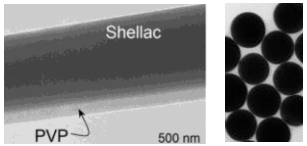
- This has informed the development of pragmatic interventions to help get the best form treatments by changing behaviour optimising engagement
- We have recently developed a new programme of research examining the behavioural aspects of antimicrobial stewardship
- Research has impact informing national treatment guidelines and the NHS New Medicines Service. UCL-Business spinout company applying research into practice

Fabrication & Synthetic Technologies for Advanced Drug Delivery

Pharmaceutical technologies







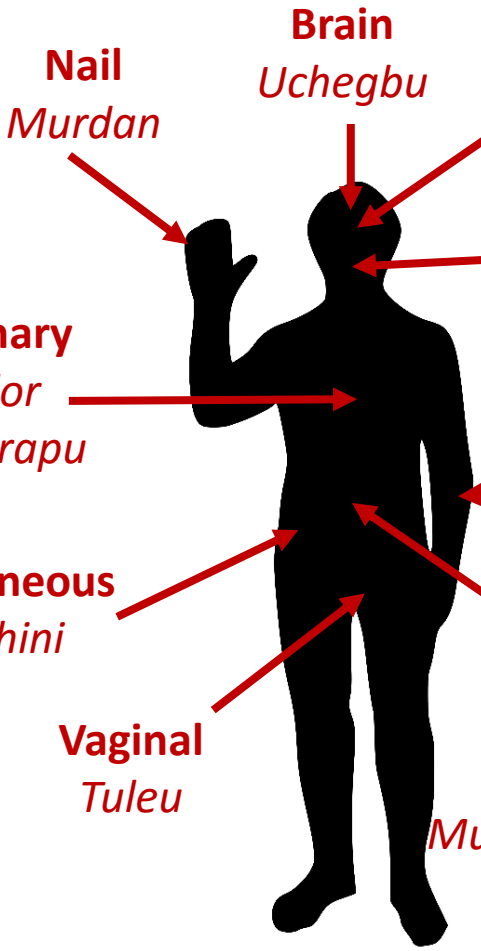
Macro	Micro	Nano	Molecular engineering
3D printing	Electrospraying		Novel polymers
Inkjet printing	Nano-in-micro formulations		Protein mimics/conjugates
Crystal engineering	Spray drying	Self-assembly	
Hot melt extrusion	Emulsions	Electrospinning	
Tablets/minitablets	Suspensions	Inorganic NPs	
Coating technologies			
Liquid formulations			

Materials characterisation

Full gamut of techniques available. Particular expertise in thermal methods, synchrotron X-ray diffraction, electron and derivatised atomic force microscopies, hyphenated approaches, dissolution testing, IVIVC, protein binding, surface analysis

Fabrication & Synthetic Technologies for Advanced Drug Delivery

Routes of administration



Nail
Murdan

Brain
Uchegbu

Ocular
Brocchini

Buccal/sublingual
Orlu
Tuleu
Murdan (vaccines)

Pulmonary
K Taylor
Somavarapu

Dermal/ transdermal
Lane

Subcutaneous
Brocchini

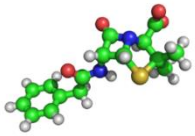
GI tract
Basit
Gaisford
Murdan (vaccines colonic)

Vaginal
Tuleu

Formulation development

Active ingredient size

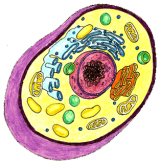
Small molecule
All PIs



Peptides
Basit, Brocchini, Uchegbu

Proteins
Basit, Brocchini, Murdan, Uchegbu, Williams

Exosomes
Williams



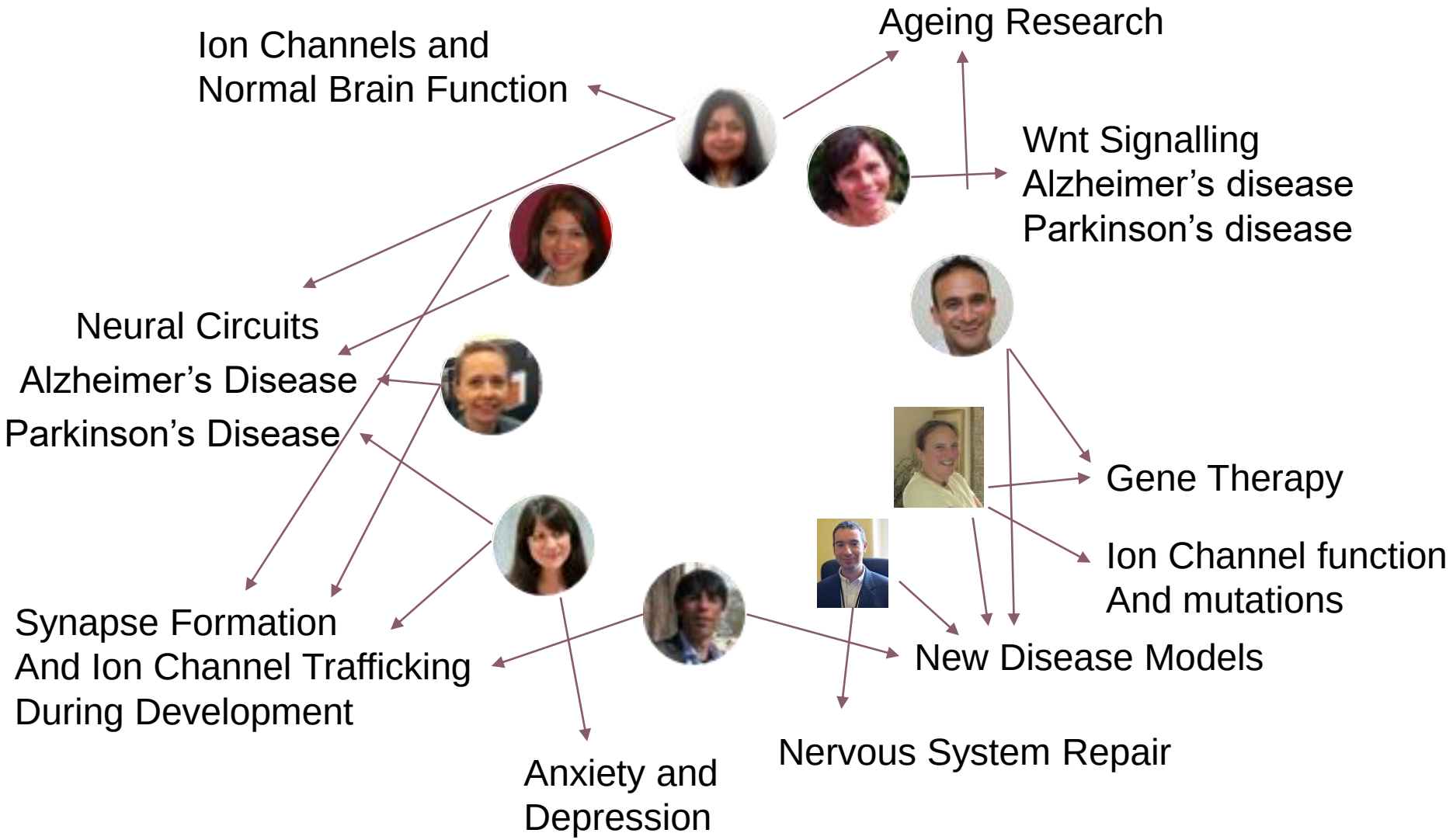
Cells and bacteria
Basit, Gaisford, Pasparakis

Translational Neuroscience Cluster

Aims

1) Understand normal brain function,
2) Uncover the fundamental causes of neurological and psychiatric diseases
3) Identify novel therapeutic targets for their treatment.

Translational Neuroscience peope



Stephanie Schorge - Gene therapy for the treatment of epilepsy

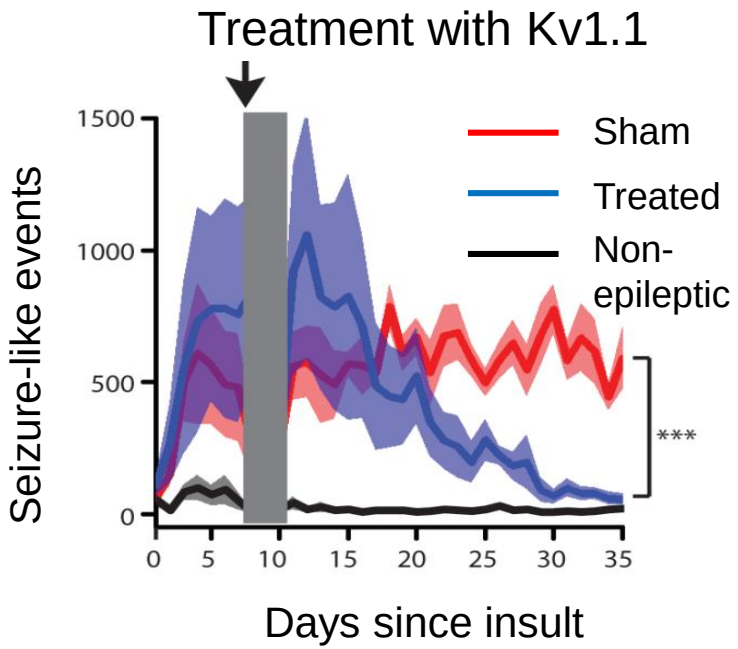
1% of population suffers from epilepsy, of which 25-30% have no effective treatment

Surgery for refractive epilepsy is dangerous and highly invasive

Gene therapy can be used even for non-genetic epileptic conditions – may be used to manipulate neuronal excitability

In the animal study, the rat seizures were effectively eradicated (cured?)

Stephanie has been awarded £1.9m by MRC to develop first human trial of this approach



Kätzel et al Chemical-genetic attenuation of focal neocortical seizures. Nat Commun. 2014 May 27;5:3847.

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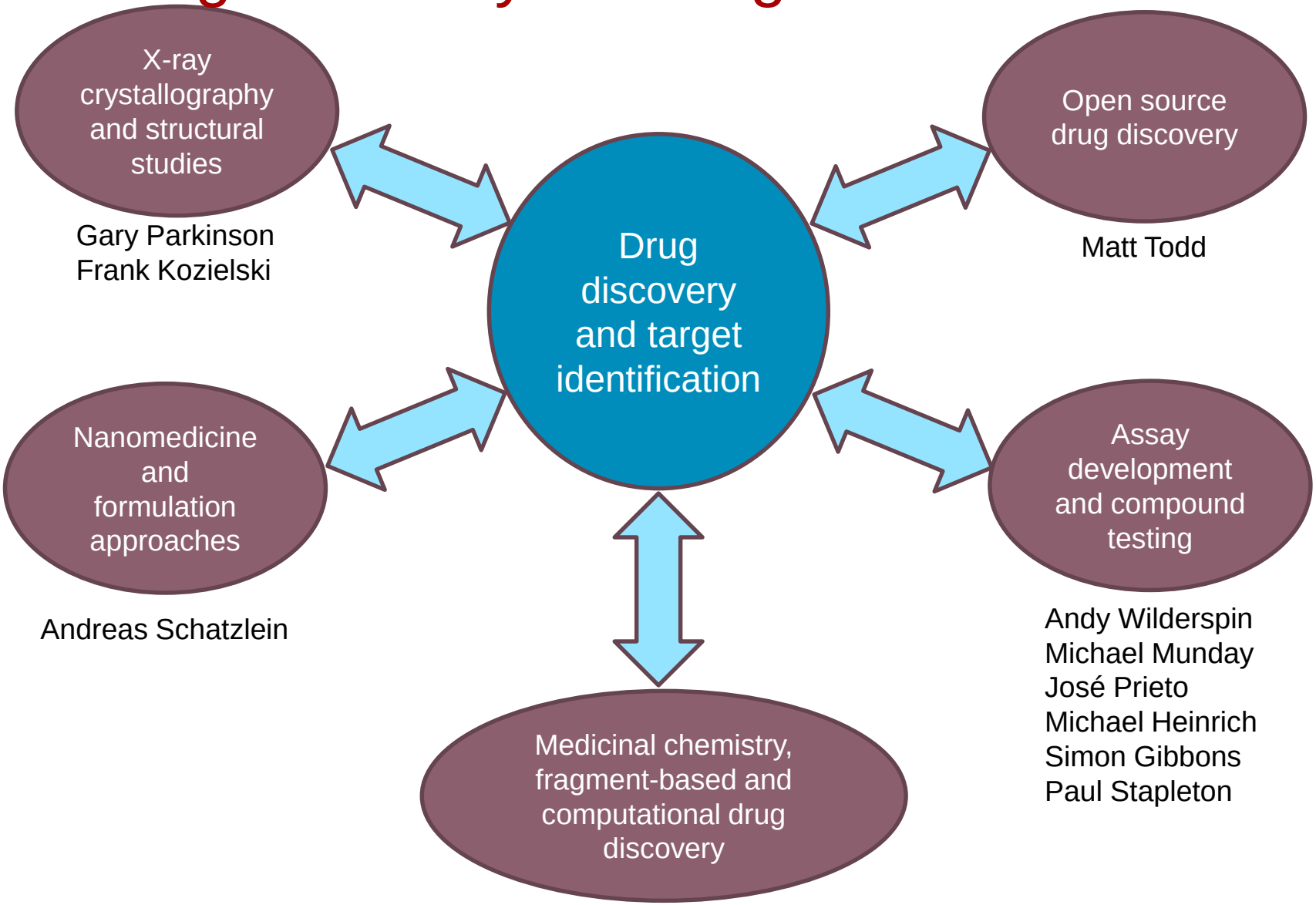
Drug discovery and target identification



Drug Discovery and Target Identification

Therapeutic Focus

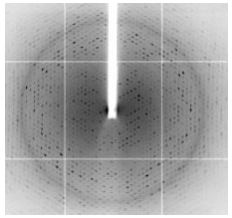
Antimicrobial targets e.g. malaria, antibiotic resistance, diabetes (natural products)

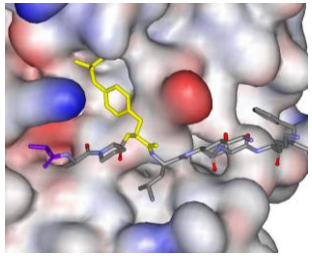
Cancer drug discovery e.g. kinesin drug targets, transcription factor targets including STAT3, and Nrf2

Targeted delivery of peptides and small molecules using nanoscale approaches

STAT3

X-rays

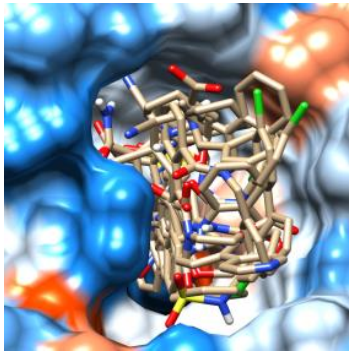


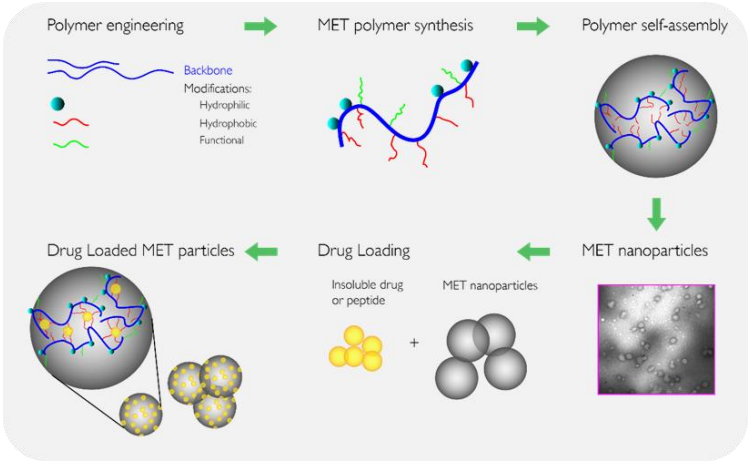


Method: Drug/ligand screening using X-ray crystallography

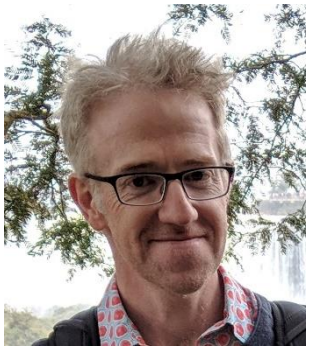
Diffraction of small molecule ligand/crystal soaks

Results: Bound peptide in pTYR pocket





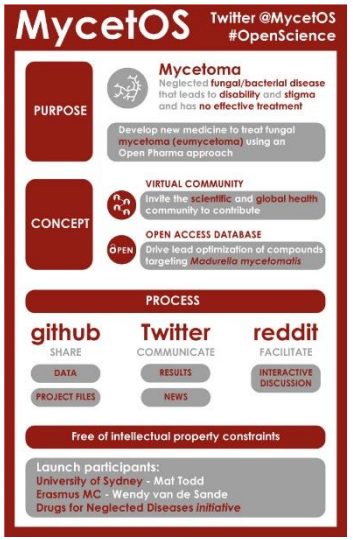
Mat Todd – open source drug discovery



Award winning pioneer of new approach to synthesis and discovery

Principle is that data and ideas are shared via a virtual community. New synthetic routes or new molecules can be developed via a coordinated shared lab book approach

Major initiatives in malaria, tuberculosis but as a model can be applied very widely indeed



NOVEMBER 30 2016 SAVE PRINT LICENSE ARTICLE

Sydney schoolboys take down Martin Shkreli, the 'most hated man in the world'

Marcus Strom

SHARE

Dylan Siow-Lee holding about $150,000 worth of Daraprim if sold in the US market. Photo: Nic Walker

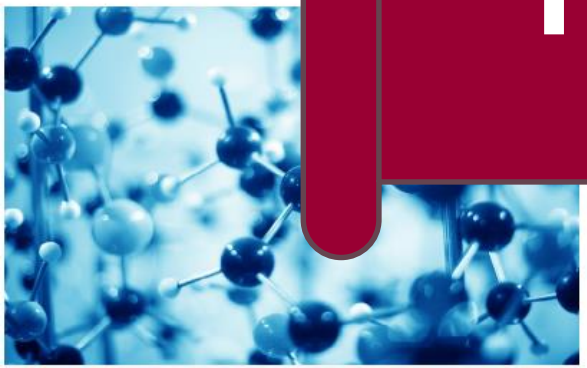
Open Source Malaria
Twitter: @O_S_M

1st Law: All data are open and all ideas are shared
2nd Law: Anyone can take part at any level
3rd Law: There will be no patents
4th Law: Suggestions are the best form of criticism
5th Law: Public discussion is much more valuable than private email
6th Law: An open project is bigger than, and is not owned by, any given lab

Age-Related Me
Development A

science

Thank you



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