

# Using fictional characters to help students expand and demonstrate their understanding of complex biomedical concepts

## Using Game of Thrones to teach neuroscience and neuropharmacology during lockdown.

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### INTRODUCTION

- During the pandemic, there was a requirement to provide additional synchronous live tutorials that would engage students whilst encouraging them to problem-solve and use their imagination.
- We also wanted memorable topics where students would actively participate and apply what they had learned in classes.
- Given the popularity of Game of Thrones and use of poisons running throughout the TV series, we used different storylines to get the students to work out how fictional poisons/drugs might affect nervous system function.
- Informal student feedback indicates this form of tutorial using 'pop culture' references is a desirable method of teaching advanced medical sciences.

### SUMMARY OF WORK

- Students (n = 80) did not have to be aware of the content of the television programme but there are plenty of clips on platforms such as YouTube to look up the fictional events described.
- We had previously used a similar approach during informal online teaching with North American students (n = 510 students) where we discussed the science of other fictional characters such as Darth Vader, Captain America, and Colossus. Published, peer-reviewed articles on these topics are freely-available for students to obtain.
- Many poisons (both fictional and real) target mechanisms and processes that are commonly discussed in a range of our courses relating to neuroscience, physiology and pharmacology.
- Our idea was to flip the classroom during Collaborate hour-long tutorial sessions and demonstrate to students that they could apply the knowledge that they already had gained from specific courses and use it in novel ways to solve problems.
- These events allow students to demonstrate not only their mastery of discipline-specific knowledge, but also the wider graduate attributes of imagination, problem-solving, lateral thinking, and originality.

### SOME EXAMPLES USED IN CLASS

(Character images not used here to avoid any potential copyright issues)

Character	Features	Topics to explore
Cersei Lannister	Delivers poison by a kiss to Tyene Sand. We are told the poison is called 'The Long Farewell'. Symptoms of poisoning include bleeding from the nose, blurred vision, and nausea	Why doesn't Cersei die if she has the poison on her lips? What can we tell about the drug if it can be transferred lip to lip? Why might it take a long time to have an effect? What processes do you think the drug might be acting upon?
Olenna Tyrell	Given poison by Cersei Lannister. Drinks it in wine. We are told there will be no pain or horrible side-effects. Dies relatively quickly.	Does this drug sounds like anything we have discussed in the course? What mechanisms might this drug be acting upon if it causes death with no pain/distress?
Joffrey Baratheon	Poisoned at own wedding in his drink with something called 'The Strangler'. Problems breathing, starts to bleed and skin goes purple. Acts within minutes.	What mechanisms that control breathing might this drug be targeting? Why are blood vessels involved? How might we try and reverse such a poison?

### DISCUSSION

- Our perceptions were that students were much better at demonstrating their mastery of the discipline-specific material when asked about it in this fictional context, compared to 'dry' questions that related to everyday pharmacology or neuroscience problems.
- A far greater number of students volunteered answers or questions during the sessions that used such fictional scenarios as the basis for tutorial work.
- There were a far greater number of follow-up questions via email from individual students after the sessions took place.
- Students have already started working on their own fictional characters/scenarios to explore how valid the science might be behind some of the fiction.
- Previous work by Berg & Polvsing (2016), Fitzgerald (2018) and Brown *et al.* (2017) have all reported the worth of using fictional characters to help students expand and demonstrate their understanding of complex biomedical concepts.
- We further used these session to demonstrate to students that they already had some understanding of how drugs worked from a variety of fictional sources such as Agatha Christie detective stories, and why the poisoned apple might have caused Snow White to fall asleep!
- Use of such fictional scenarios can increase interactivity during tutorial-based activities and provide a platform that allows a wider range of students to contribute during such online classes.