Career Connection: Eric Brown & Antibiotics

Prof. Eric Brown is a member of GlycoNet. To understand his work and his colleagues, use the following video to answer the questions.

Watch the GlycoNet Story: https://www.youtube.com/watch?v=CQGEGIoqTpQ

1. Define glycomics

2. Why are carbohydrates important?

3. What is GlycoNet?

4. According to Prof. Stephen Withers, Canada has many well recognized researchers in glycomics. What type of scientists work in this field?

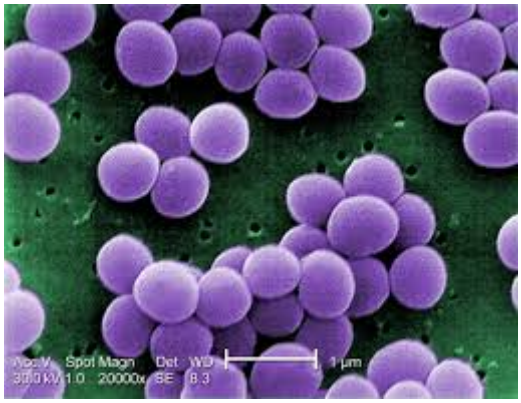
5. What are the benefits of having this network of researchers?

6. GlycoNet brings together a variety of researchers. What are their research initiatives?

Prof. Brown suspects his interest in science may have sparked when he was in grade 1 and he dressed up for Hallowe'en as a mad scientist winning the costume contest at his school in Dundas Ontario. He was interested in science in school and decided to pursue a degree in Food Science at the University of Guelph. Choosing a co-op option for this degree enabled him to get a wide range of experiences and pay for his own education. During one of his placements his interest infundamental research was ignited when studying the folding of proteins. This experience drew him towards more theoretical research. He received his M.Sc. and PhD. at the University of Guelph with a focus on biological chemistry. He then completed a post-doctoral program at the prestigious Harvard Medical School. Prof. Brown then spent several years working in the pharmaceutical industry in Boston prior to coming to McMaster University to continue his research. He very active in his research and appreciates the atmosphere in his position at McMaster that still allows him to follow his curiosity. He has also started initiatives to combine biomedical discoveries and business studies at McMaster. He has won numerous awards and is currently the Canada Research Chair in Microbial Chemical Biology. He has a very active laboratory; mentoring many undergraduate and graduate students.

Outside the laboratory he has many interests. He is an avid sailor; a pastime he shares with his family. According to Prof. Brown he has a dormant golf game and still regularly plays hockey.

For more information on his laboratory, his graduate students, and his research projects see http://www.brownlab.ca/



MRSA-Methicillin-resistant
Staphylococcus aureus

We will use the following video to investigate Prof. Brown's pioneering work.

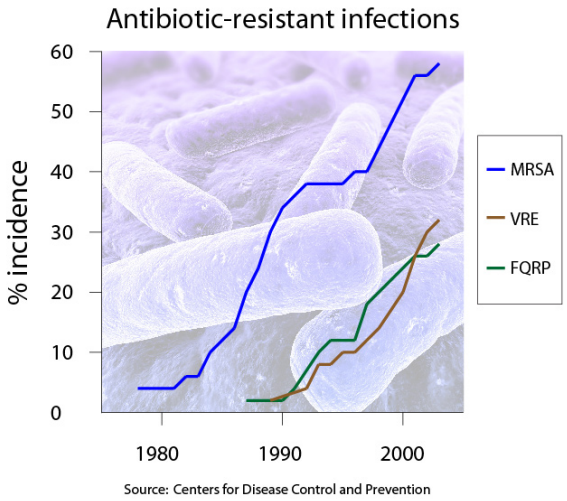
Taking on superbugs with new insights into uncharted biology:
https://www.youtube.com/watch?v=jIAU4ZAhmSU

1. Where do we find *Staphylococcus aureus*?

2. What does *Staphylococcus aureus* cause?

3. When does Staphylococcus aureus become known as MRSA?

4. Professor Brown uses the following data



Source:
http://www.futuretimeline.net/subject/biology-medicine.htm

Fill in the blanks

Over the past twenty years the incidence of MRSA has increased from _____ to _____. VRE (a vancomycin-resistant) and a FQRP (fluoroquinolone-resistant) bacteria show similar increases.

5. What attitudes were seen when antibiotics were first seen?

6. Large amounts of penicillin were required in World War II. How did this need get met?

7. What was the “golden age of antibiotics”?

8. What was the attitude towards antibiotics in the 1960s?

9. What was the state of antibiotic research in the 1980s?

10. What does Prof. Brown cite as one of the most important factors in inappropriate antibiotic use?

11. What is drug resistance in bacteria? Provide 3 mechanisms.

12. Is this resistance limited to only one bacteria cell?

13. What are some solutions to antibiotic drug resistance?

14. What is new about Prof. Brown's research on drug combinations? Give the name of this type drug combination.

15. What does Prof. Brown mean when he says drugs have "cryptic activities"? Provide an example.

16. Prof. Brown's team tried to kill a multi-resistant form of bacteria known as *Pseudomonas aeruginosa* and MRSA. Describe his research. Include a brief description of the successful combinations.

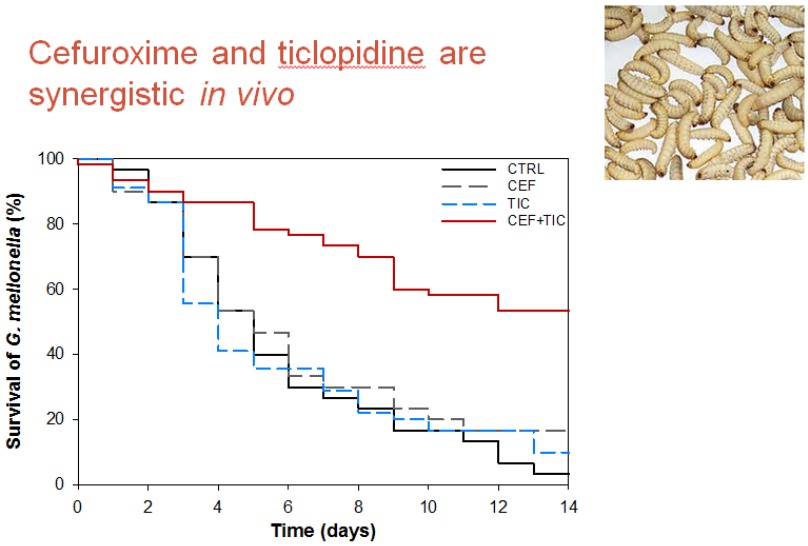
    Pseudomonas aeruginosa

    MRSA

17. Why did the research team choose wax worms as the animal model?

18. Wax worms were exposed to MRSA and tested under a variety of conditions:
    - an antibiotic, cefuroxime(CEF)
    - a drug of interest, ticlopidine (TIC)
    - a combination of cefuroxime and ticlopidine (CEF + TIC)
    - a control –without any drugs(CTRL)

    Summarize the results of the cefuroxime and ticlopidine in wax worms.



Farha, M.A. Leung, A., Sewell, E.W., D'Elia, M.A., Allison, S.E., Ejim, L., Pereira, P.M., Pinho, M.G., Wright G.D. and Brown, E.D. 2013. *ACS Chemical Biology*, 8:226.