

Ava Sulpher, Shawn Ding, Dylan Revells - The Cubes in Space Experiment: Protecting Teeth in Space

- Chiraz: Hello and welcome to CDA Oasis. My name is Chiraz Guessaier and today I am joined with Dr. Aaron Burry, Associate Director, Professional and Scientific Affairs, here at CDA. The story is a testimony to a spirit of innovation, creativity, initiative, and potential found in our future Canadian generations. A group of very young Canadian students came up with an idea that may be a game changer for many patients undergoing radiation therapy and who are at great risk of losing their teeth. We have invited the stars in this story so they, themselves, can tell it in their own words. So, hello everyone. Welcome to CDA Oasis. Can you introduce yourselves?
- Ava: My name is Ava Sulpher. I'm in grade five at St Gemma.
- Dylan: My name is Dylan Revells. I'm in grade five at [inaudible].
- Shawn: My name is Shawn Ding. I'm grades six at St. Clair.
- Chiraz: Perfect. Welcome all to this conversation and we want it to be a very informal conversation. I'd like to start by asking you, how did it all start? How did the idea of doing this experiment and developing this product and what is the product that you developed? How did it all come about?
- Shawn: Oh, well, we, first we joined the contest called Cubes in Space where we would send an experiment into space and to see how space would affect the experiment. And we decided to send up teeth because we know that bones weaken in space. So, we thought, well, teeth are similar to bones, so we should see if teeth also deteriorate in space. And it turns out they do.
- Speaker 1: So, we decided to make something that protects astronauts' teeth in space because teeth are very important to our looks and eating and everything. So, we designed a teeth radi-protector, which is a kind of like a mouthguard, but it has a thin layer of Demron, which is a fabric that protects against radiation embedded into it, which will protect astronauts' teeth and can even protect people undergoing radiation therapy.
- Dr. Burry: Oh, that's amazing. How did you feel when your research idea was accepted by Cubes in Space amongst hundreds of others submitted from all over the world?
- Dylan: We felt really excited because when we joined the contest, we didn't know if we were going to make it or not because there's like over a thousand groups in this contest and only 80 groups get to make it. So, we were very lucky to make it.
- Chiraz: So, Shawn, you mentioned that the mouth guard could help people undergoing radiation therapy, is that the only use of the product or are there other uses?

- Shawn: We designed it so it would protect astronauts' teeth in space, so they wouldn't deteriorate. But, there are many uses such as, as you mentioned protecting if there are patients undergoing radiation therapy with maybe cancer, like a tumor near their mouth or in their head or they could wear this while undergoing radiation therapy and protects their teeth.
- Dr. Burry: Tell us about how you developed the product. What are the steps you followed, who did you work with? Were you able to do it on your own or was it necessary for you to collaborate with other people and experts?
- Ava: Yeah. So, in the steps that we made it was once we had gotten the teeth back that we had tested in space to see if they had weakened, then we started thinking about how we could find a solution to that and then we came up with the teeth radi-protector and once we did, we had to see if we can make it. So, we worked in partnership with Space Maintainers Laboratories to mold the teeth radi-protector into what it should actually look like. And, we worked with Dr. Johnson to get the teeth that we would actually put inside the teeth radi-protector when it went on to the rocket. And, we also, like, it was very important for us to take ideas from other people than just having two people make it and then design it and everything.
- Dr. Burry: Were you able to actually go to the lab and see the production happening?
- Dylan: Yes. I went to the lab. Not everyone went to the lab, but because it was a Saturday, only like 20 to 30 students went to the lab and we worked with like a technician to we use this machine that molded the plastic and Demron on to the tooth. And at first, it didn't work and we had to add other stuff on to the tooth so that it would hold on properly.
- Chiraz: What is the material that you used Dylan? Can you talk to us a little bit about that?
- Dylan: The material used is called Demron. It was created by the US radiation shield technologies and we don't know what it's made of because it's not released to the public, but we know that we were able to use it in our Cubes in Space project because they did include some of the materials.
- Chiraz: And you layered it between another material. Is that how it happened?
- Dylan: Yeah, it was like sandwiched in between two layers of Essix plastic, which is for making mouth guards to straighten teeth.
- Chiraz: Now what is the next stage of this experiment? Because I understand there is a next stage.
- Shawn: Well, we thought it was just going to be a simple experiment to try and test teeth. Then, we realized how much purpose this could actually have. So we've been thinking of

maybe even patenting it, but we realized that costs a lot of money; so we might not be able to do that, but hopefully we will. And, maybe sell our idea.

Chiraz: Great. you also have another stage, you're sending teeth, more teeth into space.

Shawn: Oh yes. Oh yes. We're going to validate our experiment this year again. So, we're going to do the same experiment and see if it has the same results as we did last year to make sure that it actually works properly.

Chiraz: So, you were sending a pair of unprotected teeth and another pair of protected teeth?

Dylan: Yes. Yeah. We could get a little cube on a sounding rocket and another one on a balloon for doing the same thing for both of their cubes. There's going to be two teeth. Yeah, that's the cube. And there's going to be two teeth with the teeth radi-protector on top of them and one two sets unprotected and we're keeping a control sample back at our class.

Chiraz: So, I understand that a group of students comes from different feeder schools to St. Brother Andre for this program in science. Can you tell us more?

Ava: So, we all come from 30 different schools of students who come to St. Brother Andre one day a week to the program for gifted learners.

Dylan: It's not just science, like it's everything. Each term we do like a big project like Cubes in Space for example, and many other projects. And one of the things we're focusing on this year is the UN global goals. And so, we do like team challenges where we get into groups of three or four and we use like random materials to build stuff. And, that usually revolves around the UN global goals somehow.

Dr. Burry: Now, we're just wondering, do any of you plan to pursue a career in science or maybe even dentistry?

All: Yeah,

Chiraz: Who wants to be the dentist?

Shawn: Well, I'm not all that interested in dentistry to be honest. This project kind of has taught me more about the teeth and all that and it's pretty interesting.

All: Yeah, definitely.

Chiraz: Now, to conclude our beautiful conversation, I'd like to ask the three of you to tell us if you learned anything out of this whole experiment?

- Dylan: We definitely learned lots of things out of this experiment. For me, I think I learned the most about radiation in space and different types of radiation and how and what stuff can protect things from radiation. And I think that's the main thing that I learned.
- Ava: For me, it was probably learning about some of the issues that astronauts have that we don't know about. So, before we started this experiment, we had no idea that teeth would be weakened in space.
- Shawn: For me it was learning about how radiation could actually affect things like people's bones and actually have a real impact on some people, which is why these products actually have a purpose and will be useful.
- Chiraz: I really don't know how to close this conversation. This is a great conversation. I'd like to keep talking to you guys. It was a pleasure to meet you. It was a pleasure to get to know you. We wish you all the best in the next stage of your experiment as well as in all your studies and your lives and keep us up to date if you guys have set any other breakthroughs. Okay?
- All: Thank you. Thank you. Thank you.
- Dr. Burry: Thank you very much.