HD

1
00:00:09,190 --> 00:00:07,909
with valentine's day just passed we

2
00:00:11,190 --> 00:00:09,200
thought this might be a good time to

3
00:00:13,110 --> 00:00:11,200
talk about the heart in particular the

4
00:00:14,950 --> 00:00:13,120
largest heart study ever completed on

5
00:00:16,390 --> 00:00:14,960
board the space station

6
00:00:18,310 --> 00:00:16,400
laurie meigs of the payload operations

7
00:00:22,950 --> 00:00:18,320
center at nasa's marshall space flight

8
00:00:26,950 --> 00:00:24,710
valentine's day is sometimes used to

9
00:00:29,269 --> 00:00:26,960
measure how big or how small our heart

10
00:00:30,790 --> 00:00:29,279
is one study actually measured the size

11
00:00:33,430 --> 00:00:30,800
of the heart of astronauts on the space

12
00:00:35,750 --> 00:00:33,440
station to see how microgravity may or

13
00:00:37,590 --> 00:00:35,760

may not affect it it's one study that

14
00:00:39,990 --> 00:00:37,600
according to the co-investigator is

15
00:00:43,350 --> 00:00:40,000
already changing lives on earth

16
00:00:46,069 --> 00:00:43,360
the icv or integrated cardiovascular

17
00:00:48,310 --> 00:00:46,079
study was the largest and most ambitious

18
00:00:50,790 --> 00:00:48,320
study of the cardiovascular adaptation

19
00:00:53,750 --> 00:00:50,800
to long-term space flight ever attempted

20
00:00:56,950 --> 00:00:53,760
we studied 14 astronauts

21
00:00:59,189 --> 00:00:56,960
before and during and after six months

22
00:01:01,910 --> 00:00:59,199
on the space station and we did a very

23
00:01:03,910 --> 00:01:01,920
comprehensive set of evaluations

24
00:01:07,030 --> 00:01:03,920
before and afterwards we used cardiac

25
00:01:10,230 --> 00:01:07,040
mri very advanced cardiac imaging to

26
00:01:12,310 --> 00:01:10,240
look at cardiac morphology and structure

27
00:01:14,630 --> 00:01:12,320
since we originally hypothesized that

28
00:01:16,230 --> 00:01:14,640
the heart atrophies and shrinks with

29
00:01:19,030 --> 00:01:16,240
long duration space flight about one

30
00:01:21,109 --> 00:01:19,040
percent a week we quantified the work of

31
00:01:23,429 --> 00:01:21,119
the heart by putting a little finger

32
00:01:25,109 --> 00:01:23,439
blood pressure device and measuring the

33
00:01:26,390 --> 00:01:25,119
amount of work the heart was doing with

34
00:01:29,030 --> 00:01:26,400
each heartbeat

35
00:01:31,270 --> 00:01:29,040
over the course of 24 hours we looked at

36
00:01:33,990 --> 00:01:31,280
advanced electrophysiology

37
00:01:37,350 --> 00:01:34,000
we used echocardiography novel imaging

38
00:01:41,030 --> 00:01:37,360

techniques 2 and 3d imaging at multiple

39
00:01:42,950 --> 00:01:41,040
gravitational gradients so um space

40
00:01:43,990 --> 00:01:42,960
which spell equivalent which is lying

41
00:01:45,670 --> 00:01:44,000
flat

42
00:01:48,069 --> 00:01:45,680
mars equivalent

43
00:01:51,190 --> 00:01:48,079
right and then earth equivalent so it

44
00:01:52,310 --> 00:01:51,200
allowed us to calibrate what we saw in

45
00:01:54,550 --> 00:01:52,320
space

46
00:01:57,510 --> 00:01:54,560
and then perhaps even more important on

47
00:01:59,749 --> 00:01:57,520
landing day we study them again at mars

48
00:02:01,910 --> 00:01:59,759
gravity which is the first time anyone

49
00:02:04,389 --> 00:02:01,920
has ever evaluated the cardiovascular

50
00:02:06,550 --> 00:02:04,399
system if an astronaut were to land on

51
00:02:07,590 --> 00:02:06,560
mars after six months in flight what'd

52
00:02:09,270 --> 00:02:07,600
you find

53
00:02:11,350 --> 00:02:09,280
well interestingly

54
00:02:13,910 --> 00:02:11,360
you know the astronauts right now do a

55
00:02:15,110 --> 00:02:13,920
lot of exercise on on play

56
00:02:17,589 --> 00:02:15,120
and so

57
00:02:20,150 --> 00:02:17,599
our least fit astronauts the ones who

58
00:02:22,710 --> 00:02:20,160
release fit before they left

59
00:02:25,270 --> 00:02:22,720
actually became fitter instead of

60
00:02:27,990 --> 00:02:25,280
getting smaller their hearts got bigger

61
00:02:29,350 --> 00:02:28,000
and um because we were quantifying the

62
00:02:32,630 --> 00:02:29,360
amount of work of the heart we could

63
00:02:35,430 --> 00:02:32,640

show that the more work the heart did in

64
00:02:37,910 --> 00:02:35,440
space compared to beforehand the more

65
00:02:41,110 --> 00:02:37,920
the heart got bigger in contrast the

66
00:02:42,470 --> 00:02:41,120
most fit astronauts tended to lose some

67
00:02:44,150 --> 00:02:42,480
heart muscle

68
00:02:45,350 --> 00:02:44,160
but not nearly as much as we had

69
00:02:48,150 --> 00:02:45,360
predicted because of all the

70
00:02:49,670 --> 00:02:48,160
countermeasures so at the end of the day

71
00:02:51,990 --> 00:02:49,680
with the kind of counter countermeasures

72
00:02:54,390 --> 00:02:52,000
we're doing in flight the heart adapts

73
00:02:56,229 --> 00:02:54,400
pretty well

74
00:02:57,750 --> 00:02:56,239
but basically overall we're studying you

75
00:02:59,110 --> 00:02:57,760
know they're healthy the astronauts are

76
00:03:01,910 --> 00:02:59,120
healthy people that's right how does

77
00:03:03,990 --> 00:03:01,920
this relate to folks on earth who

78
00:03:07,270 --> 00:03:04,000
may not be as healthy and as fit as that

79
00:03:08,550 --> 00:03:07,280
sure well perhaps the best example is

80
00:03:11,190 --> 00:03:08,560
patients who have what we call

81
00:03:13,750 --> 00:03:11,200
orthostatic intolerance or the inability

82
00:03:14,869 --> 00:03:13,760
to stand up in fact there's a group of

83
00:03:17,110 --> 00:03:14,879
patients

84
00:03:19,670 --> 00:03:17,120
mostly young women called the postural

85
00:03:21,670 --> 00:03:19,680
orthostatic tachycardia syndrome who

86
00:03:23,190 --> 00:03:21,680
can't stand up for long periods of time

87
00:03:24,789 --> 00:03:23,200
their hearts are beating really really

88
00:03:27,190 --> 00:03:24,799

fast

89
00:03:29,110 --> 00:03:27,200
and they get lightheaded and dizzy and

90
00:03:31,350 --> 00:03:29,120
and it turns out that their physiology

91
00:03:33,430 --> 00:03:31,360
is very similar to astronauts

92
00:03:35,430 --> 00:03:33,440
and so

93
00:03:37,430 --> 00:03:35,440
their hearts get really really small

94
00:03:39,430 --> 00:03:37,440
just like astronauts do and

95
00:03:41,990 --> 00:03:39,440
based on what we learned from studying

96
00:03:43,750 --> 00:03:42,000
astronauts and our bedrest studies we

97
00:03:44,869 --> 00:03:43,760
know that if you can keep the heart from

98
00:03:47,670 --> 00:03:44,879
shrinking

99
00:03:49,670 --> 00:03:47,680
you can prevent or reverse this syndrome

100
00:03:52,229 --> 00:03:49,680
and we've now studied hundreds of women

101
00:03:54,309 --> 00:03:52,239
around the world and changed the lives

102
00:03:56,390 --> 00:03:54,319
of many of them i get emails all the

103
00:03:57,670 --> 00:03:56,400
time dr levine you've given me my life

104
00:03:59,350 --> 00:03:57,680
back

105
00:04:01,110 --> 00:03:59,360
wow that's something too it is quite

106
00:04:03,030 --> 00:04:01,120
compelling and it's all based on the

107
00:04:04,789 --> 00:04:03,040
work we did with nasa trying to

108
00:04:06,710 --> 00:04:04,799
understand what happens to the heart in

109
00:04:08,789 --> 00:04:06,720
space

110
00:04:10,309 --> 00:04:08,799
and taking a live look into the payload

111
00:04:12,229 --> 00:04:10,319
operations integration center tim

112
00:04:13,589 --> 00:04:12,239
horvath is the payload operations

113
00:04:15,750 --> 00:04:13,599

director today leading the team of

114
00:04:18,629 --> 00:04:15,760
flight controllers here in assisting the

115
00:04:20,870 --> 00:04:18,639
crew with all of those busy science

116
00:04:23,590 --> 00:04:20,880
activities and penny pettigrew is the

117
00:04:24,870 --> 00:04:23,600
pacom assisted by crystal morgan today

118
00:04:26,870 --> 00:04:24,880
that'll do it for us here from the

119
00:04:28,710 --> 00:04:26,880
payload operations integration center