



# WELSH BACCALAUREATE

## Advanced

### Individual Project

Bangor University – College of Behavioural Science



PRIFYSGOL  
**BANGOR**  
UNIVERSITY

#### **Brief – Medical Imaging: art and science**

Medical Imaging or radiography and radiology have often been referred to collectively as ‘art and science’, simply because of the combination of the following: the image and its quality and aesthetics (art) with understanding technology, physics and biology (science).

Aspects of the following paragraph could form the basis of your project:

Some say that ‘art and science’ is not enough, commenting that there are other essential aspects in medical imaging and the patient experience. These include understanding human behaviour, especially when a person is experiencing an illness episode and the concepts of empathy. However, we cannot ignore the impact of technological developments on accuracy, patient tolerance and radiation safety.

**Contact:** <https://www.bangor.ac.uk/healthcaresciences/>



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#### **Brief – Medical Imaging: 'plain' and 'specialised' imaging**

In late 1895 Wilhelm Röntgen discovered X-rays and published his findings in early 1896. The potential for medical use in medical diagnostics was quickly realised and well over 100 years of medical imaging has resulted in *several* diagnostic imaging methods now being available to us.

Consider the following information as a basis for your project:

The imaging team today must consider which of the methods available are most suited to individual patients; sometimes this means that 'plain' X-ray imaging might be used, rather than methods considered 'specialised'. These specialised methods include magnetic resonance imaging (MRI), computed tomography (CT), ultrasound, nuclear medicine or even hybrid imaging. The imaging media may be via ionising radiation, ultrasound or magnetic resonance and the appearances of images differ for each of these modalities.

There are challenges facing the team when selecting methods, such as patient tolerance, availability of equipment, radiation dose and requirements related to clinical history. In addition, patients and their families sometimes wonder why 'simple' investigations such as plain X-ray imaging might be offered to them and ask why they haven't been referred for 'specialised' investigations.

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#### **Brief- Going Viral!**

Every year, in the middle of winter, an epidemic of flu and other respiratory viruses grips Wales causing misery and discomfort. Whilst for the vast majority of people these viruses are an inconvenience, they can be deadly to the young and the old.

At the end of the First World War a major influenza pandemic occurred known as Spanish Flu. This pandemic was responsible for killing over 50 million people across the globe. Of course, back in 1918 we did not have many of the wonderful medical technologies we rely on now to help combat the virus. On the other hand, it wasn't very easy to travel around to spread the infection either.

Modern life increases the risk of a global pandemic of respiratory diseases such as Middle East respiratory syndrome (MERS) and Swine Flu in some respects, but modern medical advances might decrease the risk by providing answers and treatments.



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#### **Brief- The sweet effect of honey**

Honey has been collected as a food source by humans since at least 8000 BCE and has been used for its medicinal qualities since the time of the ancient Egyptians. It has been described as having anti-microbial effects and has been used to treat wounds and burns for many millennia.

Honey appears to have antimicrobial effects.



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#### **Brief- A bug loses its grip**

The Black Death is the name given to a great pandemic of the 14<sup>th</sup> Century caused by the bacterium *Yersinia pestis*. Over 7 years the pandemic swept over Europe killing between 30-50% of the continent's population. Since this time *Yersinia pestis* has continued to cause periodic epidemics of bubonic and pneumonic plague. However the mortality associated with the bacterium has dropped dramatically.

Bacteria and viruses appear to become less virulent to humans over time.



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#### **Brief- See appendix**

The human appendix is often considered to be a vestigial organ, serving little purpose to the human body and often causing significant harm. It has even been described as 'a leading candidate for the most poorly designed organ in the human body'. Some doctors agree while others disagree with this statement.



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#### **Brief- Baby it's cold outside!**

It is a common feature in nature and has also been noticed in humans that we exhibit seasonality to our reproductive drives. Many more babies are conceived during the winter to be born in the spring/summer.

This seasonality could have advantages and disadvantages.



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#### **Brief- Who do you think you are?**

Modern humans are believed to have evolved in Africa and to have colonised the rest of the world in waves of migration. By 40,000 BCE they had arrived in Europe but it would not be until approximately 12,000 BCE that humans arrived in North America. Given that the early human population was very low and they tended to migrate in small groups, this will have impacted on the genetic diversity for modern humans. This might help us research where peoples' ancestors came from.



# WELSH BACCALAUREATE Advanced

## Individual Project Cardiff University – Medical Sciences



### **Brief – How do researchers develop new medical treatments?**

How are new medicines and treatments developed? Scientists, engineers and doctors and other healthcare professionals are at work every day in hospitals, clinics, laboratories and communities developing and testing a huge number of ideas aimed at improving the health and care of patients. How do they come up with the ideas? How do they research and test them? How do they keep patients safe during the experimental phases? How can they be sure that their new medicines and treatments work? And how do they work in teams and with industry to develop their ideas into a product that people can use every day?

You might be interested in the development of new medicines, or innovative technologies (such as monitoring machines or surgical equipment), or you might want to explore how the advice doctors and nurses give to patients about things such as diet and exercise changes as we find out more about what makes a difference to people's health.

You can use a number of different research methods to get information: studying books and articles in scientific and medical journals, looking at University prospectuses and research reports or reading articles and books about famous medical researchers and their work. You can look in newspapers and on websites for information about medical innovations and look at clinical trials registers and databases to see what research is being carried out in Wales. You might want to look into the ethics of research on patients and how research is regulated in order to protect trial participants from harm. All this information is available in your local library or on the internet. You could also get first-hand information through talking to healthcare professionals including doctors, nurses and pharmacists as well as academics and scientific researchers, or through 'shadowing' a scientist or medical researcher. You might see if there is a research laboratory, clinic or medical technology company near you who would be willing for you to visit.

### **Contacts**

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# WELSH BACCALAUREATE

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### Individual Project

Cardiff University – Medical  
Sciences



#### Brief

Doctors can, quite literally, hold your life in their hands. Learning to be a doctor is a complex business: in addition to studying clinical science, doctors need be capable of doing many other things such as diagnosing and treating a huge range of conditions and illnesses, performing practical procedures and prescribing safely, working effectively in a team with nurses, pharmacists and other health care professionals, and understanding how to keep patients safe and how to communicate with them and their families in sometimes difficult and stressful situations. When a person decides to become a doctor they must meet the challenge of getting into medical school. Once in medical school they have a lot to learn and can learn it in several, different ways. Later, they must decide what sort of doctor they want to be – for example, a GP, anaesthetist, surgeon or medical researcher. How people are trained to be an NHS doctor in Wales at the start of the 21<sup>st</sup> century could be different in the future.

Many people are interested in the undergraduate medical education that takes place in universities and teaching hospitals and how qualified doctors keep their training up to date once they start work in the NHS.

#### Contacts

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