Centre of the Cell

Introducing the games

Perimeter Screens

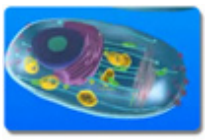
Some of the games the pupils will use during a Centre of the Cell visit are available online, and can be used on an interactive whiteboard. Playing one or two of them in the classroom before the visit will ensure there are some familiar sights in the Pod. This will also introduce the pupils to the way the games work.

Useful games for introducing cells are:

What is a cell? www.centreofthecell.org/learn-play/games/what-is-a-cell/

Introduces the concept of cells and gives pupils an idea of the very large numbers of them in the body.

Explore a cell www.centreofthecell.org/learn-play/games/explore-a-cell/



This interactive 3D cell gives your pupils an idea of the many different parts of a cell, and how they are specialised for different functions.

Build an Organ www.centreofthecell.org/learn-play/games/build-an-organ/

Pupils think about which cells make up which tissues, and which tissues make up which organs.

Nucleus games

The nucleus – the centrepiece of Centre of the Cell, in which games are housed that can be found nowhere else in the world.

Most of the games in Centre of the Cell are self-explanatory, and are not described below in favour of letting visitors explore them for themselves. One or two, however, may require some introduction from parents or teachers.

Information follows on these games and background to the relevant science.

TB Invaders

This game demonstrates that although a solution to a problem may have been found, that solution will not necessarily be the best one. Many scientists are working on finding better solutions to problems that have been officially 'solved'.

In this case, the problem is tuberculosis (TB) treatment. In this game, visitors discover the drawbacks of current treatment, and meet Professor Tanya Parish, who is working to find better treatments that will work quicker, be better for the patient, and decrease the problem of drug resistance.

The problem

Though TB can be cured, the cure is onerous, requiring that the patient take several types of antibiotic over six months.

Many patients get bored of taking their antibiotics, particularly once the worst symptoms have passed and they feel better, despite the fact that there are still TB bacteria in their system.

If they stop taking their antibiotics before the bacteria are wiped out, there is a strong chance the infection will take hold once more, and this time the bacteria may not be so susceptible to the action of the antibiotics: they will have developed resistance. Drug-resistant TB is an increasing problem, especially in London, and a major contributor is people ceasing medication before their infection is cleared.

The science

The TB bacterium exists in several life-stages, changing from one to the other as it grows. We do not currently have a drug that will work against TB at any time in its life: the several antibiotics a patient must take all attack a different life stage.

Professor Parish is trying to develop a medicine that will attack the TB bacterium at any time during its life, meaning that treatment will involve far fewer drugs and take far less time. That would be better for the patient – whose liver must to process the medicine – and better for everyone, as people would be more likely to finish their treatment and so drug-resistance will be less of a problem.

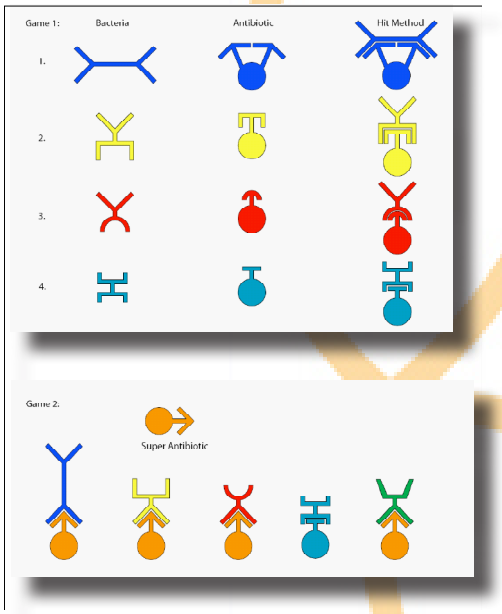
The game

The main element of the game is a two-part shoot-em-up, attacking TB bacteria using antibiotics as bullets. The bacteria are continually changing life-stage.

In the first part of the game, you have several bullets: one for each life-stage. As the bullets are continually changing and the life-stage of the bacteria are continually changing, it makes it very difficult to ensure the right bacteria are hit by the right bullet at the right time.

In the second game, you have only two bullets: Professor Parish's hypothetical new medication that kills almost all of the bacteria in any life-stage; and one of the old ones, just to mop up any bacteria that might be left over. This game is, of course, vastly easier, showing how much quicker a patient could be cured of TB with the new antibiotic.

The antibiotics and bullets are represented by corresponding symbols, as follows:



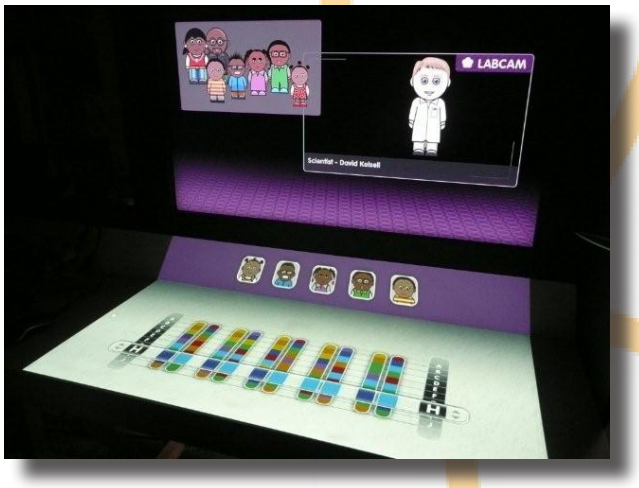
Gene Search

This game shows how scientists discover the function of genes by looking for patterns within families. It is based on the work of Professor David Kelsell, who has discovered the functions of a number of genes, including one for the skin disease Harlequin Ichthyosis – which is covered in one of the perimeter screen games – and one for a certain type of deafness.

The game

There are many causes of deafness, some of which are hereditary. This game looks at one particular genetic deafness, exploring the genotypes and phenotypes of a family with deaf children to discover which gene caused the deafness.

Once the gene is identified, visitors then use that information to screen embryos for deafness, identifying which will grow up to be deaf and which are likely to grow up to be hearing. This raises an ethical question at the end that is of relevance to Key Stage 4 pupils and above: just because we can screen embryos for deafness, should we do so?



Beyond Brushing

This game is based on stem cell research being done by Professor Francis Hughes, looking at how to grow new jawbone in patients whose lack of dental hygiene has caused their bone to be eaten away by bacteria.

It is the lack of jawbone, not receding gums, that causes teeth to fall out in patients with severe gum disease. This lack of bone also makes restoration difficult – bridges and implants both need bone to for support.

The science

When the jawbone develops, it develops from stem cells that have been instructed to differentiate into bone cells. These instructions come from a particular chemical that is present in the mouth at the right time during development.

Professor Hughes and his team are trying to replicate the chemical so that they can instruct the stem cells in a patient's mouth to differentiate into bone. Being able to grow back the bone in this way would allow dentists to replace teeth with bridges and implants, instead of only being able to provide false teeth.

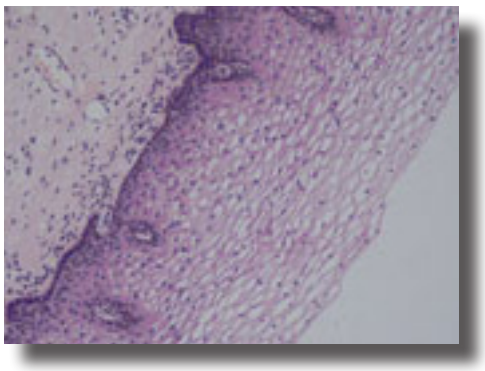
Cancer diagnosis using microscopes

Histopathologists use slides made from tissue to diagnose disease. Cancer diagnoses in particular are made using this method. Centre of the Cell contains two microscopes, both of which have a set of slides showing either cancerous or healthy tissue. The job of the visitor is to diagnose which is which.

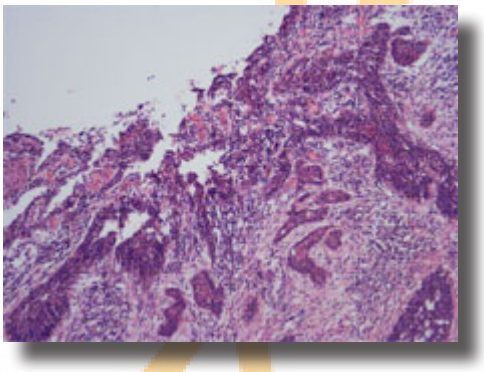
The difference between cancerous and healthy tissue lies in the organisation of the cells. Healthy tissue is very orderly, because the cells are growing as they should and dying as they should. In contrast, cancer cells grow chaotically – barging their way into places they shouldn't grow, and rarely dying to make way for others. Cancer tissue is therefore very disorganised.

If you are not used to looking at slides and identifying different features of cells and tissues on them, this difference between healthy and cancerous tissues can be hard to spot. Below is an example.

Healthy tissue



Cancerous tissue



Note that the healthy tissue is in clear layers, whereas the cancerous one is not, and that the edges of the cancerous tissue are haphazard, whereas the healthy tissue is smooth.