

THE HUMAN PROTEOFORM PROJECT WITH PROFESSOR NEIL KELLEHER

TALKING POINTS

KNOWLEDGE

1. What is a protein?
2. What is a proteoform?

COMPREHENSION

3. Why does the Human Proteoform Project need to catalogue the different cell types in the body before it moves on to proteoforms?

APPLICATION

4. How could the results of the Human Proteoform Project benefit healthcare? For example, what are the potential advantages of protein-based cancer drugs over chemotherapy?
5. Neil mentions that he works with doctors, computer scientists, business leaders and research directors. What role do you think each of these disciplines has in making his project a reality, and why might they be interested in getting involved?

ANALYSIS

6. In Neil's 'gold coin' analogy, why is the 'top-down' method more efficient than the 'bottom-up' approach?
7. What do you think motivates Neil to do the work and take the risks that he does?

EVALUATION

8. The Human Genome Project cost about \$2.7 billion but since completion has paid for itself many times over. How do you think it has done this? In what way could the Human Proteoform Project do the same?
9. How would you judge the success of the Human Proteoform Project? What long-term impacts would a successful project result in?

ACTIVITIES YOU CAN DO AT HOME OR IN THE CLASSROOM

Neil's project requires substantial investment and collaboration. Individually or in groups, imagine you are promoting the Human Proteoform Project to a major prospective investor. Research and design a presentation that incorporates all the points below in an engaging way:

- Why the project is important from a societal perspective.
- Evidence of feasibility.
- The scale and nature of the collaborative effort needed.
- A timeline of the project, including milestones along the way.
- The Human Genome Project as an example of a successful project on a similar scale.
- How the investor will get returns on investment.
- The underlying science – presented to a non-scientist audience.
- A related personal story (real or fictional) to engage your audience.

Present to your class when you have completed your presentation.

MORE RESOURCES

- Neil gives an inspiring TEDx Talk on his project here: <https://www.youtube.com/watch?v=hHJxMnq51KU&feature=youtu.be>
- This video explains how the Human Genome Project was a success, emphasising the importance of collaboration: <https://www.youtube.com/watch?v=AhsIF-cmoQQ>
- This article, co-authored by Neil, talks about why the term 'proteoform' was adopted: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4114032/>
- An amazing effort has been put in to creating the first Human Proteoform Atlas. Visit this resource that links proteoforms to human cells, tissue and disease: <http://human-proteoform-atlas.org/>