



ProCan™ - A new approach to cancer diagnosis and treatment options

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*The ACRF International Centre for the **Pro**teome of Human **Cancer** was made possible by a \$10 million Award from the Australian Cancer Research Foundation (ACRF) In Dec 2015*

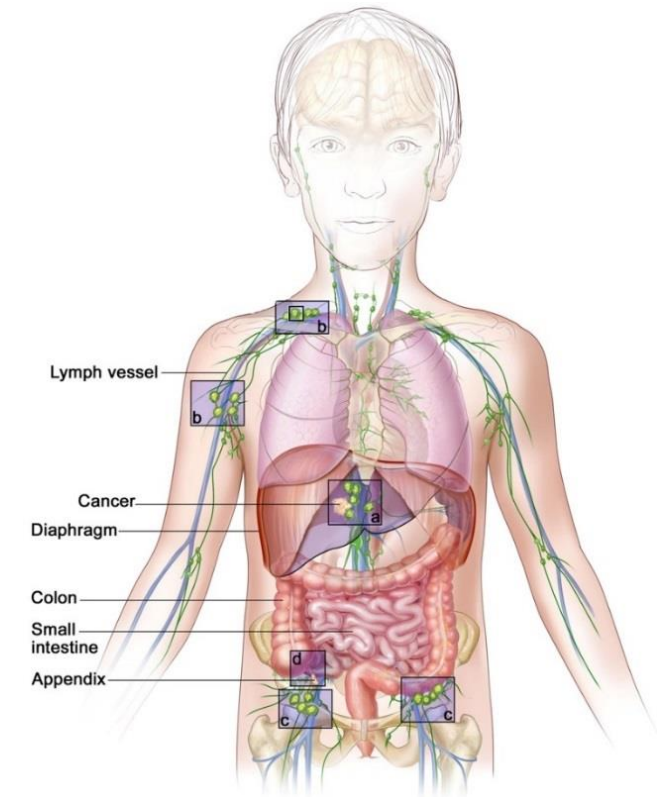
Launched Sept 2016

Potentially the largest competitive medical research equipment grant in Australia!

Cancer Affects Any Part of the Body – In Kids & Adults

Children generally develop different types of cancer to adults.

Leukaemia	Brain, other central nervous system and intracranial tumours (e.g. glioma)	Soft tissue sarcomas
Lymphoma		Kidney tumours (e.g. Wilms tumour)
	Other nervous system tumours (e.g. neuroblastoma)	Bone tumours
Other		Germ cell tumours
	Other	Eye tumours
Other		Skin cancers
	Other	Liver tumours
Other		Other



Two Challenges: Define the cancer, find the treatment

Genomics:

- The 'Genome' is *all* our genes
- 'Genomics' is the study of all our genes *together*
- Very few drugs target genes

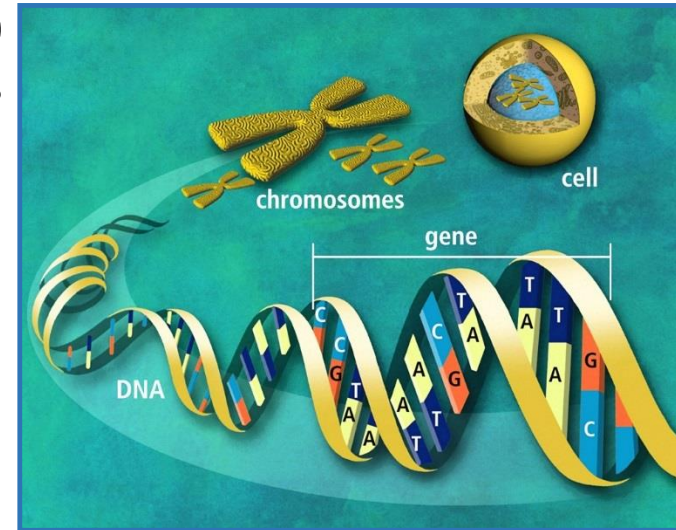


DNA Codes For Proteins: Proteins do the work in our cells

Proteomics:

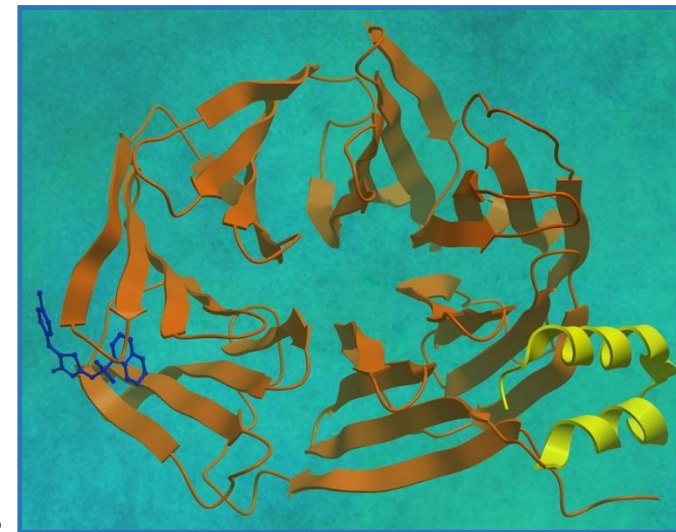
- Genes code for making proteins
- The 'Proteome' is *all* the proteins from our genes
- 'Proteomics' is the study of all proteins *together*
- Most drugs target proteins

20,000
genes



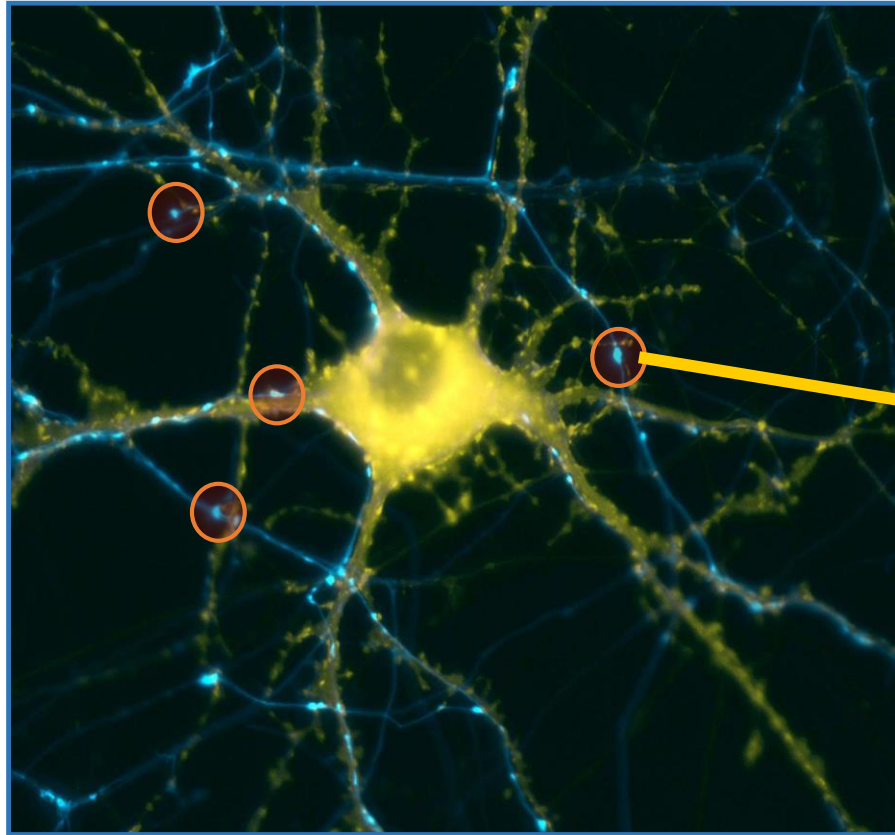
Genes are
codes to
make
proteins

A million
proteins

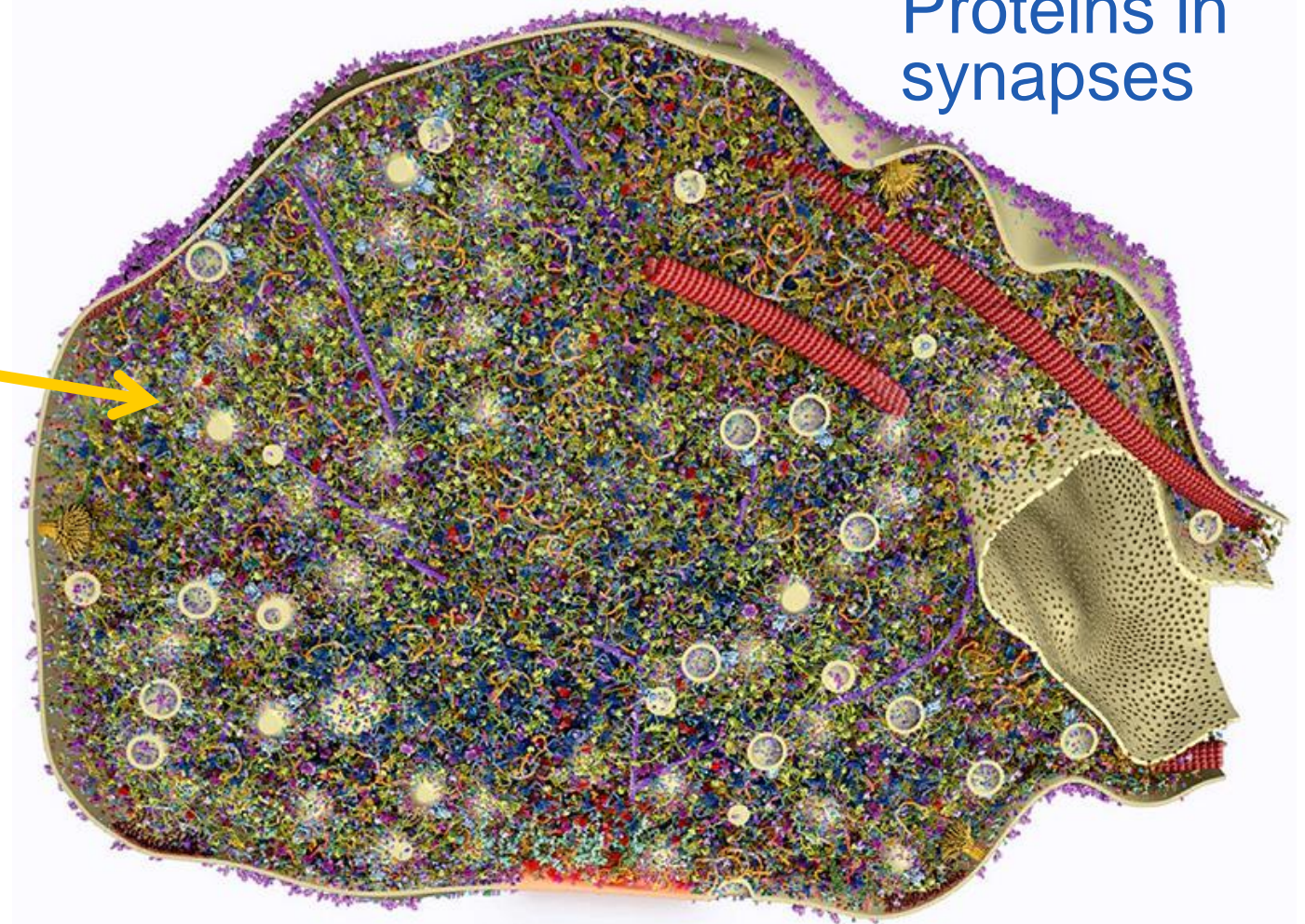


Proteins Completely Fill Our Cells

Crowded beyond comprehension, billions of proteins moving

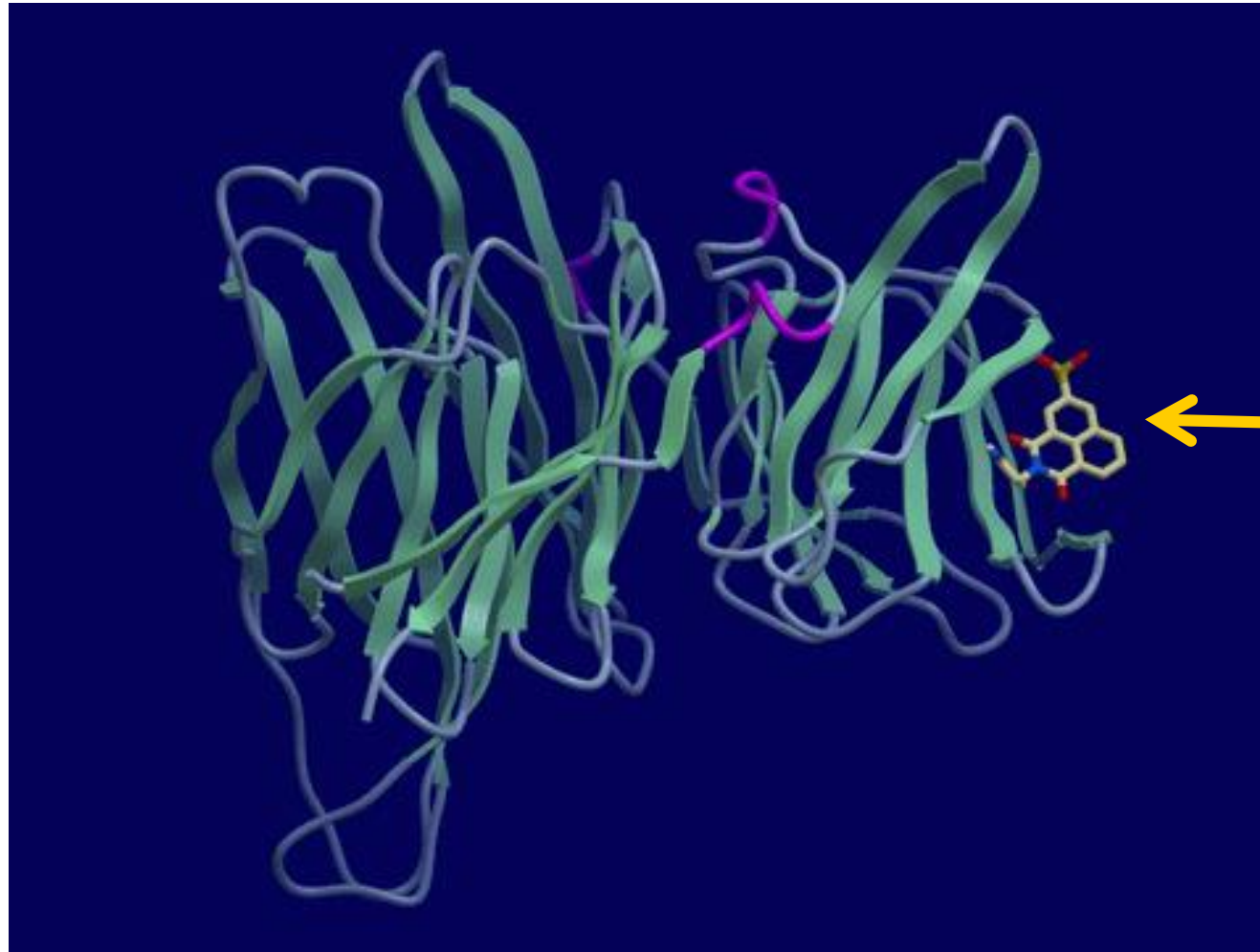


Nerve contacts
(synapses)



Proteins in
synapses

Most Drugs Work By Blocking Proteins

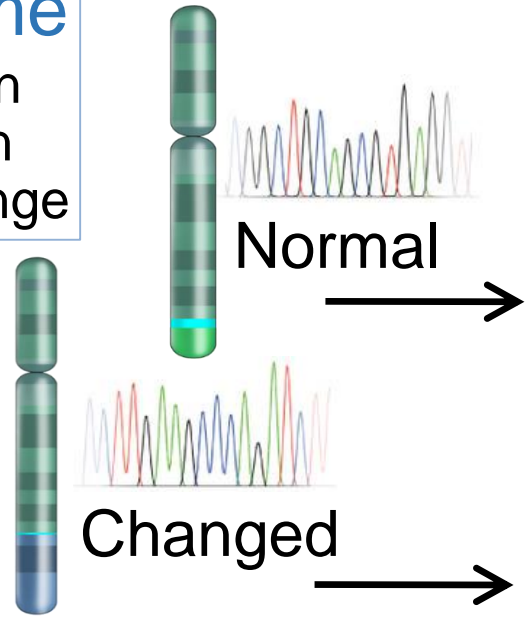


Drug
(Pitstop)

Disease Changes The Proteome Unpredictably

Genome

- Mutation
- Deletion
- Rearrange



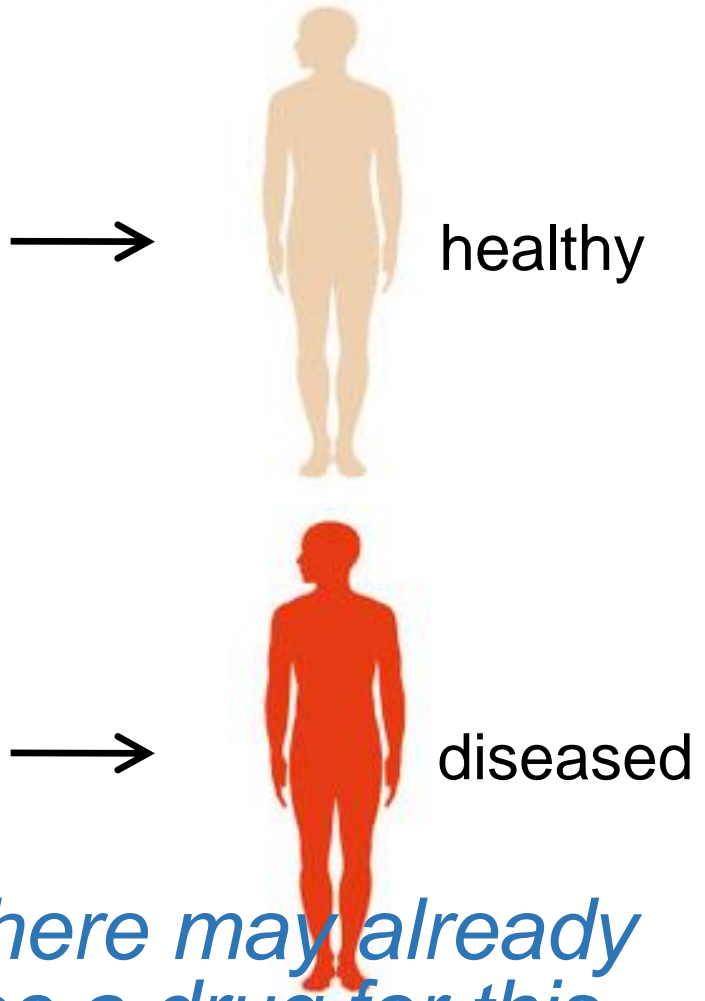
Proteome

- Environment (chemicals / UV)
- Infection (virus / bacteria)
- Inflammation / fever

Changed →



The proteins in cells



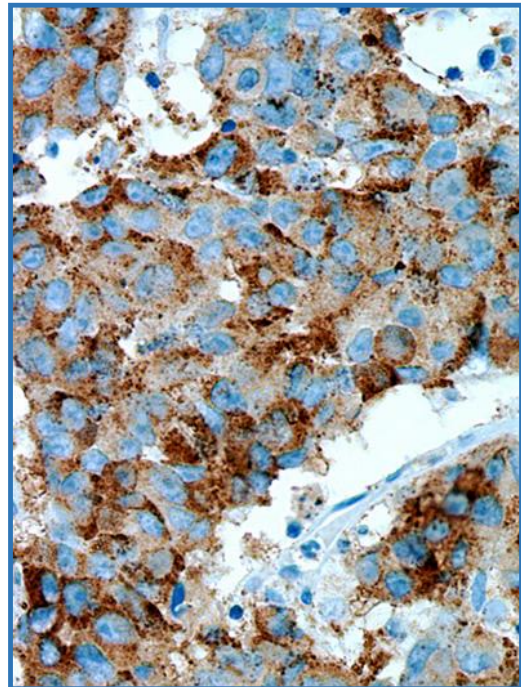
There may already be a drug for this

Cancer Diagnosis Can Be Slow

Often the wrong treatments are used



kidney cancer



Antibody stain

The Current Way

One protein at a time

Drugs chosen by
experience

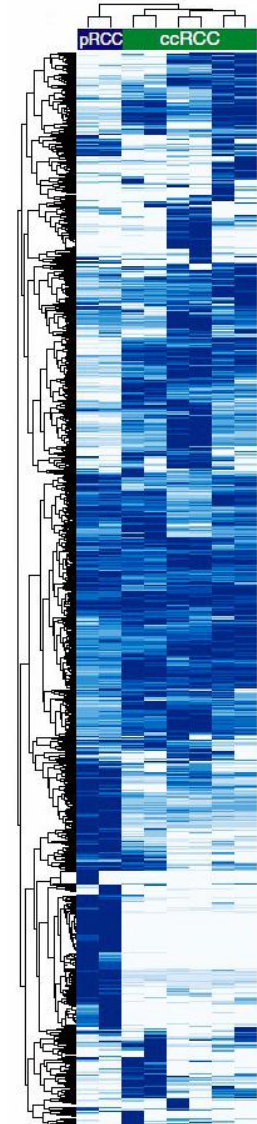


Our New Way

Most proteins at once

Drugs identified
rationally

Proteome maps



The ProCan Concept

The problem

- Every cancer has different protein patterns (proteomes), makes treatment decisions difficult

The barrier

- Until now, only a small number of proteomes could be studied, and not reliably between labs

The ProCan plan

- Collect proteomes on an industrial scale, with universal, reliable outcomes
- Collect cancers from patients where their treatment outcomes are known
- **Analyse the proteome of 70,000 cancers of all types, in 5-7 years**

A simple plan – a huge project!

Why ProCan Can Succeed

Disruptive Technology

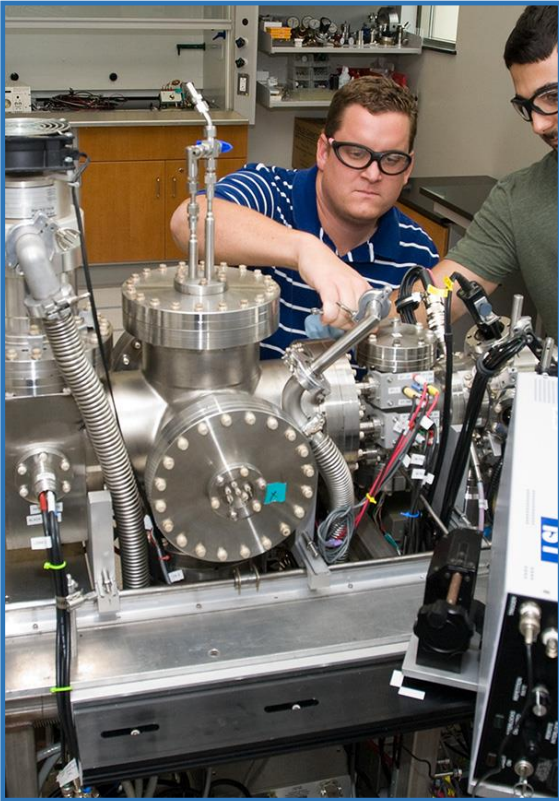
- Tiny biopsies liquefied by a Barocycler
- Proteomes collected by a new Mass Spectrometry technology – SWATH-MS
- New data analytics for treatment decisions

Custom-Built Factory

- Multiple instruments for high throughput
- Instruments work in harmony for consistent results over the years and for ISO accreditation
- Clear work flow and clear SOPs

A simple plan – a huge project!

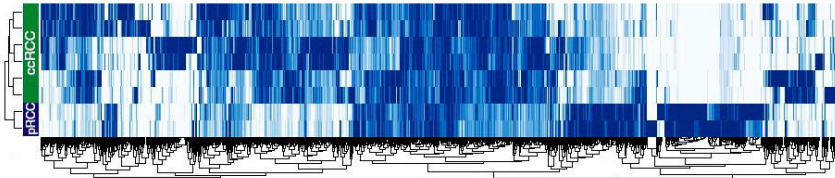
ProCan Introduces Industrial-Scale Proteomics



Research-mode



Factory-mode



Digital proteome expression maps



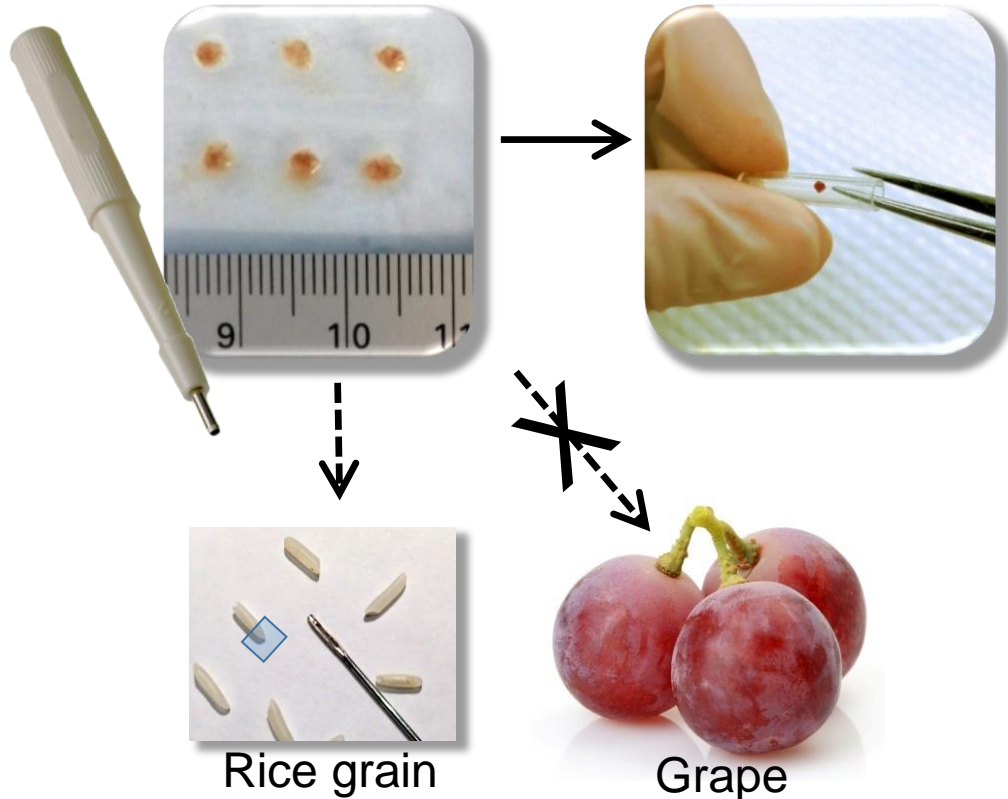
World first industrial-scale cancer proteomics



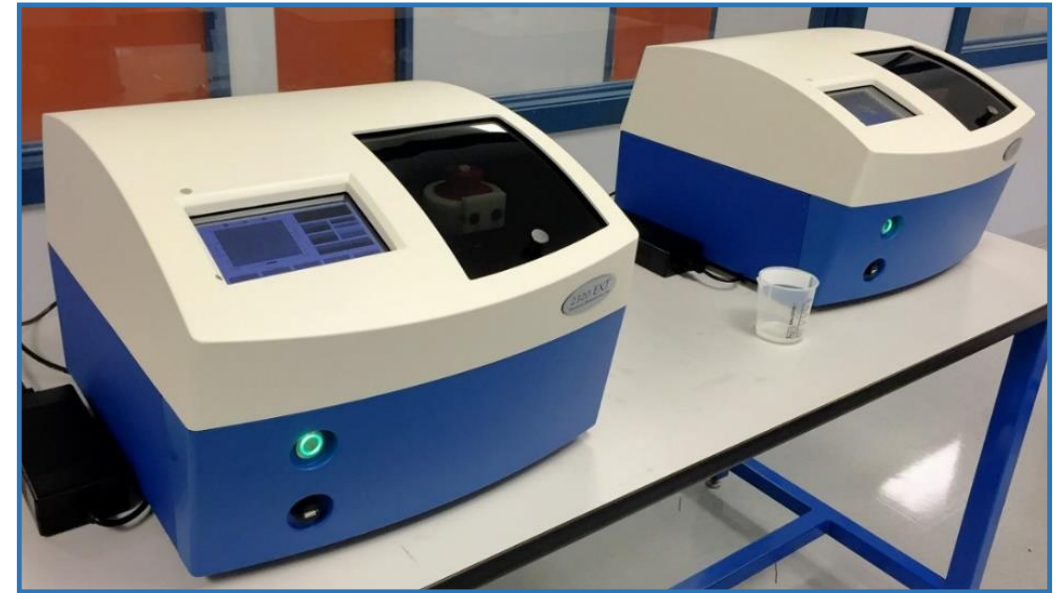
How ProCan Industrialises Proteomics



Tiny samples..



..allows high throughput



Meet the 'Barry' brothers (Barocyclers)

Collecting Proteomes on an Industrial Scale

Tumour
sample

Proteins and peptides

SWATH-MS files

Data analysis

SWATH Mass Spectrometer



6-pack



Harness the 6-pack

Collecting Proteomes on Industrial Scale



Huge computational power

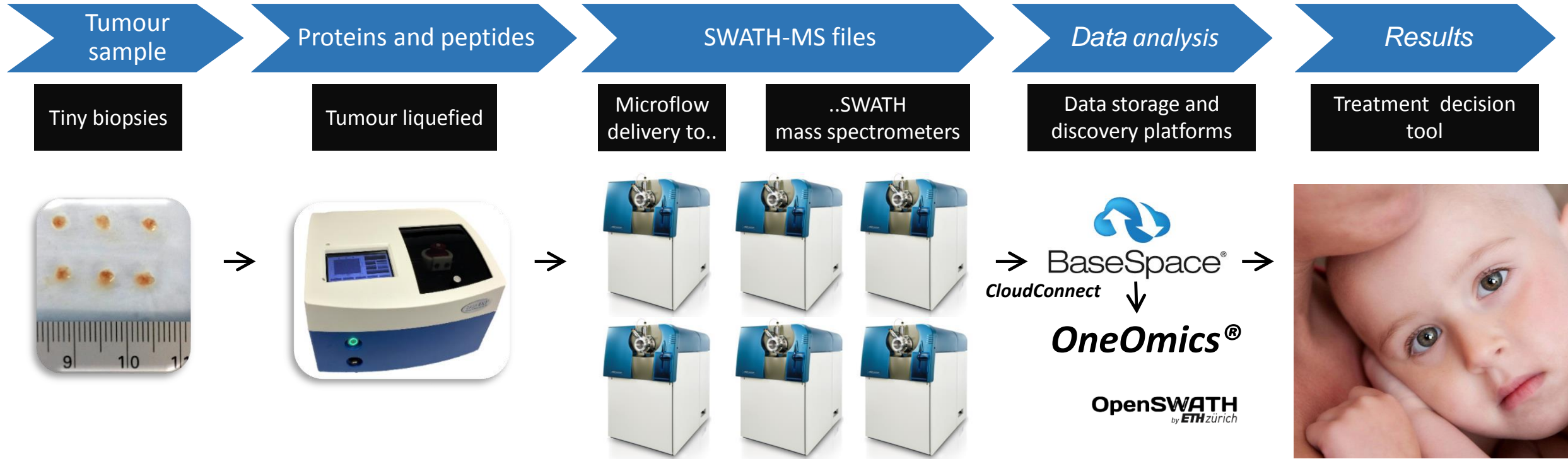
OneOmics[®]

- Amazon cloud computing environment
- Enormous parallel computing power
- Data analysis and discovery
- Connects proteomics with genomics
- Community contributes new 'apps'



OneOmics[®]


Workflow Operation by SOPs



Factory-mode data must be consistent between machines and across the years

Transformative ProCan Outcomes

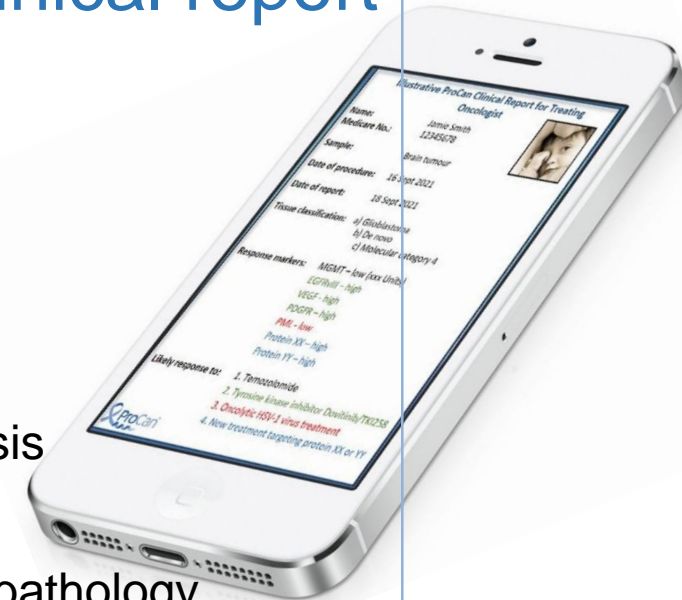
Illustrative ProCan Clinical Report for Treating Oncologist

Name:	Jamie Smith	
Medicare No.:	12345678	
Sample:	Brain tumour	
Date of procedure:	16 Sept 2021	
Date of report:	18 Sept 2021	
Tissue classification:	a) Glioblastoma b) De novo c) Molecular category 4] New
Response markers:	MGMT – low (xxx Units) EGFRvIII – high VEGF - high PDGFR – high PML - low Protein XX – high Protein YY – high	
Likely response to:	1. Temozolomide 2. Tyrosine kinase inhibitor Dovitinib/TKI258 3. Oncolytic HSV-1 virus treatment 4. New treatment targeting protein XX or YY] New



Prototype clinical report

- Patient record
- Rapid report
- Improved diagnosis
- Greatly expands pathology
- Precise data provided
- New discoveries
- Futile treatments avoided
- Treatment decision tool for clinicians; *Personalised for Jamie*



ProCan Alliance with the Cancer Moonshot



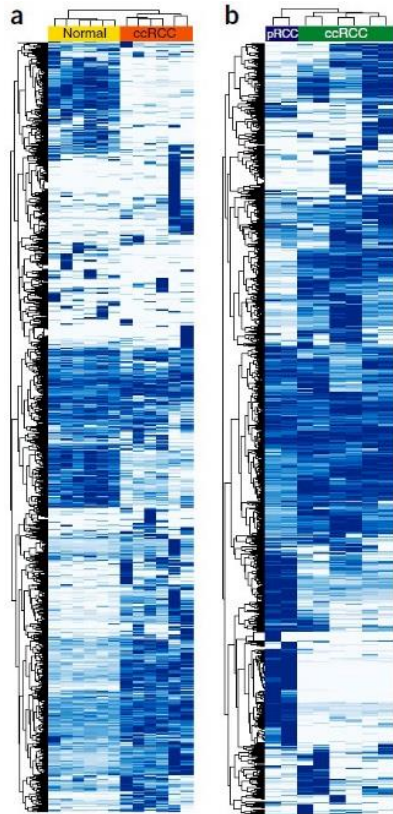
The collaboration of **ProCan** with the Cancer Moonshot announced by VP Joe Biden on 17 July 2016

CANCER MOONSHOT

The Moonshot goal is to **bring forward cancer therapies**: not 10-15 years away, but ~5 years....

ProCan Public Library of Digital Proteomes

Shared via the National Cancer Institute (Washington), last indefinitely



2-3 petabytes of data sharing
for new data-mining



ProCan will provide new options



ProCan Funding Support



AUSTRALIAN
CANCER
RESEARCH
FOUNDATION

