LENScience CONNECT
Bringing Schools and Scientists Together

LENScience Senior Biology Seminar Series
Student Update Number 3 – March 18th, 2011

In this issue:

Seminar 1 — Questions

Huntington's Disease: Understanding a Mutation

Thanks to everyone who participated in the seminar yesterday.
The livechat and questions that came up during the seminar were impressive.

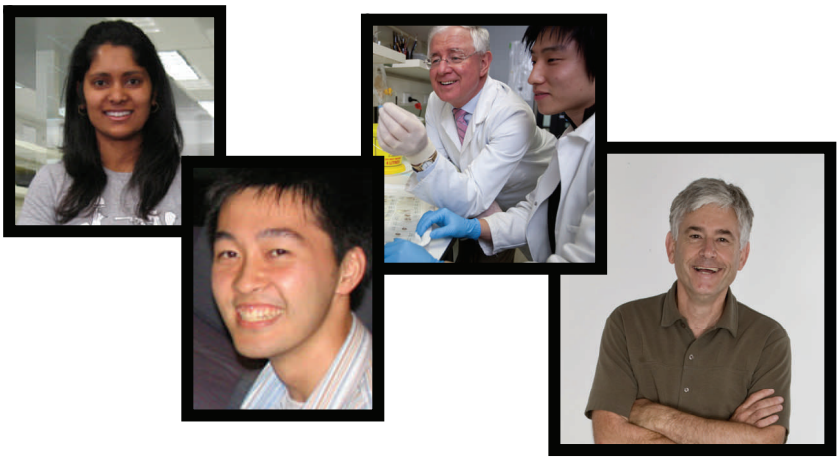
For information about support for people and families affected by Huntington's Disease contact.....

Huntington's Disease Associations of New Zealand

http://www.huntingtons.org.nz

0800 HDAUCK 0800 432 825

Keep an eye on the Question Page on the wiki—this will be updated with answers to your questions over the next week thanks to Pritika, Eric, Colin and the team from the Centre for Brain Research.



CENTRE FOR BRAIN RESEARCH
THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau

Pritika Narayan | Colin Mak | Professor Richard Faull | Eric Kim | Professor Mike Dragunow

NATIONAL RESEARCH CENTRE FOR GROWTH AND DEVELOPMENT

LIGGINS INSTITUTE
THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

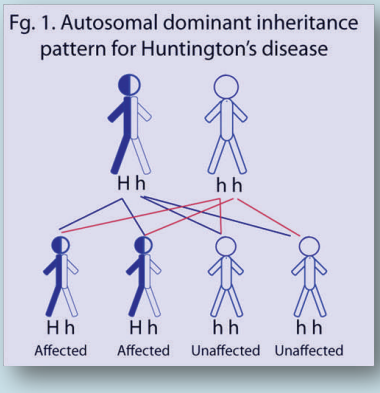
Seminar 1 week 3 — Challenge Questions

Huntington's Disease: Understanding a Mutation

Week 3: March 21-25

- Go to your POST-SEMINAR SCHOOL WORKSHOP on the CHALLENGE QUESTIONS .
- Work together with your group to develop answers to the challenge questions and place these on the wiki.
- Each challenge has its own wiki page.
- Keep a watch on the wiki to see how the LENScience and Centre for Brain Research teams respond to your answers. If they challenge you with a question or a suggestion about how to improve your answer —follow through.
- Watch the wiki and learn from what other people are writing.

Challenge 1: Inheritance Patterns



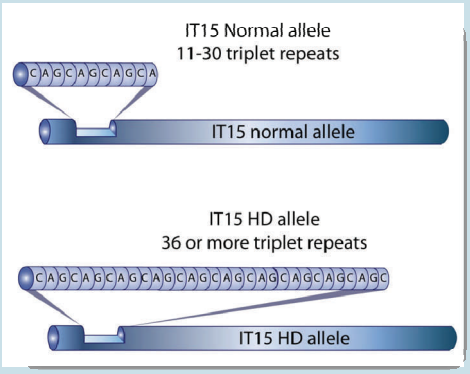
Huntington's Disease is caused by a gene mutation of the *IT15* gene on chromosome 4. The pattern of inheritance is **autosomal dominant.**

Compare and contrast autosomal dominant, autosomal recessive, sex linked dominant, and sex linked recessive inheritance patterns and **discuss the relationship** between inheritance patterns of a disease and the likelihood of offspring being affected by the disease.

Unpack the question

- Identify each of the patterns you are going to have to talk about.
- Make sure you understand the similarities and differences.
- Identify the **relationship** (or link) between the pattern and the likelihood of offspring being affected by the disease.
- You could look up examples of diseases that are inherited in this way and use these examples in your answer.
- To compare and contrast you need to organise your information so that you can explain each pattern and discuss the similarities and differences giving **reasons** for these.
- Consider using diagrams like the one above in your answer. If you want to put those on the wiki you can insert them as a picture.

Challenge 2 Gene Expression



The *IT15* gene shows variation in the number of CAG repeats between individuals. In a normal allele there are between 10 and 35 CAG repeats, whereas in the mutant allele there can be 36 or more CAG repeats.

Using your understanding of **gene expression** and **protein structure**, explain the **impact** of additional CAG repeats on the **structure** of the huntingtin **protein**.

Unpack the question

- Identify what the question is asking you to explain.
- What key biological knowledge and understanding are you being asked to use in your explanation?
- This question is asking for an explanation—make sure you have identified **how** and **why** the additional CAG repeats will impact the structure of the huntingtin protein.

Challenge 3: Variation in the HS phenotype

Evidence from research shows that there is both genotypic and phenotypic variation present in Huntington's disease. Some aspects of this variability can be explained while other aspects are not well understood.

a. Using information presented in the seminar paper, discuss aspects of the phenotypic variability seen in HD that can be explained to some extent by research evidence.

Unpack the question

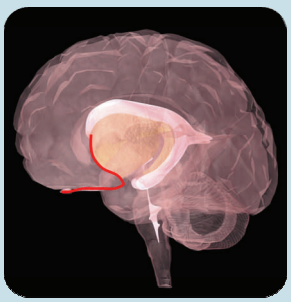
- Go back into the seminar paper and the power point (available here), identify the evidence that you could use in your answer and organise this to help you develop a discussion (e.g. you could use a retrieval chart).
- In developing your discussion you need to think about what the evidence can explain in terms of variation in the phenotype, and what cannot be explained.
- In the seminar Professor Faull and Pritika both presented evidence that sometimes the genotype can be the same but we see variation in the phenotype. How could you incorporate this evidence into your discussion?

b. Scientists at the University of Auckland are currently exploring the possibility that HD may involve alterations to epigenetic processes. **Explain** what the epigenome is and **discuss potential** effects of alterations in epigenetic processes on structure and function within an organism.

Unpack the question

- Take a careful look at this question. It is asking a theoretical question.
- You will need to explain what the epigenome is. Think about how Pritika did that in the seminar. Could you use some of her ideas in your answer?
- The question is asking you to discuss **potential effects.** Think of it as a "what if" question. There may be more that one potential scenario for you to discuss.

Challenge 4: The potential of stem cells



Scientists have identified that the human brain has adult stem cells and that when affected by HD, the human brain tries to repair itself by making replacement brain cells (a process called neurogenesis). While the potential to replace diseased brain cells using stem cells is exciting, the research is still in the phase of development and understanding whether this is potentially viable or not will take many years.

Compare and contrast the **potential** of embryonic and adult stem cells as future treatment options for neurological disease, **examining** both **biological and ethical issues** associated with this potential.

Unpack the question

- Make sure you are clear about what the similarities and differences between adult and embryonic stem cells.
- You will need to identify the **potential** of each type of stem cell as a future treatment option. Think about the advantages and disadvantages of each.
- When examining the ethical issues, remember you should be looking at these from a range of view points of different groups within society.
- This is a question that you could use to start you off on your research for AS 90714—Research a contemporary biological issue.

Login and contribute your answers at

http://lens.auckland.ac.nz/index.php/Seminar_1_2011_Discussion_Page

Registering for the wiki and live chat

Congratulations to the 650 students who have completed their personal registration.

Make sure **YOUR** friends have registered.

The student registration link on the web page or directly here.

The question and discussion pages are protected so that only registered users can edit or write to them.

If you want to ask a question or contribute to the discussion about the challenge questions you will need to login. You automatically get a username for the wiki when you register for the seminar series.

If your school has permitted access to chat during the seminars you will also be sent a username and password for the live chat.

If you forget your password email lensciencehelp@auckland.ac.nz and we will send it to you again.

Information about how to login is found in Student Update Number 1.

Seminar Series Awards

A reminder that we have awards for the best contributions for each seminar—questions and discussion.

At the end of the year we will also be making an award to the best overall contribution from a student and from a school, as well as the best supporting teacher.

What is happening in your school?

We would love to profile some of your schools.

Let us know what you are doing. How is your school organising your workshops? How many of you are participating? Have you got a biology prefect who is leading the student discussion contributions?

Send us your photos and news to share with other schools. LENSciencehelp.auckland.ac.nz