



1  
00:00:01,667 --> 00:00:05,371  
>> The integrated cardiovascular  
experiment studies heart mass

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00:00:05,371 --> 00:00:09,575  
and rhythms to glean information  
about cardiac atrophy.

3  
00:00:09,575 --> 00:00:11,444  
That's a decrease in  
heart muscle that's seen

4  
00:00:11,444 --> 00:00:13,546  
in some astronauts  
when they return

5  
00:00:13,546 --> 00:00:15,247  
from long duration missions.

6  
00:00:15,247 --> 00:00:16,782  
Here's one of the  
co-investigators

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00:00:16,782 --> 00:00:19,251  
of that experiment  
had to say about it.

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00:00:19,251 --> 00:00:21,320  
Tell us about the integrated  
cardiovascular experiment.

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00:00:21,320 --> 00:00:22,688  
>> Michael Bungo: Well  
it's pretty extensive

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00:00:22,688 --> 00:00:25,057  
and that's why they ended up  
giving it the name integrated.

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00:00:25,057 --> 00:00:28,260

But we're looking  
at a diverse number

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00:00:28,260 --> 00:00:32,064

of cardiovascular parameters and  
how they change with spaceflight

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00:00:32,064 --> 00:00:34,100

and how changes in  
the heart function

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00:00:34,100 --> 00:00:38,904

or the heart structure  
will affect the ability

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00:00:38,904 --> 00:00:43,109

to do exercise, will affect the  
ability to stand after return

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00:00:43,109 --> 00:00:46,846

to gravity, and what  
influence that might have

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00:00:46,846 --> 00:00:50,616

on the generation of  
cardiac rhythm disturbances.

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00:00:50,616 --> 00:00:52,084

>> Lori Meggs: Tell us  
what you've learned.

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00:00:52,084 --> 00:00:55,154

>> Michael Bungo: We've learned  
that if you measured the change

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00:00:55,154 --> 00:00:58,491

in the amount of work, heart  
work now not physical work

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00:00:58,491 --> 00:01:02,962  
but cardiac work that's done  
in space versus on the ground

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00:01:02,962 --> 00:01:05,664  
because the theory is that in  
space your heart is doing less

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00:01:05,664 --> 00:01:07,900  
work than it's doing on the  
ground but if you measure

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00:01:07,900 --> 00:01:12,004  
that change in work and then  
you can relate that directly

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00:01:12,004 --> 00:01:15,808  
to how much mass or how  
big or small the heart is

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00:01:15,808 --> 00:01:18,410  
and the change in cardiac mass.

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00:01:18,410 --> 00:01:22,948  
So we've verified that and  
we've seen changes in heart size

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00:01:22,948 --> 00:01:27,853  
in the astronauts from  
preflight to post-flight.

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00:01:27,853 --> 00:01:31,624  
Then our secondary goals for  
the experiment are to look

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00:01:31,624 --> 00:01:36,362  
at those changes and see  
whether these reflect in changes

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00:01:36,362 --> 00:01:39,865

in their ability to perform  
in an exercise regime

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00:01:39,865 --> 00:01:41,901  
or their ability to perform

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00:01:41,901 --> 00:01:44,436  
in standing upright  
pre or post-flight.

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00:01:44,436 --> 00:01:47,406  
Or does it relate to the  
generation of any, as I said,

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00:01:47,406 --> 00:01:49,074  
cardiac rhythm disturbances.

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00:01:49,074 --> 00:01:50,176  
>> Lori Meggs: Tell us

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00:01:50,176 --> 00:01:53,012  
about earth applications  
that this may bring.

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00:01:53,012 --> 00:01:54,146  
>> Michael Bungo: Right.

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00:01:54,146 --> 00:01:56,615  
Well we think it does  
have some applications

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00:01:56,615 --> 00:01:59,985  
to the earth particularly  
we've had for decades,

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00:01:59,985 --> 00:02:04,590  
NASA has used bed rest as analog  
for spaceflight particularly

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00:02:04,590 --> 00:02:07,359  
as it relates to the  
cardiovascular system.

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00:02:07,359 --> 00:02:10,229  
So this may have  
implications for those people

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00:02:10,229 --> 00:02:14,733  
who are otherwise relegated  
to sedentary positions either

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00:02:14,733 --> 00:02:19,371  
because of injury or because of  
disease or there may, indeed,

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00:02:19,371 --> 00:02:22,808  
be some parallels between  
people who have heart failure

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00:02:22,808 --> 00:02:25,244  
and decreases in cardiac mass

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00:02:25,244 --> 00:02:27,112  
that we might see  
with spaceflight.

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00:02:27,112 --> 00:02:30,115  
So we're looking to make  
those kinds of analogies

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00:02:30,115 --> 00:02:31,483  
in the future as well.

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00:02:31,483 --> 00:02:32,985  
>> Lori Meggs: So if you make  
those analogies you can come

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00:02:32,985 --> 00:02:34,653  
up with what?

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00:02:34,653 --> 00:02:36,956

>> Michael Bungo: Well you know there's certainly a whole lot

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00:02:36,956 --> 00:02:39,191

more people on earth than there are in space

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00:02:39,191 --> 00:02:45,598

so if there are either equivalent situations on earth

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00:02:45,598 --> 00:02:49,868

that could help supplement our knowledge base for spaceflight

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00:02:49,868 --> 00:02:53,305

or conversely, if in order to prevent some

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00:02:53,305 --> 00:02:54,540

of the changes we see

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00:02:54,540 --> 00:02:56,642

in spaceflight we develop certain countermeasures.

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00:02:56,642 --> 00:03:00,212

These may be applicable as I'll put in quotes treatments

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00:03:00,212 --> 00:03:03,015

in the clinical environment here on earth.

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00:03:03,015 --> 00:03:04,783

>> Lori Meggs: And the integrated cardiovascular

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00:03:04,783 --> 00:03:06,652  
experiment concluded recently

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00:03:06,652 --> 00:03:08,854  
with Expedition 35's  
Tom Marshburn

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00:03:08,854 --> 00:03:10,322  
as the last test subject.

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00:03:10,322 --> 00:03:13,359  
A total of 13 astronauts  
participated in this study

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00:03:13,359 --> 00:03:15,694  
over the last few years  
and we look forward

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00:03:15,694 --> 00:03:17,963  
to hearing results  
in the coming months.

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00:03:17,963 --> 00:03:20,432  
For more information on this  
and other investigations,

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00:03:20,432 --> 00:03:23,068  
go to [NASA.gov/station](https://www.nasa.gov/station).

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00:03:23,068 --> 00:03:24,903  
And as we take a live look

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00:03:24,903 --> 00:03:27,473  
into the pilot operations  
integration center,

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00:03:27,473 --> 00:03:29,541  
Tim Horvath is at the helm today

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00:03:29,541 --> 00:03:31,677

as the Pilot Operations  
Director.

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00:03:31,677 --> 00:03:34,313

And they are supporting the  
Robonaut 2 activities today.

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00:03:34,313 --> 00:03:37,583

And that will do for us from  
the pilot operations integration