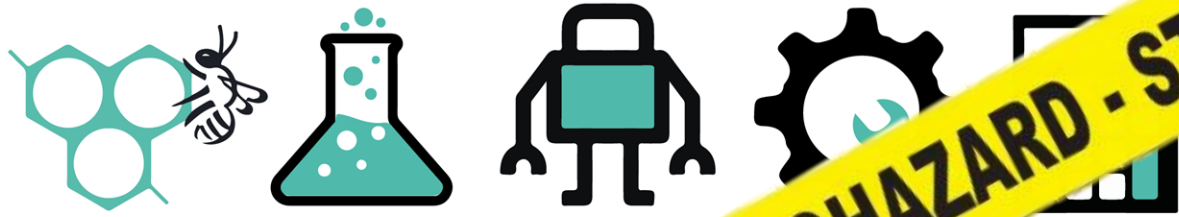


CARDIFF
UNIVERSITY

PRIFYSGOL
CAERDYDD

 The **Cardiff**
Commitment
Addewid **Caerdydd**

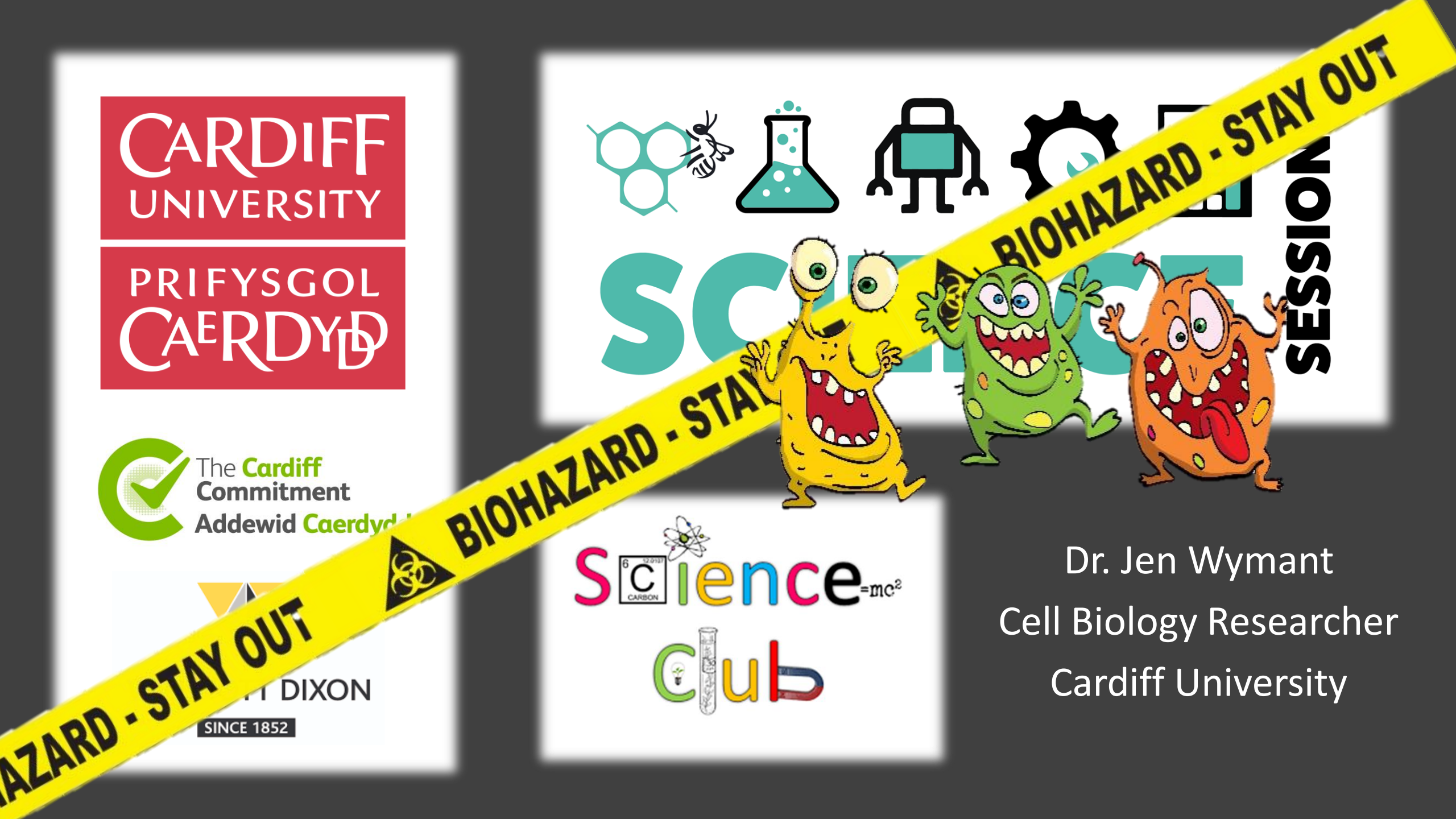
 DIXON
SINCE 1852





SCIENCE

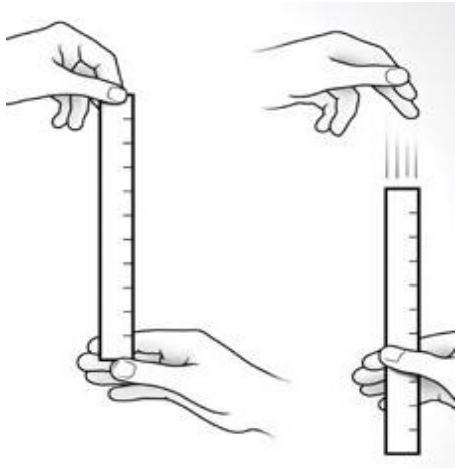


SESSION



Dr. Jen Wymant
Cell Biology Researcher
Cardiff University



Homework results!

- Who has the fastest reactions?
- Do they differ after lunch?
- What else might affect reaction times?



What are we going to do today?

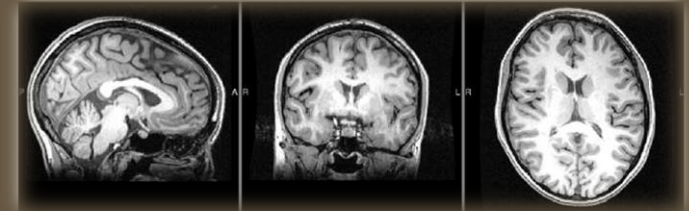
- Learn a bit more about me, microbiology, bacteria and disease.
- Learn a little about bees: how they make honeycombs and how they are helping us to make medicines
- Hunt for bugs around your school.
- Inoculate agar!

First a bit more about ME! How did I get here?

- From Rothwell (Nothamptonshire, England)
- I liked bugs, animals and dinosaurs (I still do!)
- I always asked lots of questions, wanted to understand things and wanted to help others (I still do!)
- Went to Rothwell County Infant and Junior School
- Southfield School for Girls, GCSEs and AS levels:
 - Biology, Chemistry, Physics & Maths

... study break ...

- Full-time job in a cinema and part-time job as a medical lab assistant
- Tresham College, Part-time A2 Levels:
 - Biology, Chemistry, English literature
- BSc Biomedical Science at Portsmouth Uni
- PhD Cancer cell biology at Cardiff Uni



Gill Dainty-Wymant
1954-2001

What do I do? ... Research & Teaching



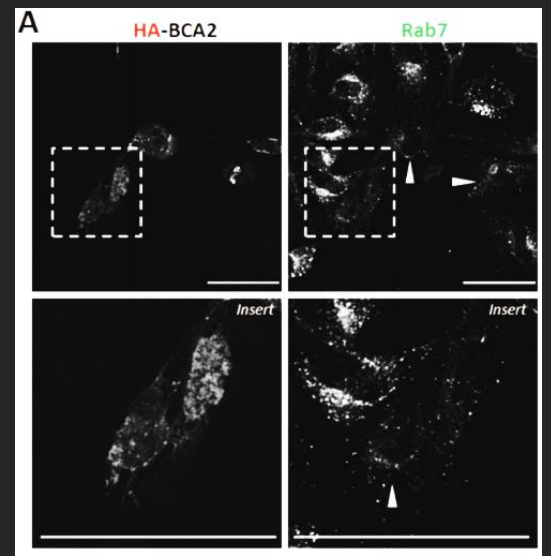
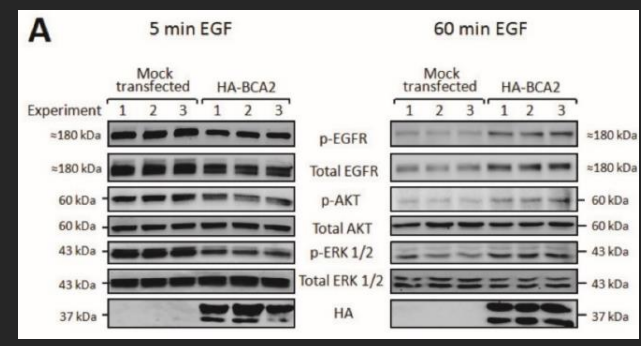
Journal of Cancer
2016; 7(15): 2388-2407. doi: 10.7150/jca.15055

Research Paper

The Role of BCA2 in the Endocytic Trafficking of EGFR and Significance as a Prognostic Biomarker in Cancer

Jennifer M. Wymant¹, Stephen Hiscox¹, Andrew D. Westwell¹, Sylvie Urbé², Michael J. Clague² and Arwyn T. Jones¹*

- Cardiff School of Pharmacy and Pharmaceutical Sciences, King Edward VII Avenue, Cardiff, CF10 3NB, Wales, U.K.
- Institute of Translational Medicine, University of Liverpool, Crown Street, Liverpool, L69 3BX, England, U.K.

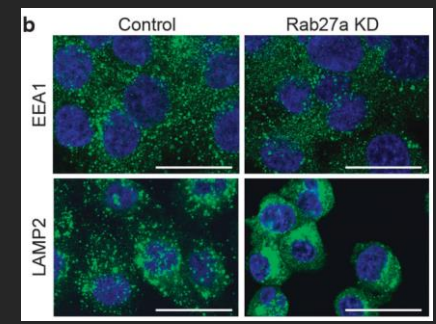
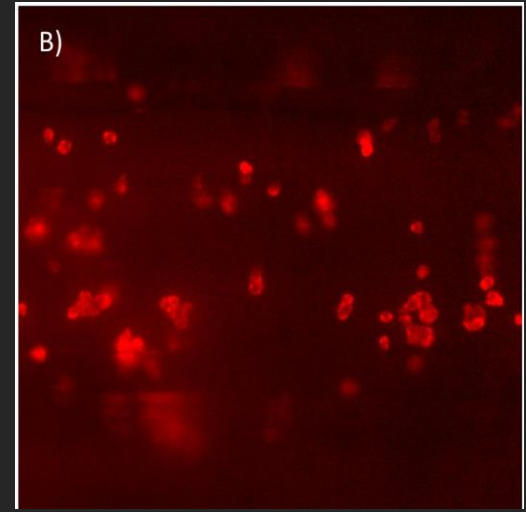


PLOS ONE

RESEARCH ARTICLE

Simple and Versatile 3D Printed Microfluidics Using Fused Filament Fabrication

Alex J. L. Morgan^{1*}, Lorena Hidalgo San Jose^{1,2}, William D. Jamieson², Jennifer M. Wymant², Bing Song², Phil Stephens², David A. Barrow^{1*}, Oliver K. Castell^{2*}



Oncogene (2015) 34, 319–331
© 2015 Macmillan Publishers Limited All rights reserved 0950-9232/15
www.nature.com/onc

ORIGINAL ARTICLE

Differentiation of tumour-promoting stromal myofibroblasts by cancer exosomes

JP Webber¹, LK Spary¹, AJ Sanders², R Chowdhury¹, WG Jiang², R Steadman³, J Wymant⁴, AT Jones⁴, H Kynaston², MD Mason¹, Z Tabi¹ and A Clayton¹

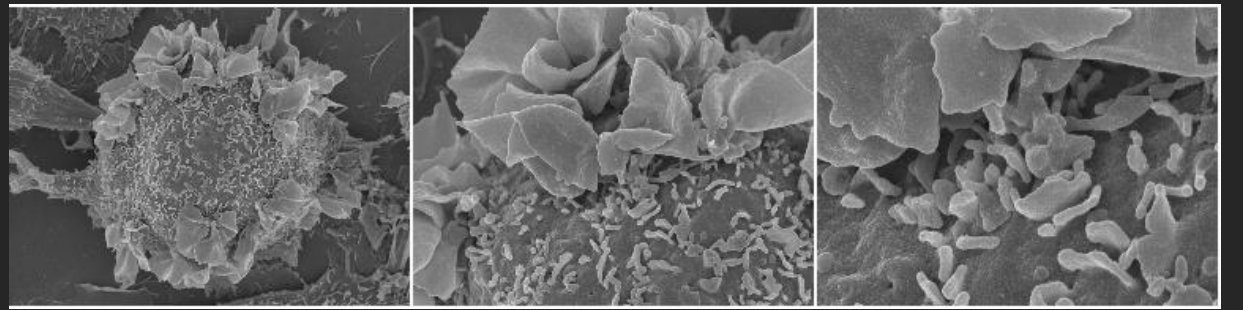
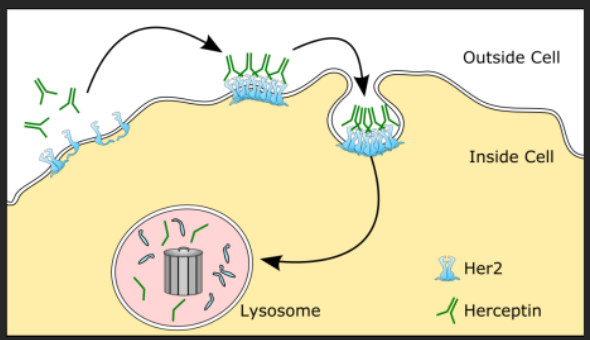
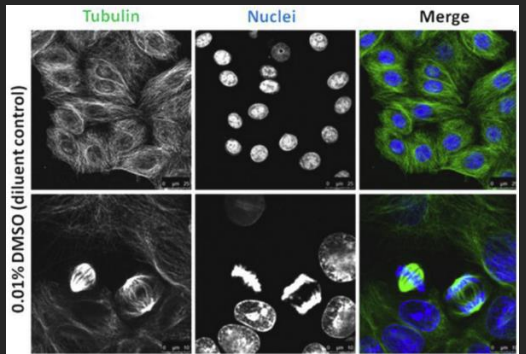
Contents lists available at ScienceDirect

European Journal of Medicinal Chemistry

Research paper

Novel cis-selective and non-epimerisable C3 hydroxy azapodophyllotoxins targeting microtubules in cancer cells

Sahar Kandil^a, Jennifer M. Wymant^a, Benson M. Kariuki^b, Arwyn T. Jones^a, Christopher McGuigan^a, Andrew D. Westwell^{a*}



What do I do? ... Travel & conferences



Frontiers in Delivery of Therapeutics
21 - 24 August 2018
TARTU, ESTONIA



75th Harden Conference - Receptor Tyrosine Kinase Structure and Function in Mammalian Health and Disease
1-5 September 2013
University of Sheffield, UK



BIOCHEMICAL SOCIETY



ESMO GOOD SCIENCE BETTER MEDICINE BEST PRACTICE

PERSONALISED MEDICINE SYMPOSIUM
SIGNALLING PATHWAYS IN CANCER

Sitges-Barcelona, Spain
4-5 MARCH 2016

2nd Special Conference
EACR AACR SIC
The Challenges of Optimising Immuno and Targeted Therapies From Cancer Biology to the Clinic
EACR European Association for Cancer Research AACR American Association for Cancer Research

24-27 JUNE 2017
FLORENCE ITALY



EACR 23
Munich | Germany | 5 - 8 July 2014 |

23rd Biennial Congress of the
EUROPEAN ASSOCIATION FOR CANCER RESEARCH
From Basic Research to Personalised Cancer Treatment

SAVE THE DATE



2016 NCRI Cancer Conference
6-9 November 2016
BT Convention Centre, Liverpool, UK



NCRI
National Cancer Research Institute

SAVE THE DATE

What do I do? ... Travel & conferences

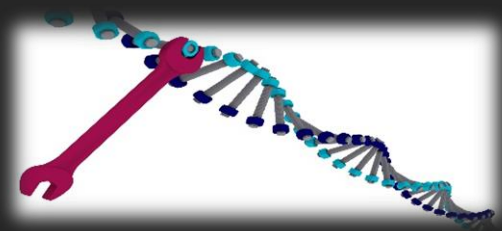
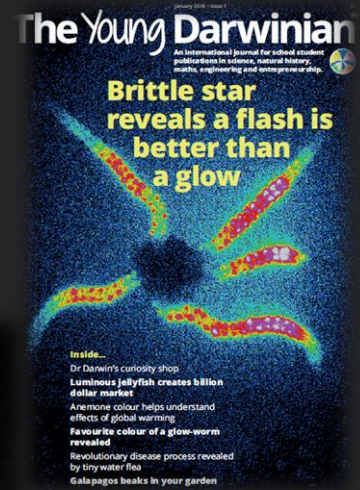
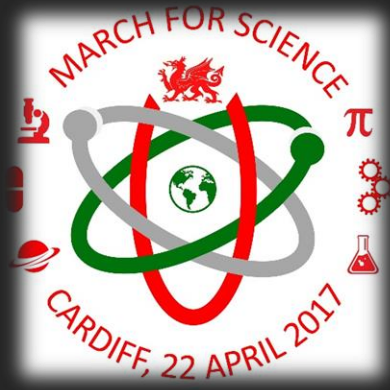


Conference - Receptor Tyrosine Kinase Structure and Mammalian Health and Disease
2013
field, UK

BIOCHEMICAL SOCIETY



What do I do? ... Public Engagement with Science



What else do I do?



But that's just my story...a scientific degree can lead you into all sorts of different careers:

- **Forensic Scientist**
- **Engineer**
- **Agriculture / Farming**
- **Ecology**
- **Medicine**
- **Pharmacist**
- **Pretty much anything!**



SCIENCE TIME! Let's look at some bacteria...



**NEISSERIA
GONORRHOEAE**



**ACINETOBACTER
BAUMANNII**



**STAPHYLOCOCCUS
AUREUS (MRSA)**



**BURKHOLDERIA
CEPACIA**



**PSEUDOMONAS
AERUGINOSA**



**CLOSTRIDIUM
DIFFICILE**



**ESCHERICHIA
COLI (E.COLI)**



**MYCOBACTERIUM
TUBERCULOSIS**



**KLEBSIELLA
PNEUMONIAE**



**STREPTOCOCCUS
PYOGENES**

So what's the problem
with bacteria?

Some types can cause
infections

If you don't like
yucky photos...
Look away now!



Bacteria cause lots of different types of infection!



Tonsillitis



Meningitis



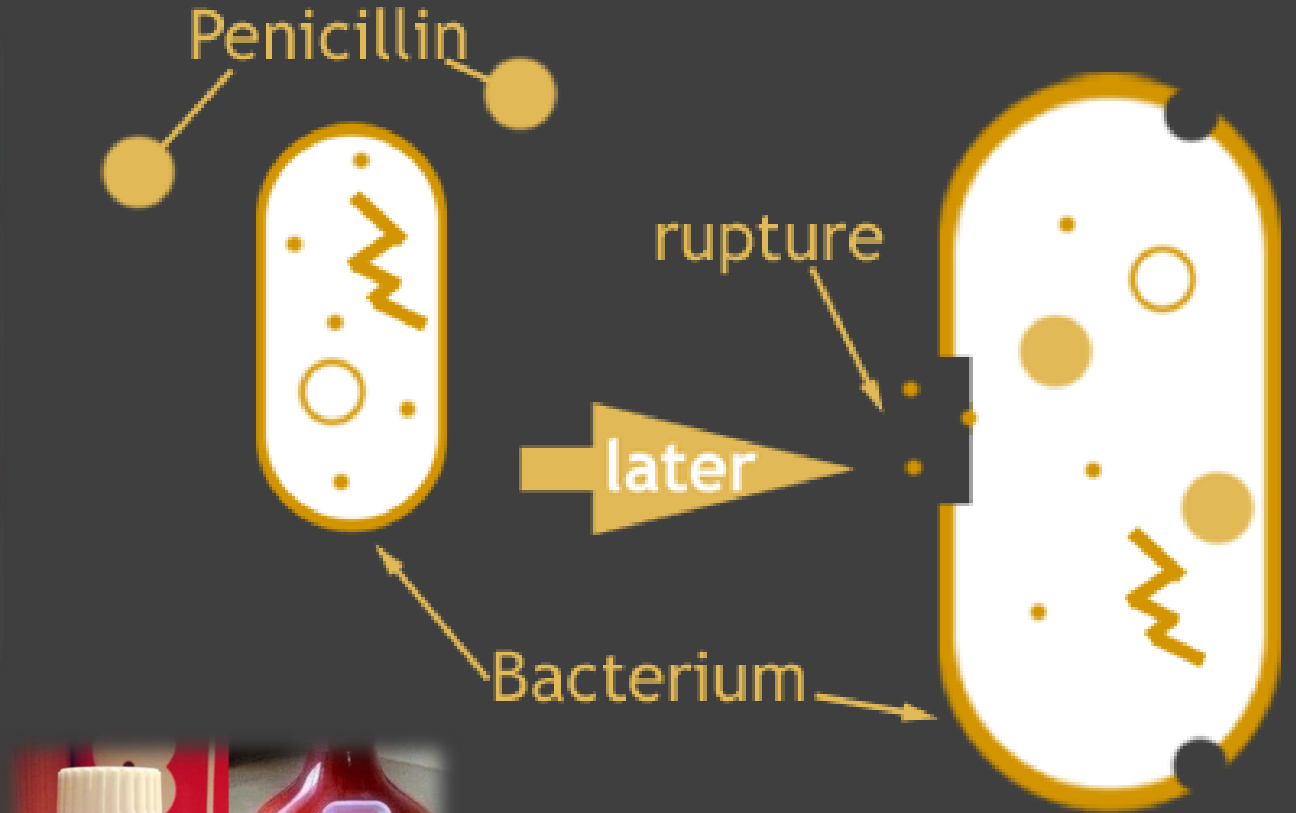
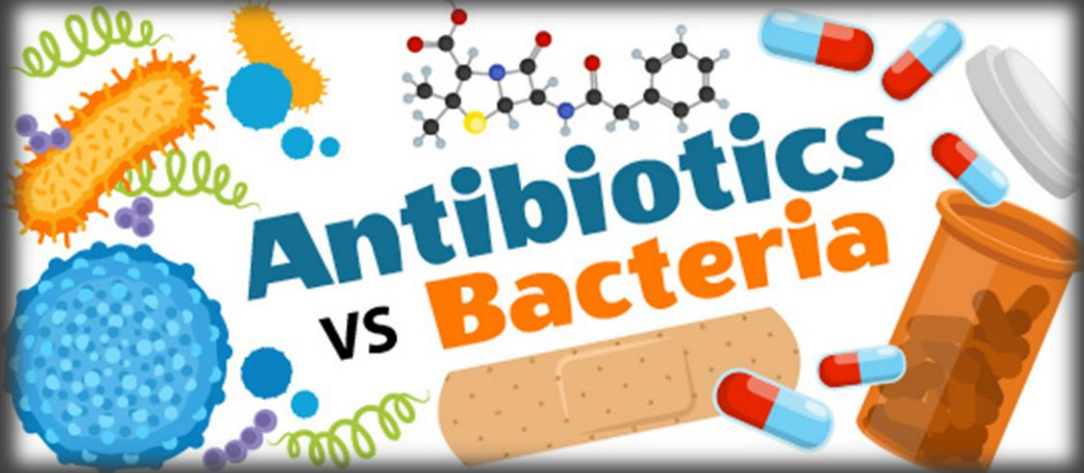
Food poisoning

And we treat them with special medicines called....



*Raise your hand if
you know the
answer*

Antibiotics: super medicines, fighting bacteria!



But...



The Threat of Antibiotic Resistance

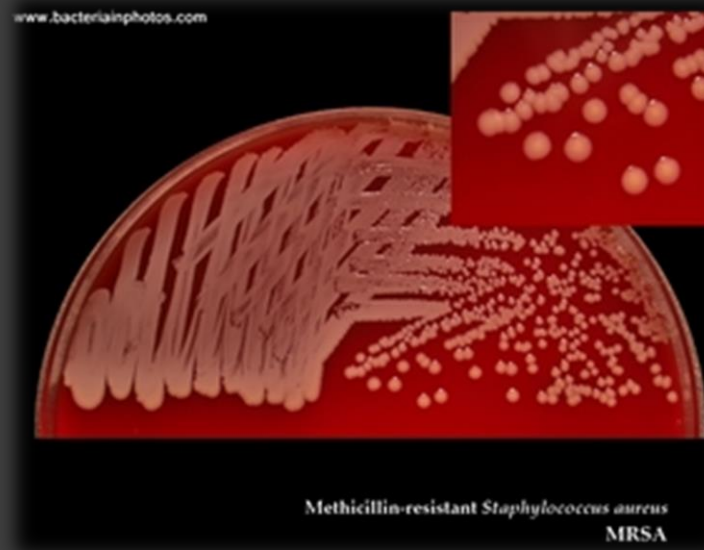
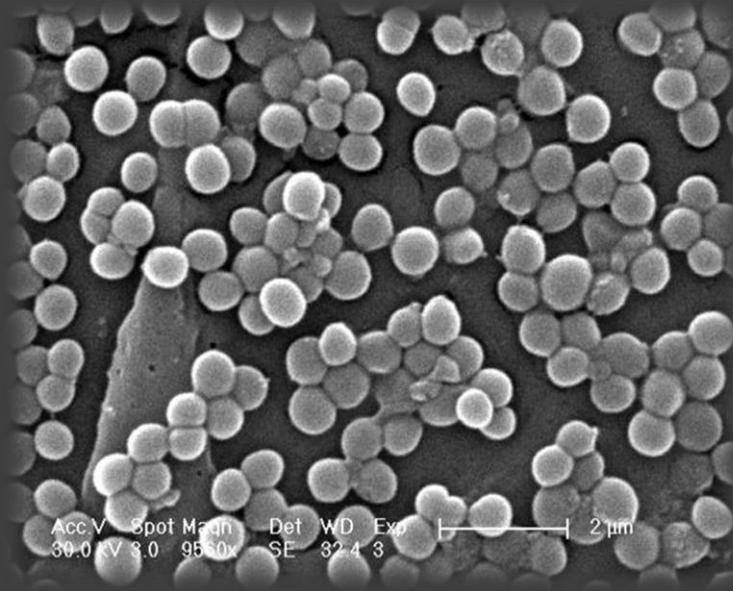
- You're all likely to die from a bacterial infection.
- Deaths from antibiotic resistant bacteria to outnumber cancer deaths by 2050 – WHO 2014
- Bacteria are becoming resistant to all known drugs.
- Ancient cures and remedies from plants may be a way of combating the problem.

Now let's meet our
baddie...

If you don't like
yucky photos...
Look away now!



Methicillin resistant *Staphylococcus aureus* (MRSA)





We've got our baddie so now we need our hero...



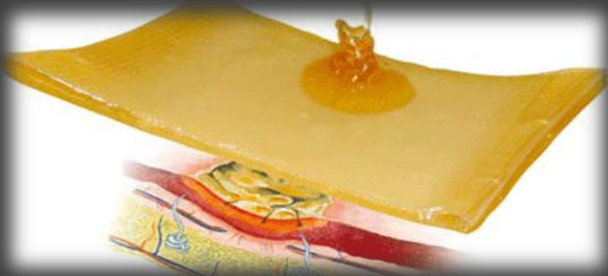
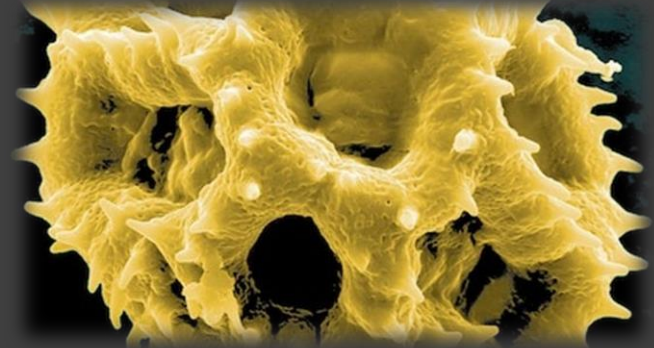
pharma



bees™

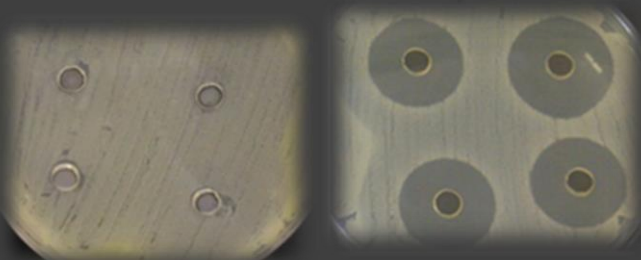


Bees!

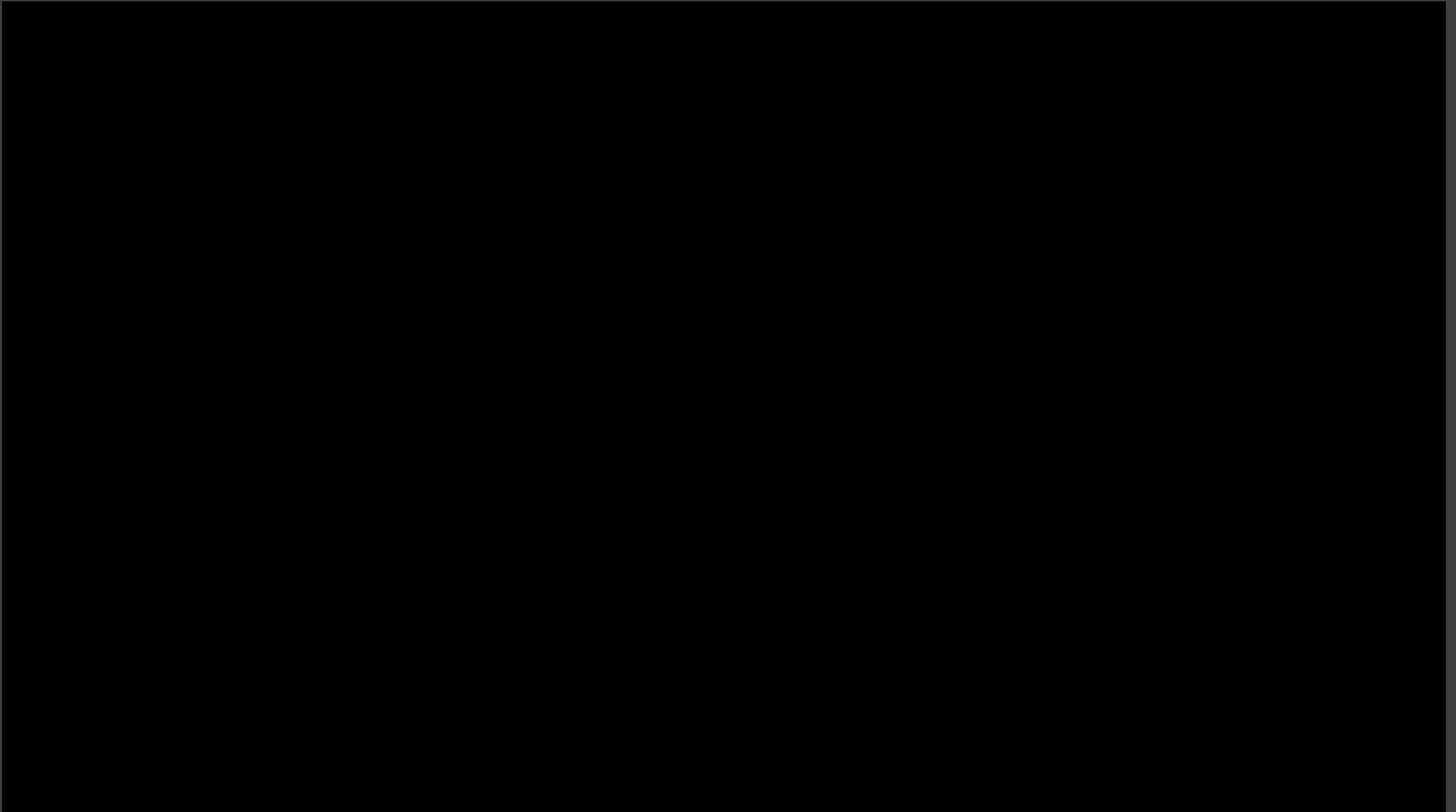


Is Manuka Honey 'Better Than All Known Antibiotics?'

Manuka honey has well-documented antibacterial properties, but the research is too preliminary to declare superiority over all antibiotics.

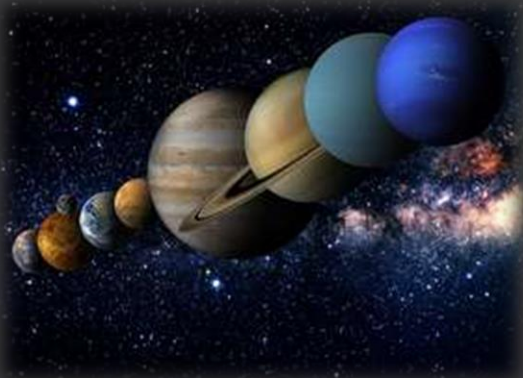


Why (else) do bees matter?



How do bees store honey?

- The most efficient shape (the one that holds the most volume with the smallest edges) is a sphere. That's why planets and bubbles are round.
- Like all creatures bees want to save energy & do things in the easiest, most efficient way
- Bees store honey in a structure called a honeycomb, but how is that honeycomb made?

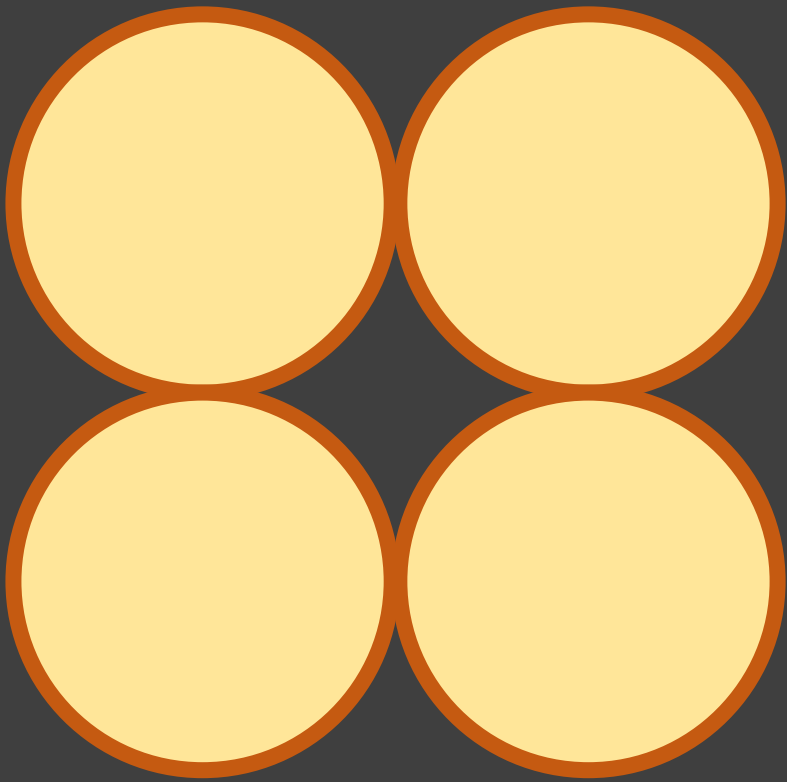


Let's make our own hydrobead
"honeycomb!"

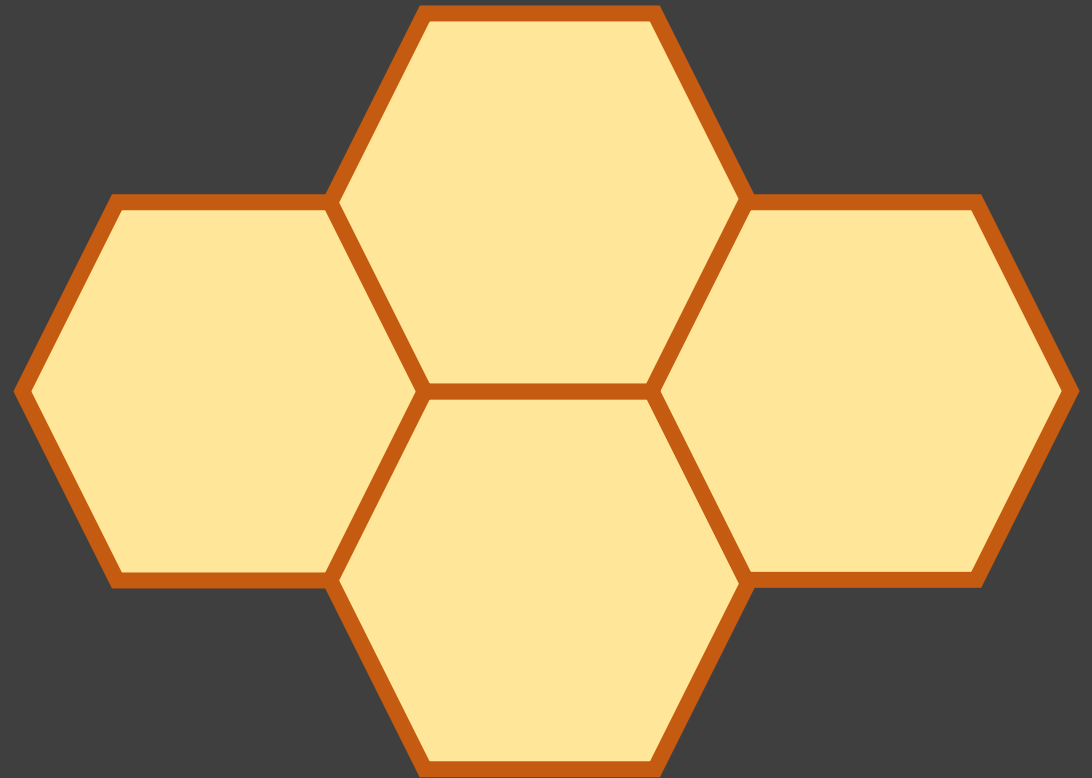


Results!

The spheres don't pack together without gaps, there is wasted space. One sphere is very efficient but lots of them packed together are not.



Squashed spheres form hexagons which packed together perfectly without gaps (tessellated). This is how a real honeycomb is made!



Results!

The s
without
One sp
the



gons
ctly
is how
!



Biohazard
Time!

CAUTION

**POTENTIAL
BIOHAZARD
PRESENT**



RWS-7561-7X10

www.RightAwaySigns.com

MADE IN USA

How Many Bacteria can you find??

- We are now going to do some grime scene investigation.....
- Rub swabs over where you might think the most bacteria will be and bring them back for analysis in our laboratory.





Places to swab



- Label Petri dish
- Rub swab gently over surface

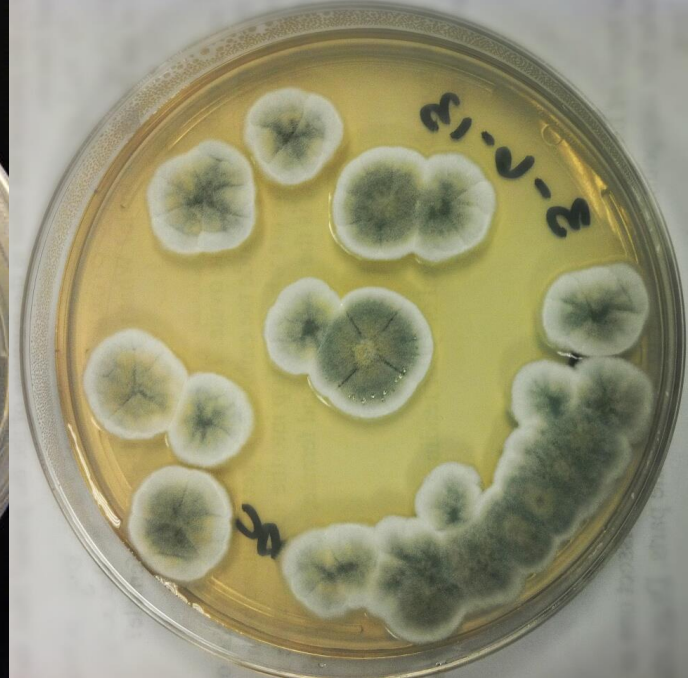


You are now officially microbiologists!

What happens now?

- We 'Grow' the bacteria at 37 °C for 24 hours
- I will then do some analysis and send all of the pictures and my findings back to you!





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See you soon!

CLASSIFIED

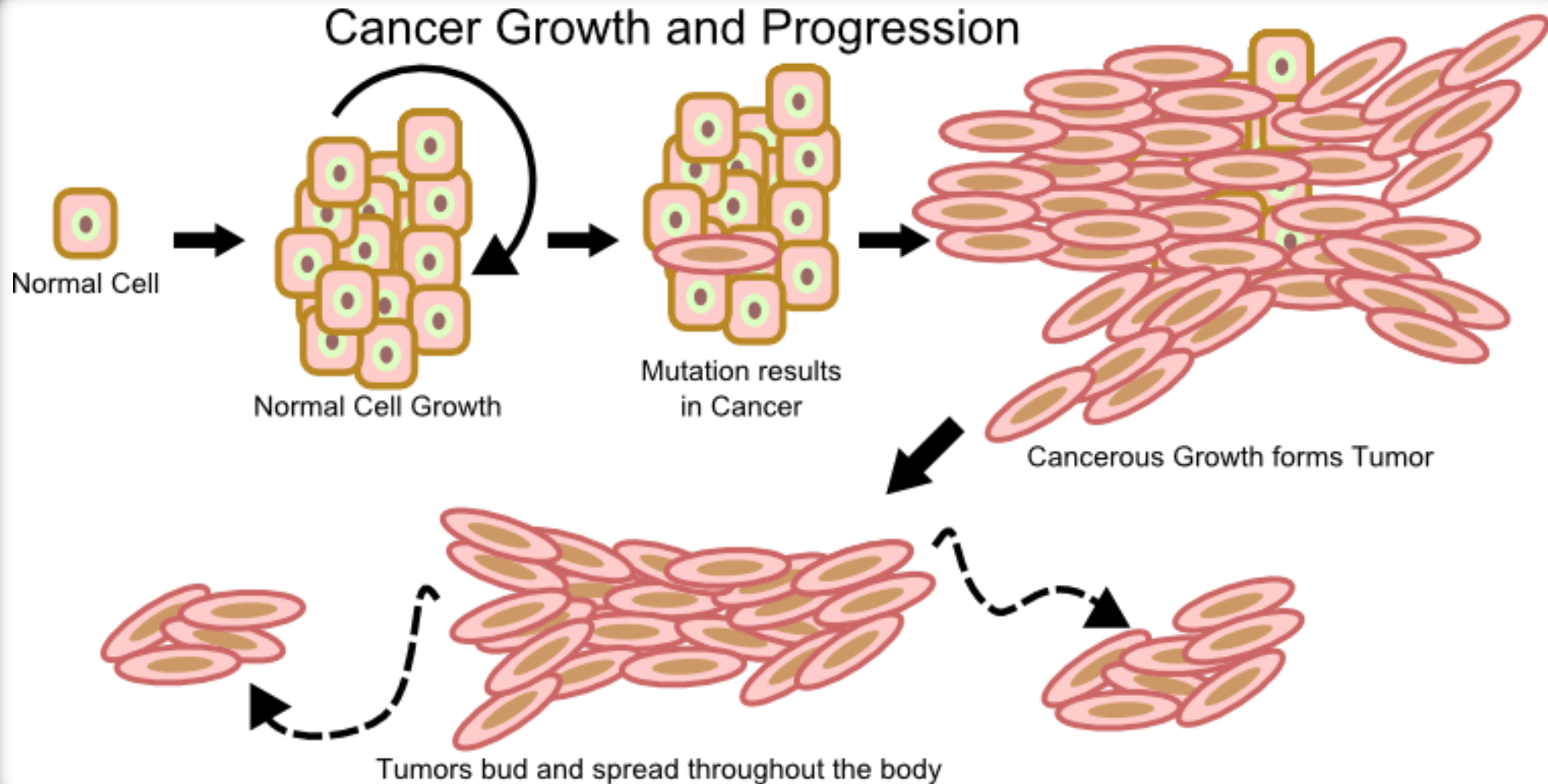
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TOP SECRET

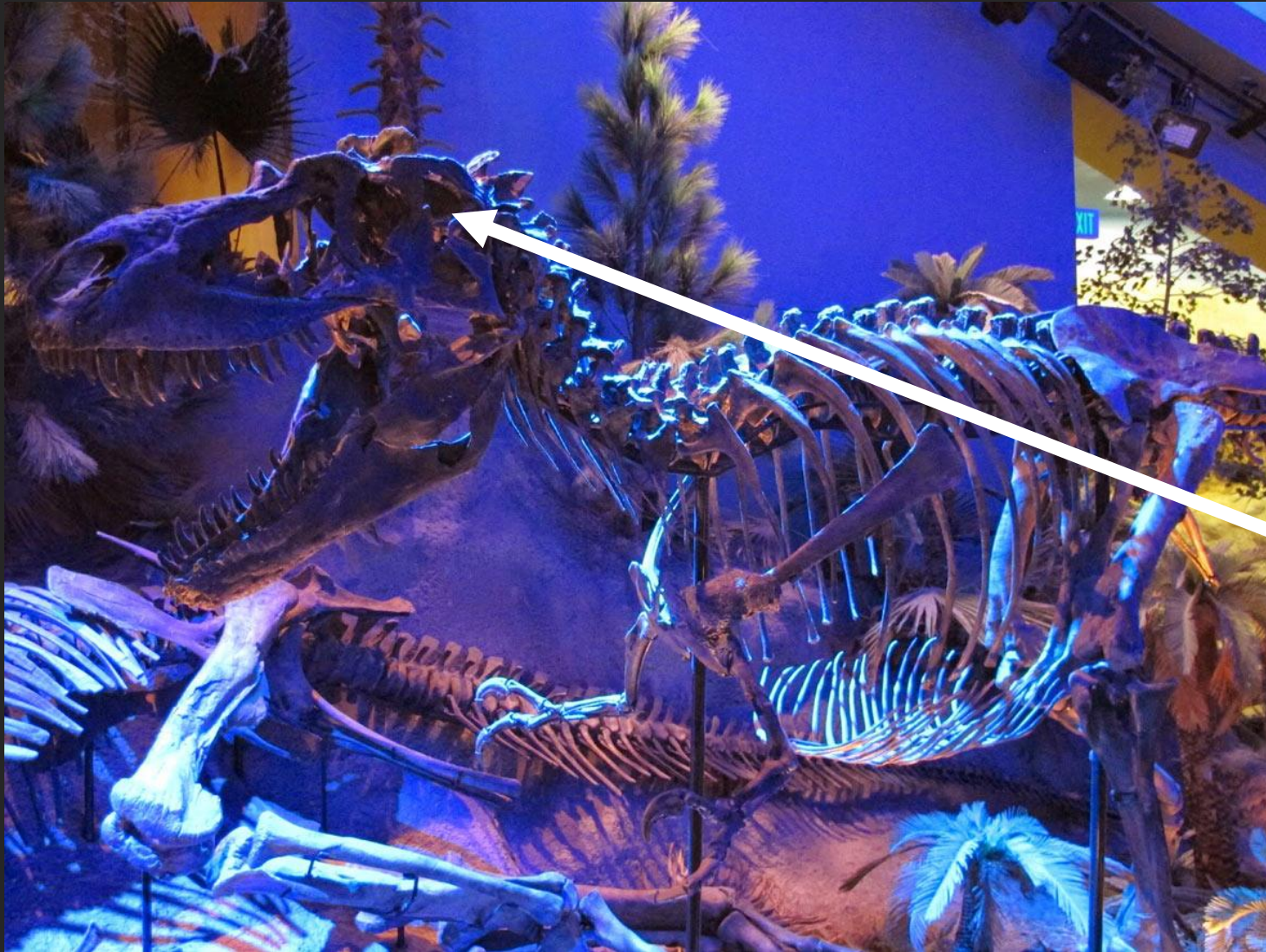
STRICTLY FOR: CATHAYS PRIMARY SCHOOLS

Cancer is a disease of cells

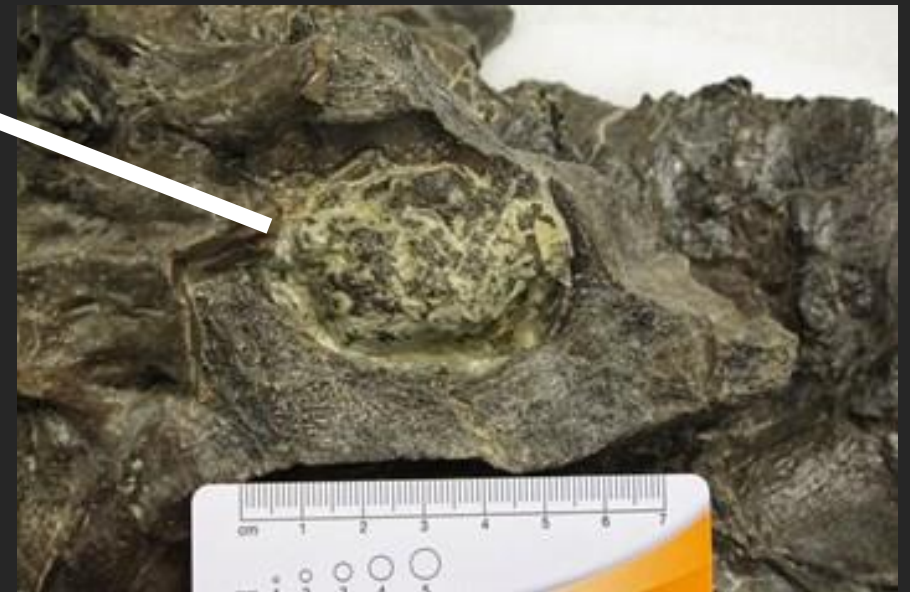
Normal cells stop growing but cancer cells just keep growing!



Cancer is an ancient disease - even dinosaurs got it!



- Gorgosaurus
- Late Cretaceous period (76.6-75.1 million years ago)
- 7.3 m, 2 tonne relative of *T. rex*
- Evidence of brain tumour



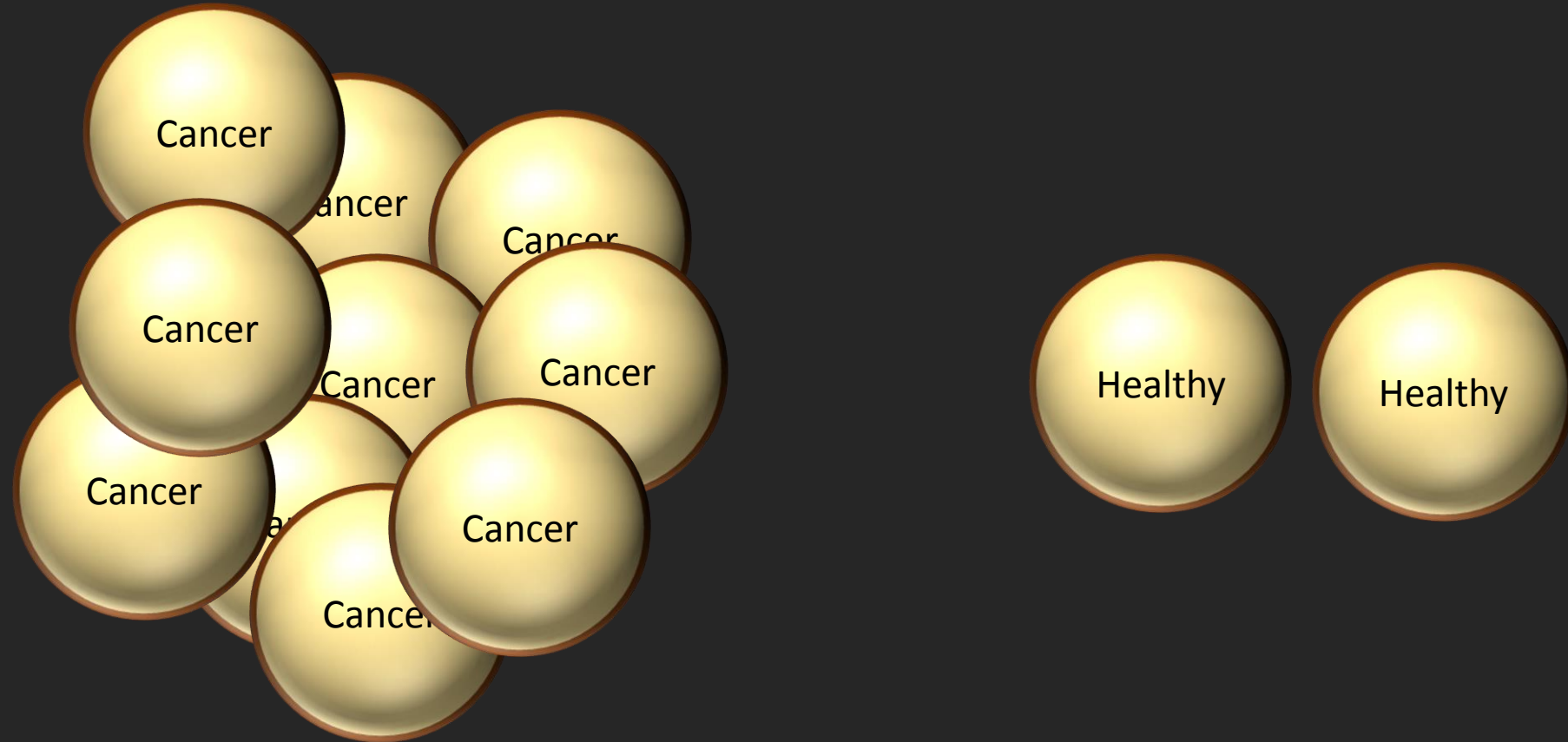
I need your help with some cancer research but why is it important?

- 1 in 2 people in the UK will get cancer in their lifetime
- Very serious disease that can make people very unwell & if untreated they can die
- **Cancer treatments work well** but could be better



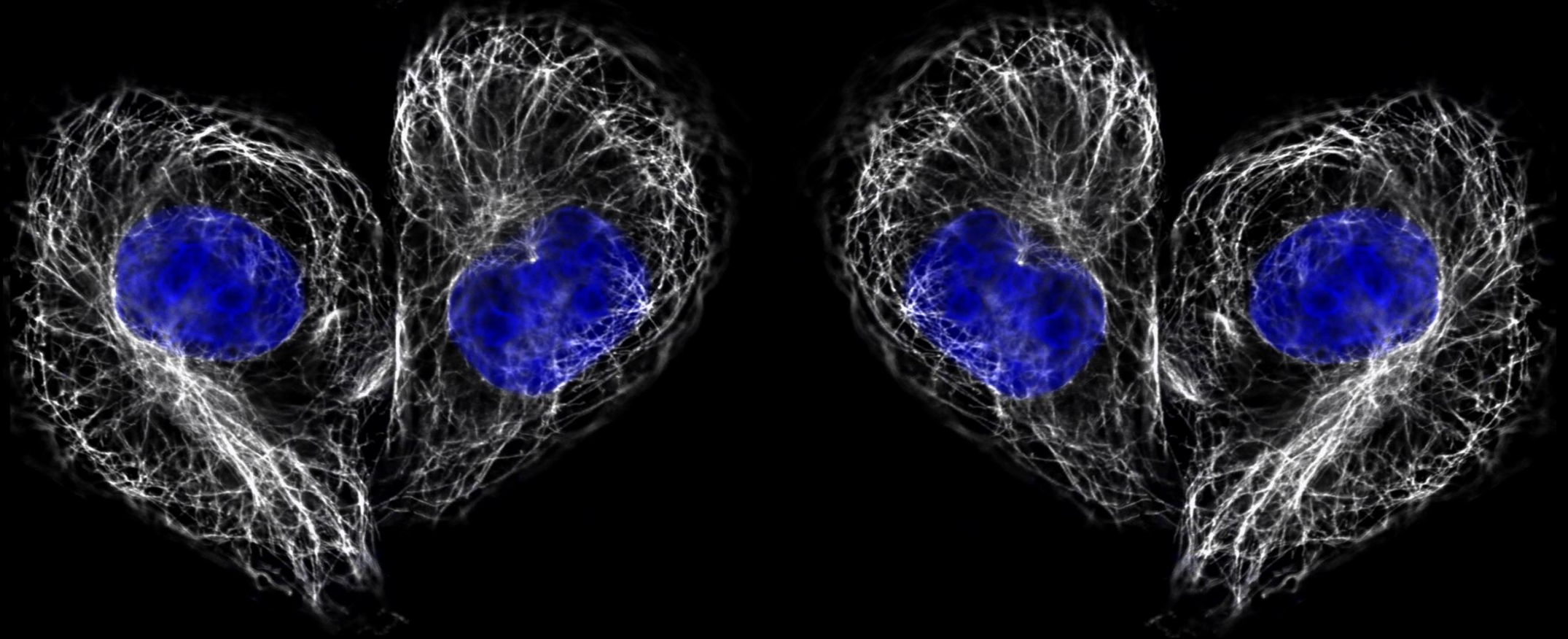
Gill Dainty-Wymant 1954-2001

Cancer treatment is like spot the difference!

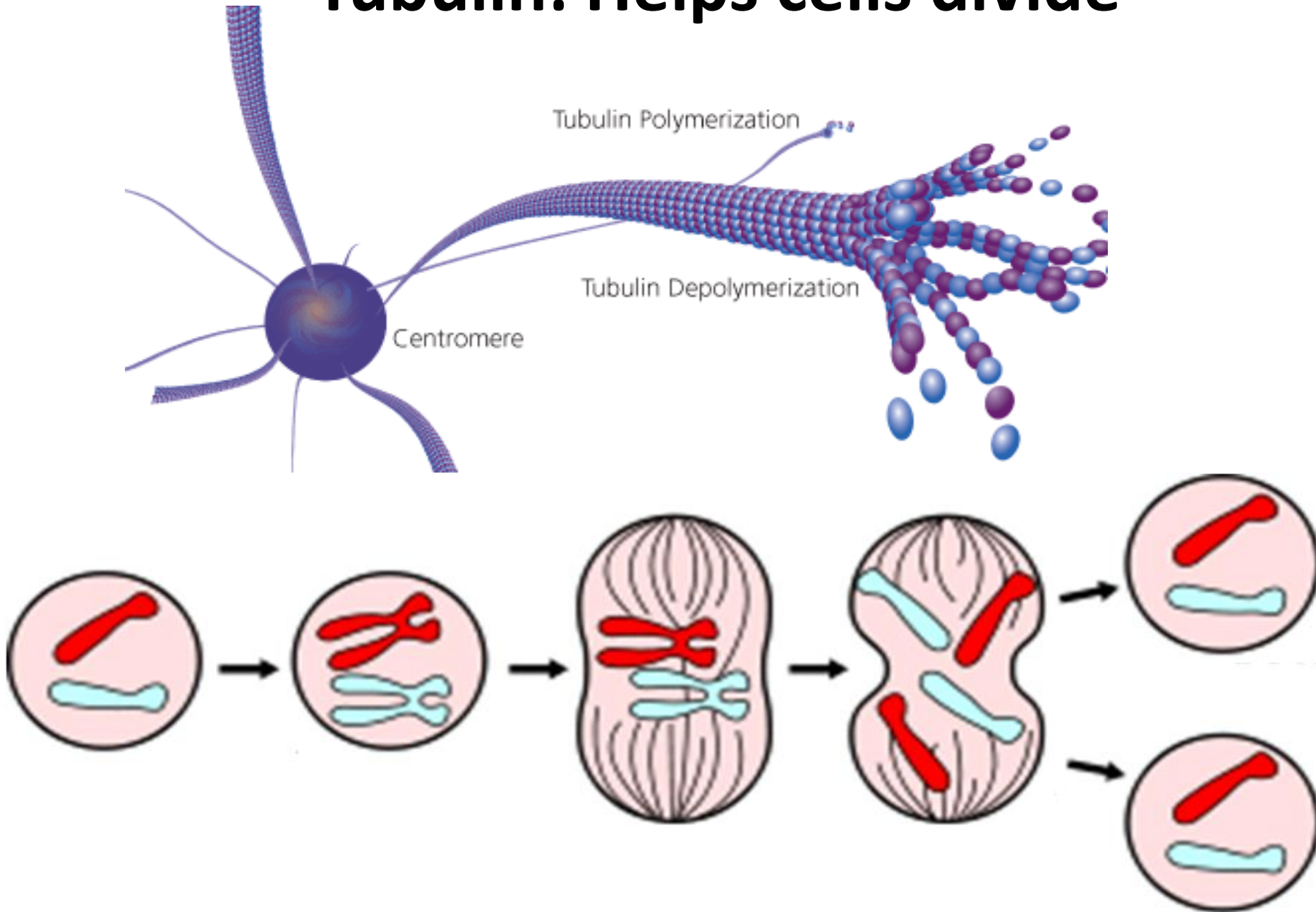


Need to find something that only cancer cells are doing or that they do a lot more of ...
like dividing/growing

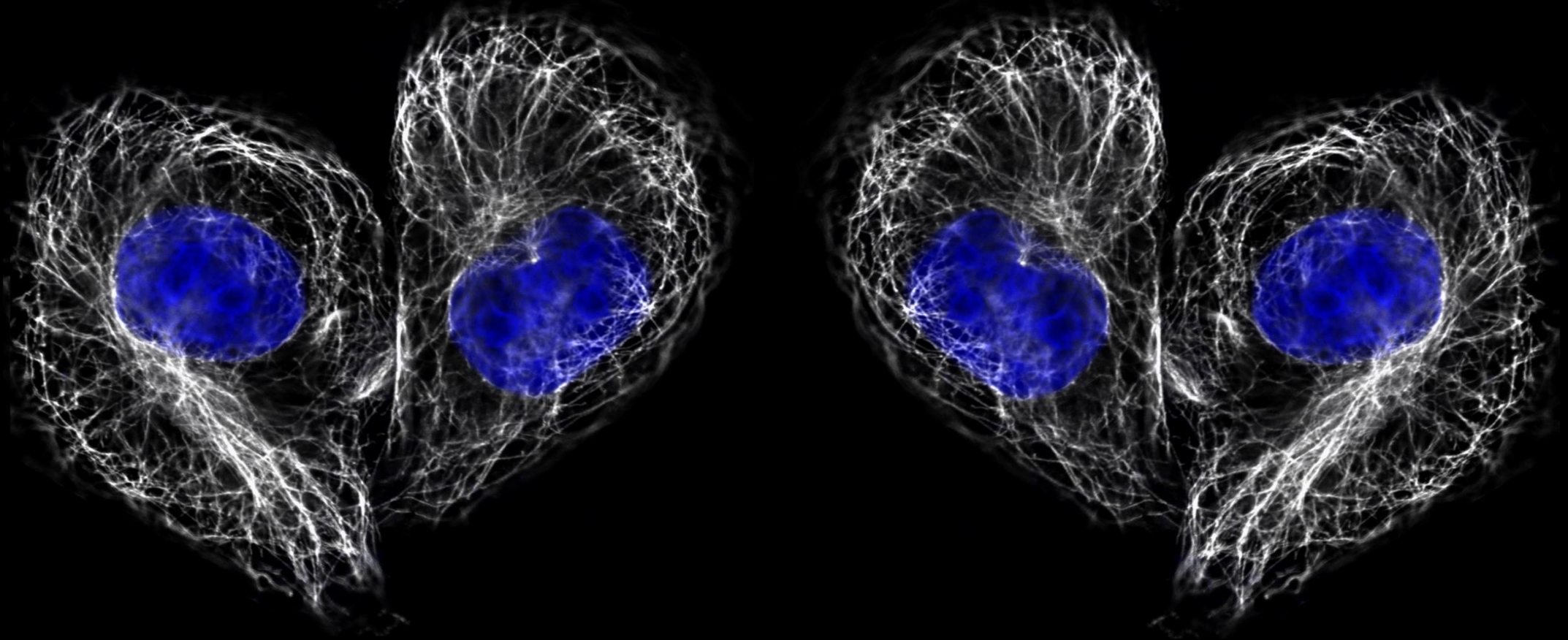
Targeting Cell Growth: Tubulin



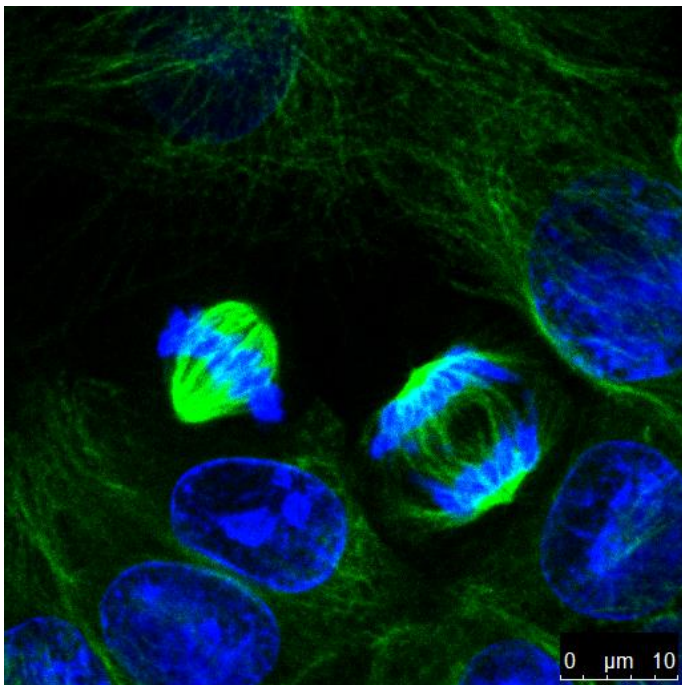
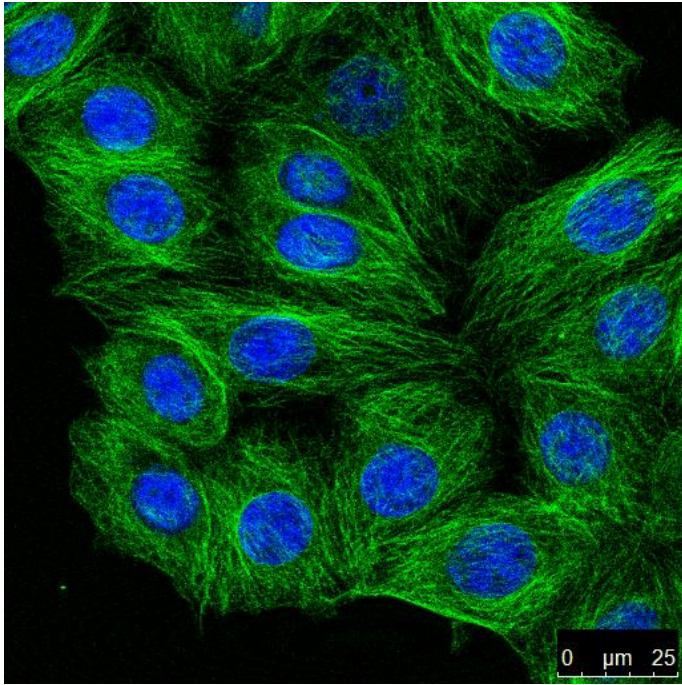
Tubulin: Helps cells divide



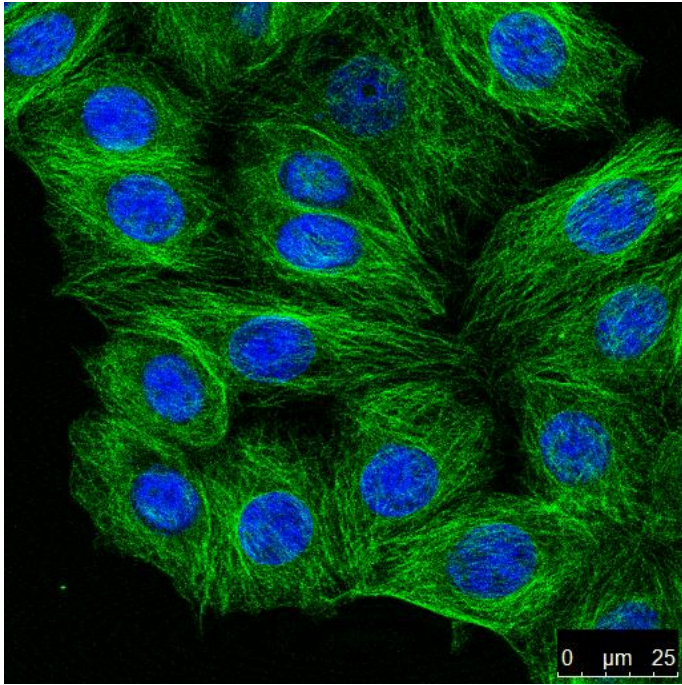
I need YOU to help me choose
which is the best new medicine?



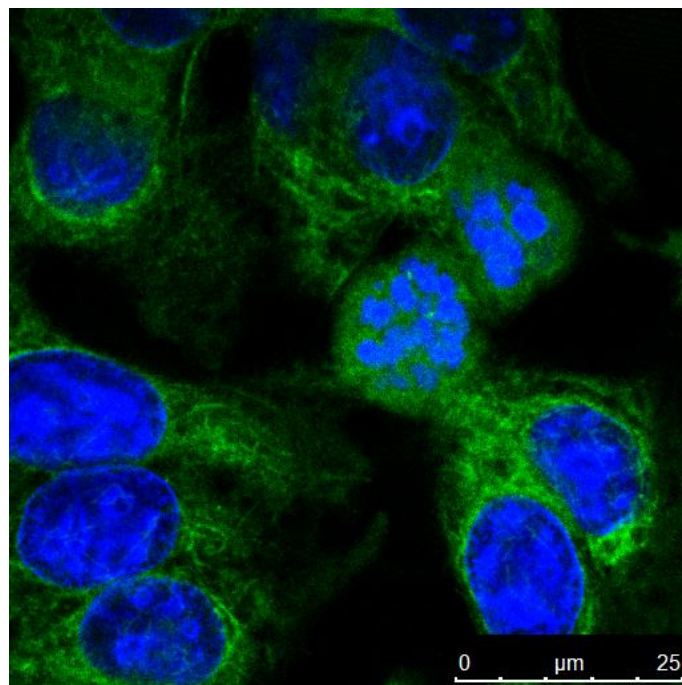
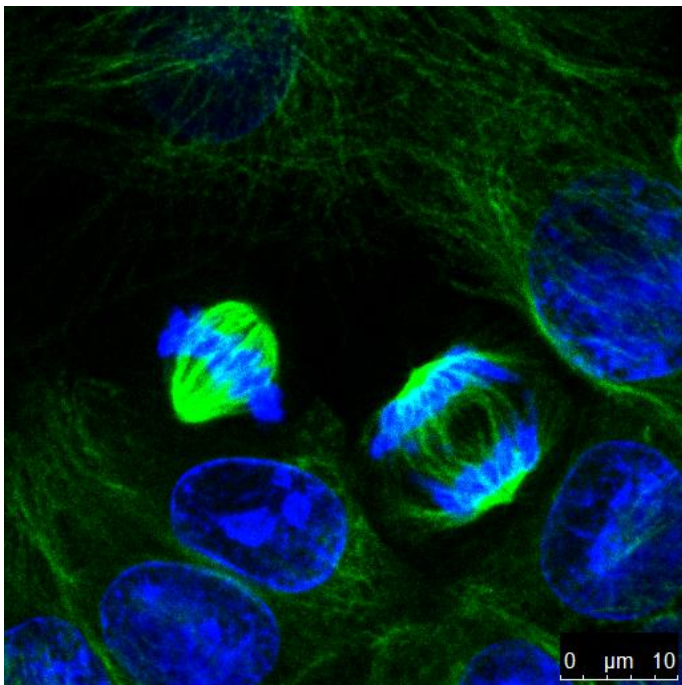
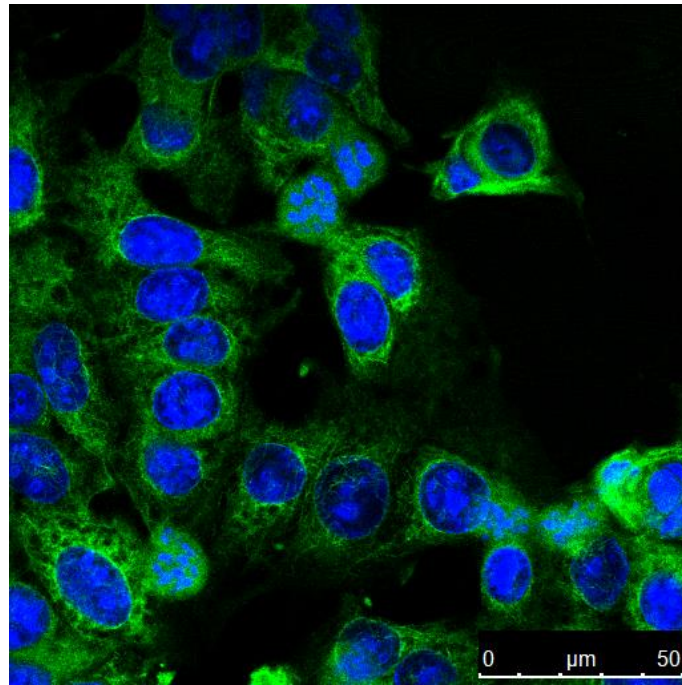
Untreated control cells



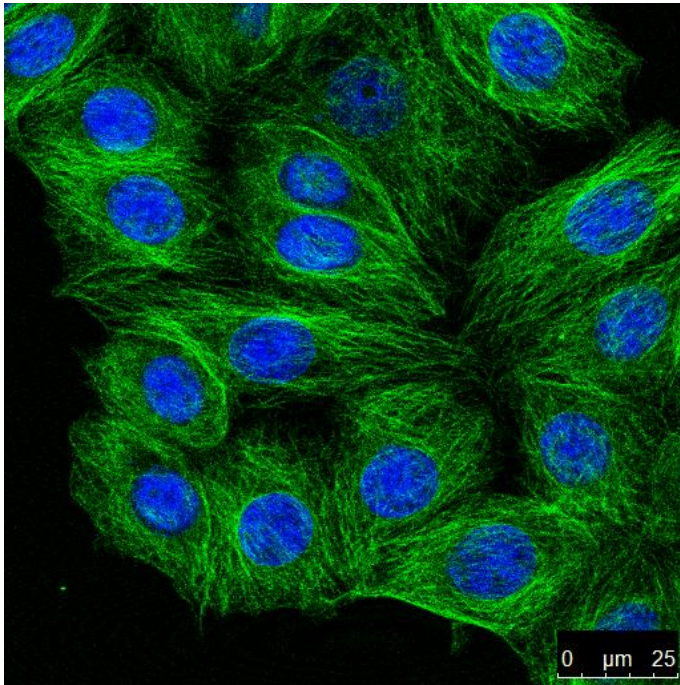
Untreated control cells



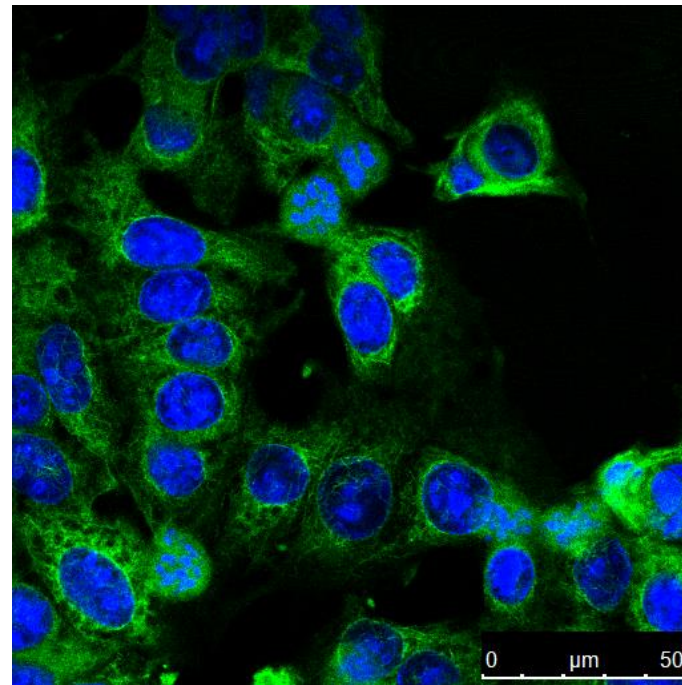
Medicine 1



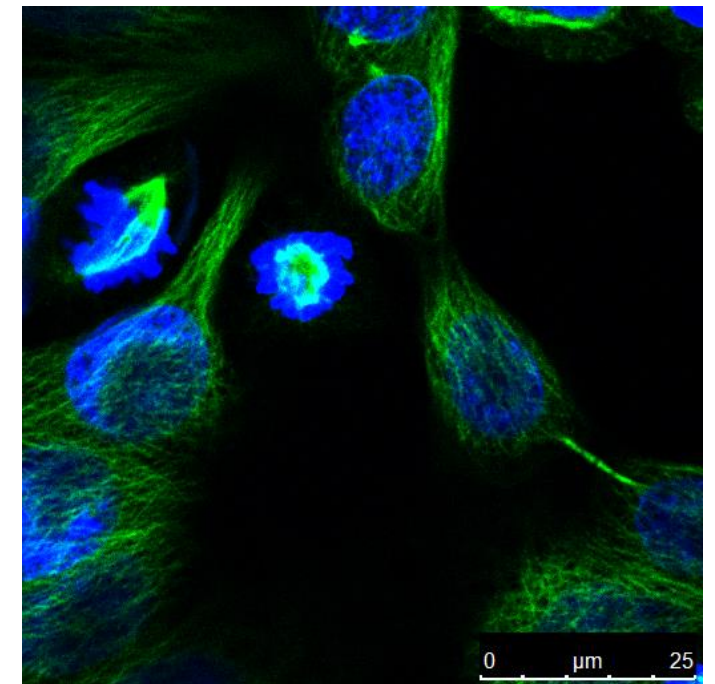
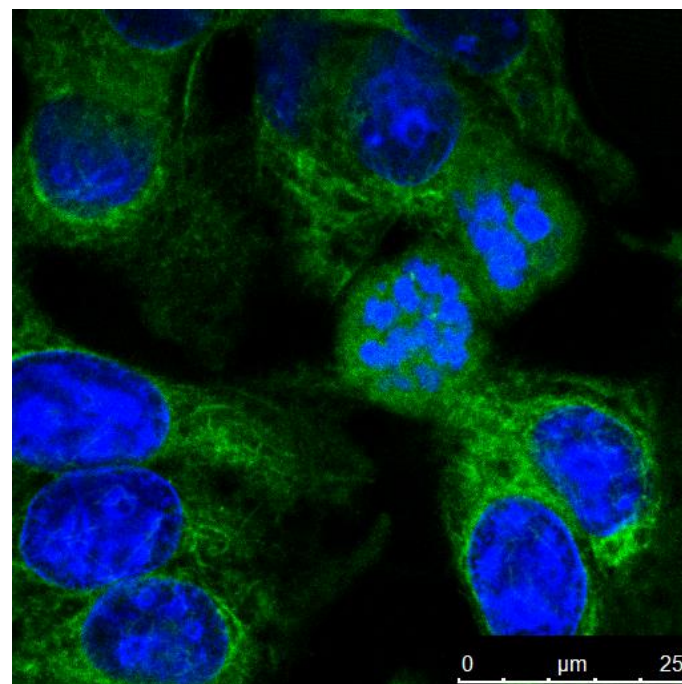
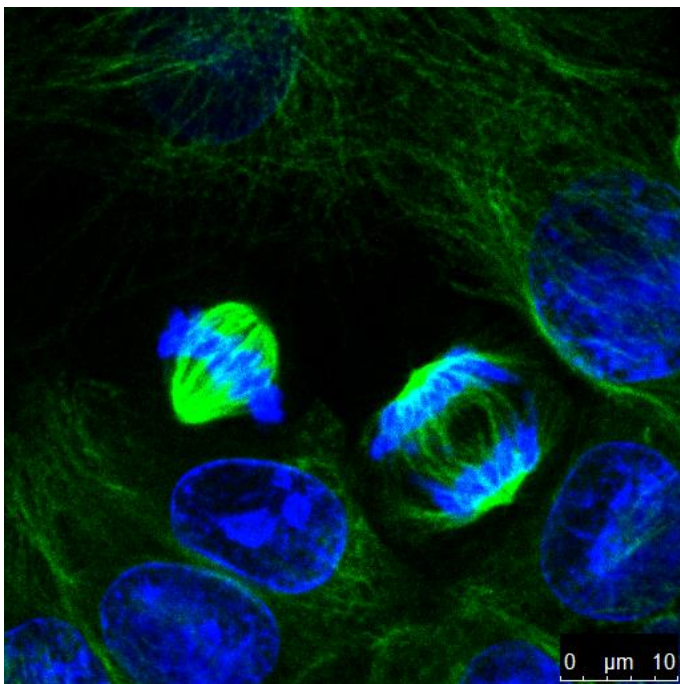
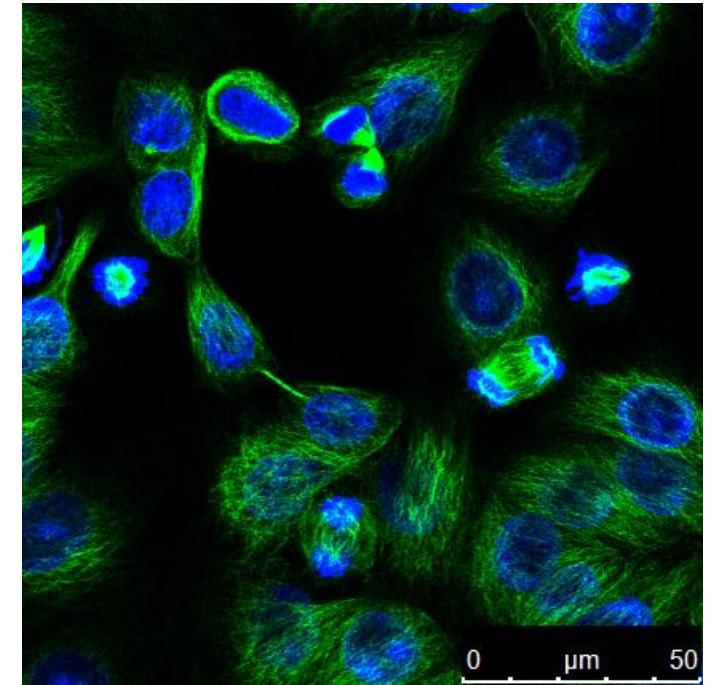
Untreated control cells



Medicine 1



Medicine 2





GREAT JOB SCIENTISTS!

HOPEFULLY WE'LL MAKE A NEW CANCER MEDICINE SOON