

REAL VOICES

Three people tell us about the part proteins play in their lives.

JACK ANDRAKA

US high school student and scientist



What do you do?

I'm a high school student and the inventor of a test to detect pancreatic cancer.

How does your test work?

I've created a novel paper sensor made from ordinary filter paper, single-walled carbon nanotubes and an antibody to mesothelin, a protein biomarker for pancreatic, ovarian and lung cancers. I dipped the filter paper into a mixture of the antibody and nanotubes, let it dry, and repeated until there was a coating on the paper. I then measured the conductivity. After mesothelin was applied to the sensor, the mesothelin bonded with the antibody and pushed the nanotubes apart. This changed the conductivity and could be measured with an ohmmeter that measures electrical resistance.

Why pancreatic cancer?

When I was in middle school, a close family friend passed away from pancreatic cancer. I didn't even know what a pancreas was, so I turned to the Internet to find out. The statistics I found shocked me, and I was determined to find a better way of diagnosing the disease so people could have the cancer detected earlier when they would have a better chance of survival.

What was the best part of making the test?

Working in the lab and learning from the scientists there. The process of science is the most fun part – just testing your

hypothesis and seeing where it leads you.

When might the test be available?

Right now I'm in talks with biotechnology companies to get the strip made more quickly and uniformly so it can get to clinical trials. It takes a lot longer to get from 'proof of concept' to a finished product than I imagined!

What are you working on now?

I want to diagnose a variety of diseases easily, quickly and economically. I also want to develop my sensor to detect more diseases. I'm currently in high school so have two years before college. This year will be busy because I'm taking a lot of advanced classes, taking important exams, researching my projects, travelling and speaking.

What's the best advice you have?

Read widely and brainstorm a lot! The best advice I've been given is to patent your idea before you speak about it publicly. If a 15-year-old who didn't even know what a pancreas was can create a sensor to detect cancer using the Internet, just imagine what you can do! We need to remove obstacles to learning by having open access to journal articles and scientific knowledge so kids like me can create and innovate.

Find out more at www.jackandraka.net

SAMANTHA RENKE

Actress and public relations professional



What do you do?

I used to be a language teacher, but I am now working in marketing and PR. I'm also doing some acting – I'm quite busy! I'm 27 and currently living in London.

What is brittle bone disease?

It's a genetic disorder that affects type I collagen in the body and is also known as osteogenesis imperfecta. There is a lot of collagen in our skeleton so it causes us to have very low bone density and fragile bones.

Due to multiple fractures, people with the condition usually have stunted growth. This happens because when you're constantly fracturing, the body needs to attend to the fracture before it can continue to grow. The new bone that grows back is very weak and can also be deformed, causing bowing of the arms and legs. Usually we have scoliosis, which is a curvature of the spine. That can push on our heart and lungs.

How does it affect you?

I've got type III osteogenesis imperfecta, which means that I'm a full-time wheelchair user. I've had approximately 200 breaks in my life. They actually started in the womb, when my mum was carrying me. When I was a baby I would fracture up to a few times a week. There's no indication when I'm going to break: I've been tipped out of my chair onto a pavement and nothing's happened to me, but I've rolled over in bed and

snapped my collarbone.

Are there any treatments?

There is no known cure, but there are a few drugs (bisphosphonates) that can be taken to increase bone density. Curvature of the spine can often be rectified by putting rods into the back, which I've had done. I've also got telescopic rods in my legs to support them and to correct my bowing.

What's the most difficult thing?

Analysing everything I do and reducing all the risks. If I'm going out for drinks with friends, I have to think: how am I going to get there? What happens if they don't have a disabled toilet? What happens if there is a flight of stairs? So I do have to do a lot of planning for even the simplest of activities.

I'm quite eager to make sure that people view disabled people as integral to society. I've always been very positive and achieved a lot in my life – in spite of the fact that I've had to battle a lot due to my health, and because we don't live in a world that is designed for disabled people.

Find out more at www.brittlebone.org

Read an extended version of some of these interviews at www.wellcome.ac.uk/bigpicture/proteins

HANNAH POWELL

Olympic weightlifter



How did you start weightlifting?

I started when I was 11, at secondary school. I hold a few British records for my age category and for my weight category, and I've competed internationally for Great Britain and for England.

How do people react?

Most of the time, the reaction is shock, mainly because I'm only 4' 8". I also often get asked if weightlifting is the reason I'm so small, but it's not. My height's an advantage. Usually the best shape for weightlifters is short everything: short arms, short legs and short body.

Which category are you in?

I'm in the lightest bodyweight category (48 kg), but I'm light for my class at 45 kg. Usually girls in this class train around 50 kg and then lose the last 2 kg over a couple of weeks to compete. The heavier you are, the more you lift, so if you're training heavy then you're training better. I'm constantly trying to put weight on.

Do you eat lots of protein?

A mistake a lot of people make when weight training is to overload on protein thinking that it's going to help them build massive muscles, but your body is only going to use so much. The thing I eat most of is complex carbohydrates, as that's what's going to help me put on weight, but protein straight after training is what helps you build the muscle once you've broken it down in training.

Chocolate is my weakness. I'm not really bothered about junk food, but every single day I find myself thinking 'I really want some chocolate'!

How often do you train?

I train about five times a week. I'm not funded [by British Weight Lifting] at the moment, so I work full time as a classroom assistant at a primary school. Going from being funded and able to train twice a day to working full time and trying to squeeze training in around work is quite hard – but I choose to do it.

Is it a male-dominated sport?

Yes. Women didn't compete in the Olympics until 2000. In the 14 years since, though, the standard of female lifting has rocketed. There are women out there who are outlifting men. 2012 has opened people's eyes to new sports.

What's next for you?

The 2014 Commonwealth Games will be the biggest chance I've ever had to perform on the international stage, so I'm working really hard and trying to keep things quiet.

Find out more at www.britishweightlifting.org

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