

Start as a stem cell !

Audience: 4+ The game can be discussed and adapted to suit many different levels. It's ideal for family audiences where players are of multiple ages.

Introduction:

'Start as a stem cell!' was designed to introduce people to the idea that cells differentiate to produce mature cells, that differentiation pathways are controlled by signals within and outside the cell and that stem cells are at the start of these pathways. The blood system has been chosen as the model for this game, as out of all the systems in the human body this is the most well characterised. Warning: regulatory networks are not normally this fun!

Instructions:



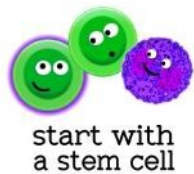
Aim of the activity:

To create as many mature blood cells as you can in 5 minutes. The game can be played by 1- 6 players in a team or as an individual (if one player).

Watch a demo of the game here:
www.eurostemcell.org/start-with-a-stem-cell

1. Player one stands on the central blood stem cell, holding a ping pong ball (stem cell). The five minute countdown is started (you could use a mobile phone/digital display/sand timer).
2. The player throws the three dice resulting in three colours displayed. The player moves one step to a new cell in the direction the colours dictate. If a direction has a multi coloured arrow then all of those colours are needed to go in that direction.
3. Player two (if there is more than one player) then stands on the centre with a ping pong ball and throws the dice. Any player on the board can move when the dice is thrown whether or not they threw the dice. Repeat until all of the team have started as a stem cell in the middle.
4. When a player reaches a mature cell (they can't differentiate any further) they place their ping pong ball in the container next to the image of the mature cell they have become. They then pick up a new ping pong ball and start again in the centre. Play continues like this until the five minutes are up.
5. The exception is when a player 'self renews' by throwing a blue, pink and yellow when on the central stem cell. They take an extra ping pong ball and return to the centre.
6. Once the five minutes are over count the number of mature cells produced. If playing as a team the result can be recorded on a flip chart / whiteboard scoreboard.





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Science messages:

1. Stem cells are able to produce copies of themselves (self renew) and give rise to different cells .
2. That cells produced are increasingly more restricted in the types of cells they can give rise to.
3. At the end of the pathway a mature cell is formed that cannot divide to give rise to different cells.
4. The process of cells dividing to become ever more specialised is called differentiation.
5. That new cells are produced from cell division
6. The type of cell produced depends on the signals that a cell receives from its environment (both internal and external).
7. The range of mature cells produced from blood stem cells.
8. That scientists are manipulating cell environments in the lab to go backwards along these signal pathways.

Misconception aware!

One misconception that may arise if not discussed after playing the game is that one stem cell will produce one mature cell. As at each division two cells are born, it's worth discussing how many actual cells would have been produced during the game (a bit of multiplication needed here!). You could have a short piece of video showing a cell division.

Tips for introducing the game:

Young audiences – an example dialogue:

"Have you ever fallen from your bike or fallen over and cut your knee? What starts to come out of the cuts?" "blood..." "Can you see anything on the game that is the same colour as your blood?" "Yes..." [point to erythrocyte] "That's a red blood cell, which is what makes your blood look red. Your blood is made of lots of other types of cells too; we can see them here. We can't normally see them as they are so small – we'd need a microscope to do that. Our challenge today is to make as many blood cells as we can in 5 minutes – do you think you can do it?" "Yes!". "All these types of blood cell are made from a special type of cell called a stem cell and that's where we start – as a stem cell...". Then take the team through the instructions. Depending on the age of the children they may not have a concept of cells but I tend not to discuss any further about cells before playing the game. This could always be done after playing.

Possible discussion points:

Examples include: types of signals, what iPS cells are (you could use a large arrow to show the pathway being reversed), transdifferentiation, the number of blood cells we would produce in 5 minutes in health and in injury.



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Risk assessment pointers:

- The floor mat can move on certain flooring. Use 'sticky mat' underneath to secure and or tape the mat down.
- Be aware of the dice – often children playing get excited and the dice can become a trip hazard.
- In wet conditions the floor mat can get damp and slippery. Wipe dry between games and / or ask participants to take shoes and socks off. Just socks can be a slip hazard.

The game in action

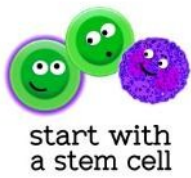


What you'll need [items provided in the kit are in bold]

1. Floor game mat
2. Box / bowl with **ping pong balls** (about 40)
3. 10 measuring cylinders or other containers for collecting the balls
4. **10 mature cell picture cards** positioned next to the containers
5. Labels for cell types (optional)
6. Score board (optional)
7. **3 large coloured dice (1x orange/blue, 1xblack/pink, 1xpurple/yellow)**

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