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00:00:00,940 --> 00:00:04,010

>> We are back here at the cardiovascular lab here at the Johnson Space Center.

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00:00:04,010 --> 00:00:08,770

I'm joined by Steve Platts, who is one of the laboratory managers here at this laboratory.

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00:00:08,770 --> 00:00:11,650

You know, before we were talking about these ultrasounds that they have here on the ground

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00:00:11,650 --> 00:00:14,950

that is very similar to what the crew up onboard the station has, Steve,

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00:00:14,950 --> 00:00:18,630

talk a little bit about the upcoming experiment called [inaudible].

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00:00:18,630 --> 00:00:22,690

>> Yeah. [inaudible] you talked a little bit about ICV earlier and that one was focused

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00:00:22,690 --> 00:00:25,950

on the heart, [inaudible] is focused on the blood vessels,

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00:00:25,950 --> 00:00:27,620

and so we would get images like this.

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00:00:27,620 --> 00:00:32,630

This is an image of a carotid artery and you see these colors streaking by, that's Doppler.

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00:00:32,630 --> 00:00:35,720

So if you think about the radars you've seen when we're looking at weather

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00:00:35,720 --> 00:00:40,320

and they're showing how the winds and the rains are moving and that's Doppler color.

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00:00:40,320 --> 00:00:44,920

This is that same concept that shows the colors moving, so this represents blood flow,

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00:00:44,920 --> 00:00:47,350

so we measure that and we measure the diameter of the vessel,

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00:00:47,350 --> 00:00:50,460

and we can actually measure the thickness of the blood vessel.

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00:00:50,460 --> 00:00:55,660

And on the ground, that thickness has been shown to relate to risk of atherosclerosis.

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00:00:55,660 --> 00:00:57,950

So, that's really what we're trying to get at.

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00:00:57,950 --> 00:01:01,880

Is space flight at all changing the risk of getting atherosclerosis

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00:01:01,880 --> 00:01:03,620

down the road for our astronauts.

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00:01:03,620 --> 00:01:06,030

>> Okay. So you take -- is this -- where do they take this?

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00:01:06,030 --> 00:01:07,370

Is this an artery in the neck [inaudible].

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00:01:07,370 --> 00:01:10,520

>> Yeah, right here in the neck and so you take a probe like this

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00:01:10,520 --> 00:01:11,600
and you just stick it [inaudible].

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00:01:11,600 --> 00:01:11,670
[Inaudible]

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00:01:11,670 --> 00:01:15,630
>> Now do they do it to themselves or do they
have a, a field expeditionary help them out?

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00:01:15,630 --> 00:01:20,360
>> We've done it both ways and for this one, I
believe we're going to have them do themselves

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00:01:20,360 --> 00:01:23,290
and we're going to have someone on
the ground do the remote guidance

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00:01:23,290 --> 00:01:24,940
like we talked about for the previous study.

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00:01:24,940 --> 00:01:27,450
>> So you're talking about the different colors
in the Doppler effect, I mean that's just

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00:01:27,450 --> 00:01:29,320
like what you see on the weather, you know...

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00:01:29,320 --> 00:01:29,760
>> Exactly.

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00:01:29,760 --> 00:01:31,770
>> [inaudible] taking a look at it,
so the, so the blue means that...

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00:01:31,770 --> 00:01:33,950
>> So the blue flow's moving
that -- in that direction.

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00:01:33,950 --> 00:01:35,680

>> Do you take a look at how fast it's going [inaudible].

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00:01:35,680 --> 00:01:36,530

>> We do. We do.

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00:01:36,530 --> 00:01:42,120

We can look at velocity and then if you multiply velocity by the cross sectional area,

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00:01:42,120 --> 00:01:43,380

you can actually get the blood flow.

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00:01:43,380 --> 00:01:48,790

And blood flow tends to be what we use more, how much blood is going through that vessel

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00:01:48,790 --> 00:01:51,300

in a minute or whatever time period you choose to use.

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00:01:51,300 --> 00:01:53,870

>> So you can [inaudible] you can actually see the, the walls here, right?

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00:01:53,870 --> 00:01:56,450

I mean you can see them expanding and [inaudible].

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00:01:56,450 --> 00:01:56,850

>> Yup. Yup.

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00:01:56,850 --> 00:01:59,100

So that's the [inaudible] you'll see in a, in an artery.

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00:01:59,100 --> 00:02:01,220

>> Yeah. So let's talk about
how small, you know,

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00:02:01,220 --> 00:02:03,840
we were talking about this earlier before we
came on the air, talking about portability,

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00:02:03,840 --> 00:02:06,260
I mean this, this is no bigger
than a laptop, right?

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00:02:06,260 --> 00:02:06,910
>> Right.

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00:02:06,910 --> 00:02:08,230
>> Now let's take a look over here to the --

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00:02:08,230 --> 00:02:10,400
this is what they used to have onboard
the International Space Station,

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00:02:10,400 --> 00:02:12,680
something this size, it was about
the size of an entire rack, right?

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00:02:12,680 --> 00:02:14,020
>> It was a full rack, yes.

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00:02:14,020 --> 00:02:18,480
It took up a lot of space and
it's, it's locked in place.

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00:02:18,480 --> 00:02:22,640
You have to do everything within a cable
length, you can't move around the station.

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00:02:22,640 --> 00:02:24,880
With the new unit here, it's portable.

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00:02:24,880 --> 00:02:26,280

You can see how small it is.

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00:02:26,280 --> 00:02:29,540

You can move it around station,
you can have a lot more flexibility

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00:02:29,540 --> 00:02:31,520

with the experiments you want to do with that.

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00:02:31,520 --> 00:02:35,130

>> [inaudible] I mean that's fascinating
to see something this large can now be done

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00:02:35,130 --> 00:02:38,290

with something that's just, you know, weighs
almost nothing and, and takes just a --

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00:02:38,290 --> 00:02:39,670

the same size as a laptop [inaudible].

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00:02:39,670 --> 00:02:42,320

>> [inaudible] and this has
much more computing power

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00:02:42,320 --> 00:02:43,960

than the ultrasound that
was up there previously.

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00:02:43,960 --> 00:02:47,130

There's a lot more we can do
now than we could do before,

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00:02:47,130 --> 00:02:49,160

even though the unit's a fraction of the size.

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00:02:49,160 --> 00:02:51,170

>> This is the same sort of
thing that hospitals use, right?

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00:02:51,170 --> 00:02:51,640

>> Absolutely.

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00:02:51,640 --> 00:02:53,730

>> Okay. So are they, are they seeing sort of the same thing,

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00:02:53,730 --> 00:02:55,770

things going smaller and smaller and smaller?

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00:02:55,770 --> 00:02:55,890

>> Yes.

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00:02:55,890 --> 00:02:55,960

[Inaudible]

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00:02:55,960 --> 00:02:59,370

>> In fact, we leverage off of those technological breakthroughs.

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00:02:59,370 --> 00:03:03,540

We are constantly watching the field to see what's coming up, what's new.

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00:03:03,540 --> 00:03:08,680

Our long range vision would be like a [inaudible], just like we'd want to able

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00:03:08,680 --> 00:03:12,950

to just scan like this with a tiny, little handheld unit and that's all we need

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00:03:12,950 --> 00:03:15,640

or iPod, iPad, something like that.

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00:03:15,640 --> 00:03:20,250

But that's where we see it going in the next 10 years, very small, handheld medical device

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00:03:20,250 --> 00:03:22,260

and so we can do everything
right then and there.

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00:03:22,260 --> 00:03:24,050

>> With a lot more power.

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00:03:24,050 --> 00:03:27,730

So let's talk about [inaudible] when it's --
the equipment's up there, this is up there.

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00:03:27,730 --> 00:03:32,240

>> Yes, this is up there now and it's being used
for ICV and some other experiments right now.

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00:03:32,240 --> 00:03:34,730

>> So how long with [inaudible]
last, like what, what's the length?

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00:03:34,730 --> 00:03:39,470

>> Well, it's -- that's a really unique part of
this study is [inaudible] the data acquisition

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00:03:39,470 --> 00:03:44,970

in flight should take about four years,
but we have a five year surveillance period

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00:03:44,970 --> 00:03:49,920

after they land so we can
track any increased risk

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00:03:49,920 --> 00:03:52,970

that the crew member acquired
while they were in space.

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00:03:52,970 --> 00:03:56,980

And so this is the first time we've been
able to do a surveillance portion of a study

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00:03:56,980 --> 00:04:01,840

so the total study is nine years and that's very, very rare for a ISS study.

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00:04:01,840 --> 00:04:04,700

>> Whenever you take a look at, you know, we talked about before how the human body reacts

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00:04:04,700 --> 00:04:08,840

to being up there in space and it -- is it one of these things where you guys study it and,

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00:04:08,840 --> 00:04:12,290

and you sort of solve these mysteries, or is it one of these where the more you look into it,

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00:04:12,290 --> 00:04:16,870

you sort of, you know, peeling back the onion, you just learn more and more about how the body,

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00:04:16,870 --> 00:04:19,900

you know, is it, is it -- are there more mysteries than you guys even anticipated?

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00:04:19,900 --> 00:04:23,210

>> Oh yeah, every time we do an experiment, we end up with more questions

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00:04:23,210 --> 00:04:25,070

than we had when we started the experiment.

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00:04:25,070 --> 00:04:27,780

And that's not to say we don't make breakthroughs, we do.

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00:04:27,780 --> 00:04:31,300

We can come up with countermeasures, we've developed a few countermeasures.

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00:04:31,300 --> 00:04:34,810

Some of the other laboratories have been working on countermeasures for various things,

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00:04:34,810 --> 00:04:38,120

but every time we do a study and you see something like this

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00:04:38,120 --> 00:04:43,360

and you think you know what you know, you find out that you really don't know that much at all.

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00:04:43,360 --> 00:04:47,130

>> Now, last, last questions real quick, you know, we, we talk about the benefits of on,

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00:04:47,130 --> 00:04:50,360

here on Earth, but what is this sort of experiment and the one we talked about before,

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00:04:50,360 --> 00:04:53,140

ICV, what does that really -- how does it impact people here on Earth and,

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00:04:53,140 --> 00:04:56,510

and talk about the differences between being in space and being here on the planet.

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00:04:56,510 --> 00:05:01,010

>> Well, we know on Earth, if you have a thickening in this vessel,

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00:05:01,010 --> 00:05:05,930

that it has a negative consequence later on for atherosclerosis

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00:05:05,930 --> 00:05:09,350

and we're doing other experiment, other parts of this experiment where we look

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00:05:09,350 --> 00:05:13,440

at how the vessels function, so how they get bigger and get smaller.

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00:05:13,440 --> 00:05:17,600

And those are all things that are used in the clinic to diagnose cardiovascular health

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00:05:17,600 --> 00:05:22,270

to see how the endothelium's working, to see what precursors might be going

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00:05:22,270 --> 00:05:25,120

on before you actually get atherosclerosis.

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00:05:25,120 --> 00:05:26,540

So, this is all subclinical.

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00:05:26,540 --> 00:05:29,140

You would not, you would not have symptoms

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00:05:29,140 --> 00:05:32,360

if we were detect something, it's very, very, very early on.

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00:05:32,360 --> 00:05:36,170

And the earlier you can detect things like this, the earlier you can treat them and your,

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00:05:36,170 --> 00:05:38,830

your chances of positive outcomes are even greater.

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00:05:38,830 --> 00:05:42,560

So, when we're doing these kind of experiments, they're all designed to relate back

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00:05:42,560 --> 00:05:46,140

to the clinic, how can we bring it back to Earth and help the people down here.

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00:05:46,140 --> 00:05:50,240

>> So, basically we can learn, you know, the warning signs of a variety of different issues

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00:05:50,240 --> 00:05:53,080

with the veins and our arteries in the heart way earlier on [inaudible] could

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00:05:53,080 --> 00:05:55,130

about learning about what happens up in space.

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00:05:55,130 --> 00:05:55,870

It's fascinating.

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00:05:55,870 --> 00:05:58,400

It's fascinating stuff to see this, you know, and see how this actually operates here

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00:05:58,400 --> 00:06:01,490

on Earth, versus up there onboard the station to see what the crew is doing,

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00:06:01,490 --> 00:06:04,170

I mean they almost have to sort of have to become their own sort of, you know,

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00:06:04,170 --> 00:06:07,160

doctors without, you know, all the technical expertise of it.

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00:06:07,160 --> 00:06:07,270

>> Yup.

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00:06:07,270 --> 00:06:11,740

>> But, but it's, it's fascinating to see this kind of stuff happening.

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00:06:11,740 --> 00:06:13,680

So, if you want to learn more

about this, you can always log

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00:06:13,680 --> 00:06:16,040

onto the NASA website, nasa.gov slash station.

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00:06:16,040 --> 00:06:18,050

Take a look at all the different experiments

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00:06:18,050 --> 00:06:22,040

that are taking place onboard the space station right now, and read about [inaudible]

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00:06:22,040 --> 00:06:25,570

or the ICV experiment that we talked about before and take a look