The use of an Innovation case in Biology-Biotechnology education (by Susanna Cirera)

Facts about the course:

1. Optional course
2. Level: Bachelor 2nd year in Biology-Biotechnology
3. Also International students with different levels attend
4. The case runs late in the course so the students can use what they have learnt.
5. The same day the case starts it is also scheduled an external lecture on Biomarkers (Bioneer)
Innovation cases in Mammalian Genomics course

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Aim:

Creating awareness of Innovation in the Biology-Biotechnology program

- To think innovatively
- To be creative
- Think out of the box

The focus of the whole case is to work with **Biomarkers** and **Animal models** which are main areas covered in the course.
Learning outcome of these cases:

Learn to make a Mind Map
Learn to make a Pitch presentation
Think innovatively in the context of Biotechnology
Biomarkers area:

Case 1: Biomarker for Alzheimer’s disease (Lundbeck)

Case 2: Non-invasive biomarker for gastrointestinal cancer in dogs (Dansk Kennel Klub)

Case 3: Circulating biomarker for sarcoma in Bernese Mountain Dogs (Dansk Kennel Klub)

Animal models area:

Case 4: Using animal models for human disease. The case of the gene USF1 in obesity and diabetes using the pig as model (KU)
**Case 1: Biomarker to be used in diagnostic of Alzheimer disease (Lundbeck)**

Most common form of dementia among elderly (50% of all 85 years old).

Progressive neurological disease, loss of neurons.

Complex disease, heritability 60-80%.

Currently, diagnosis is based on assessment of cognitive and memory skills and brain scans (CT, MRI)

**Outcome:** A new biomarker

**Benefits:** Early diagnosis and proper medication
**Case 2: Circulating biomarker for sarcoma in Bernese Mountain Dogs (Dansk Kennel Klub)**

Disseminated histiocytic sarcoma (DHS) is a malignant neoplastic disorder.

It is prevalent in middle aged to older Bernese Mountain Dogs (BMDs).

Very severe

**Outcome:** A biomarker that could be detected at early stage in the disease & could point out DHS dogs.

**Benefits:** An earlier diagnosis of DHS will improve both the treatment options and the survival time of the diseased dogs.
**Case 3: Non-invasive biomarker for Gastrointestinal cancer in dogs (Dansk Kennel Klub)**

GI cancer accounts for approximately 8% of all malignancies in dogs.

Endoscopic and surgical GI tissue biopsies requiring full anesthesia are often necessary to reach a diagnosis.

An stable and easy-measurable biomarker could be measured in all the dogs and point out which ones would acquire GI.

**Outcome:** A non-invasive biomarker (i.e in faeces or blood)

**Benefits:** Earlier diagnosis of GI will improve both the treatment options and the survival time of the diseased dogs.
Case 4: Using animal models for human disease: The case of the USF1 gene in pig obesity

Obesity is a world-wide health problem that increases the risk of co-morbidities.

Obesity is multifactorial disease

Animal models can help in identifying genetic determinants. Pigs are omnivores like humans and they are good models for human obesity

The gene USF1 has recently been identified as a key player in obesity. USF1 decreases the levels of cholesterol in blood and decreases risk of obesity and diabetes.

Outcome: Provide an optimal animal model for human obesity

Benefit: Translate knowledge in order to prevent human obesity
Mind Map:

**Definition:** is a diagram for representing tasks, words, concepts, or items linked to and arranged around a central concept or subject. It allows organizing information visually.

Example from students of last year
Mind Map (day 1 of the case)

Content: you should touch the following points

- State of the art on the disease/condition
- Why is a new biomarker/animal model needed
- Your proposal
  - Molecule/model to investigate: PROS/CONS
  - Techniques to use
  - Additional competences needed
  - Whole lab set-up
  - Possible ethical issues
- Pitfalls/Risks of the project
- Benefits to the humanity
Mind Map:

“is a useful technique that helps you learn more effectively, improves the way that you record information, and supports and enhances creative problem solving”

Use Single Words or Simple Phrases
Use Color to Separate Different Ideas
Use Symbols and Images

Major categories radiate from a central node, and lesser categories are sub-branches of larger branches.

To learn more about Mind Map visit this link
http://www.mindtools.com/pages/article/newISS_01.htm
Homework (day 2 of the case)

- Finish the Mind map and hand it out.

- Prepare a pitch talk with your group:
  Decide a person who will present
  Prepare slides
  Train together
  Be 100% prepared for the presentation
Pitch technique

“Short saletalk that is understandable to a layperson and gives a clear perspective on your project”.

Is a short presentation where you try to sell your idea as good and clear as possible using the minimal time.

**Be passionate but realistic and specific**
**Train your talk so you know it by memory**

To learn more about pitch (very sales orientated but you can use it as inspiration):
It should take 5-8 minutes per group
The presentation should include (7-8 slides)

Need (Why?)
Background
Experimental set-up/Plan of action
Time table
Risks
Benefit to humanity

You will get feed-back from the teachers
Evaluation from the students 2015: General comments

- The innovation case was good, however, more information of pitch development would be useful.
  It was a general uncertainty about what the purpose of a pitch is - this resulted in very diverse pitches on the day of presentation. I think an oral elaboration during the presentation of the pitch project, would've been helpful. It has been implemented this year.

- The innovation case was confusing for many of us. Try to be very specific about expectations.

- The innovation case was not the best. The idea was good, but some of the topics did not make too much sense. It is good to try to think innovative, but it is hard. Especially because I do not have that much of a background for these particular cases. Nothing to do about this.
- I think it **was a good idea** that you gave us different topics to choose from, as opposed to allowing us to choose our own topics.

- I think the innovation case, **was very successful**, because you were forced to come up with new ways of thinking. I am very fond of this type of learning, as opposed to the classical "teacher-speech", where you have to sit and listen.
Evaluation from the teachers

- You need to go out of your comfort zone.

- You are challenged in subjects that you haven’t prepared, and that you are not expert.

- Overall is a good interesting new experience from both sides.