



Have a Heart (and Beat it)!

Question:

How does the heart work to pump blood from the lungs to the capillaries and back?

Background:

Scientists are working on ways to fix hearts that have been damaged as a result of heart disease. They need to be able to keep blood pumping through the whole body so that nutrients can be delivered through the blood then the blood needs to get 'recharged' with oxygen from the lungs for the next trip.

Scientists and engineers are also trying to figure out how get stem cells to mature into heart tissue and replace damaged heart tissue with newly grown tissue. One of the challenges has been to get stem cell 'pacemaker' cells to beat in time with the heart they are being patched on to.

Activity:

There are two ways that you can play the heartbeat game. The larger the family you have, the more fun, so get encourage everybody to get engaged!

Version 1:

This is an opportunity to teach your kids how blood moves through the cardiovascular system. It has been modified to address the requirements of social distancing and is designed to be incorporated as a whole body, whole family activity. (This game is most fun if you have 4 or more people in your household.)

~Form a line, the person at the head of the line is the lungs, the next person is the heart, then it goes to arteries, arterioles and capillaries (of course, this depends on how many people you have joining you!).

~The lungs start by giving a 'high five' to the heart (symbolizing sending blood to the heart). The heart then turns and claps to the arteries. After receiving the clap, the arteries then turn and clap to the arterioles who then pass the clap to the capillaries.

****The challenge comes because when the 'heart' passes the beat to 'arteries' they have to clap at EXACTLY the same time. Then when the beat is passed to the next person in line, they also have to clap at EXACTLY the same time. Once the clap gets to the end of the line, the clap then goes back up the line (only now the arterioles and arteries become venules and veins). If anyone is 'off' on their clap, then the game starts over again at the lungs. See how many times your clap can get from the lungs to the capillaries and back to the lungs in a two-minute time span.

Version 2:

This is an activity that is designed to show the difficulties inherent with adding 'pacemaker cells' onto an already beating heart. For the heart to continue functioning, ALL cells must beat at exactly the same time. Form a circle with your family, design a system that you think will work then on the word "GO!" EVERYBODY must clap at exactly the same time and keep the beat going.

Vocabulary to incorporate into this lesson:

Synchronicity is the key word to both these activities. There are two science components addressed in these activities.

~Every single heartbeat is critical to moving our blood all the way out to our capillaries and back again where the blood is recharged with oxygen in the lungs.

~Our heart is made up of about 2-3 billion cardiac cells (in addition to other cells) and they ALL must beat together in the same rhythm

Beat it – Song by Michael Jackson

Use these words or your own!

You can't live without it
You gotta have heart
There are lots of pieces and
They all play a part
Spend the day with us
And you're gonna get smart
We'll beat it, just beat it!

You better run,
Gotta move like superman
Gotta keep it healthy
You don't want it less than
You wanna keep the blood
Movin while you can

Just beat it
You wanna be good!
Just beat it, just beat it
Don't want to be defibrillated

Knowin' how the veins and the arteries flow
Just goin' round and round, never say "whoa"
Just beat it, just beat it
Just beat it, just beat it.