Astronaut Cady Coleman

EXPEDITION 36/37 ONBOARD THE ISS

1
00:00:20,100 --> 00:00:17,190
it's all about matters of the heart hi

2
00:00:35,460 --> 00:00:20,110
I'm NASA astronaut Tracy Dyson welcome

3
00:00:37,319 --> 00:00:35,470
to station life on today's show our

4
00:00:39,120 --> 00:00:37,329
focus is going to be on matters of the

5
00:00:41,670 --> 00:00:39,130
heart as they relate to good

6
00:00:43,770 --> 00:00:41,680
cardiovascular health we'll take a look

7
00:00:46,470 --> 00:00:43,780
at how NASA is keeping our astronauts

8
00:00:47,760 --> 00:00:46,480
hearts healthy authors and we'll also be

9
00:00:48,960 --> 00:00:47,770
looking at some research that's being

10
00:00:51,060 --> 00:00:48,970
done on board the International Space

11
00:00:54,210 --> 00:00:51,070
Station that can keep all of us healthy

12
00:00:56,550 --> 00:00:54,220
here on the earth cardiovascular disease

13
00:00:58,680 --> 00:00:56,560

including heart disease stroke and high

14
00:01:01,200 --> 00:00:58,690
blood pressure is the number one killer

15
00:01:03,210 --> 00:01:01,210
of men and women across America many

16
00:01:04,829 --> 00:01:03,220
studies have shown that healthy habits

17
00:01:07,410 --> 00:01:04,839
including good nutrition and exercise

18
00:01:09,690 --> 00:01:07,420
are most important for maintaining a

19
00:01:11,280 --> 00:01:09,700
healthy heart here on the earth those

20
00:01:13,080 --> 00:01:11,290
habits are even more important for

21
00:01:15,270 --> 00:01:13,090
astronauts working and living onboard

22
00:01:17,219 --> 00:01:15,280
the International Space Station the

23
00:01:19,440 --> 00:01:17,229
cardiovascular system consists of the

24
00:01:21,149 --> 00:01:19,450
heart blood vessels and the approximate

25
00:01:23,429 --> 00:01:21,159
5 liters of blood that gets pumped

26
00:01:25,230 --> 00:01:23,439
throughout the entire body this system

27
00:01:27,149 --> 00:01:25,240
has the job of delivering oxygen and

28
00:01:29,459 --> 00:01:27,159
other nutrients to every cell in the

29
00:01:31,919 --> 00:01:29,469
body plus removing waste from those

30
00:01:33,690 --> 00:01:31,929
cells living in space for six months

31
00:01:36,209 --> 00:01:33,700
changes our bodies in a number of ways

32
00:01:38,550 --> 00:01:36,219
without gravity we lose bone mineral

33
00:01:41,249 --> 00:01:38,560
density our muscles atrophy our

34
00:01:42,959 --> 00:01:41,259
cardiovascular system gets weaker some

35
00:01:45,389 --> 00:01:42,969
of our studies have shown that in space

36
00:01:47,399 --> 00:01:45,399
the size and shape of our hearts may

37
00:01:49,559 --> 00:01:47,409
actually change which could impact

38
00:01:51,510 --> 00:01:49,569

humans ability to function well when we

39
00:01:54,629 --> 00:01:51,520
return back to earth or even land on

40
00:01:56,819 --> 00:01:54,639
Mars on earth our heart and blood

41
00:01:58,590 --> 00:01:56,829
vessels are well adapted to work against

42
00:02:01,349 --> 00:01:58,600
the downward pull of gravity in space

43
00:02:03,510 --> 00:02:01,359
however there's a tendency for blood and

44
00:02:04,319 --> 00:02:03,520
other bodily fluids to accumulate in the

45
00:02:05,879 --> 00:02:04,329
upper body

46
00:02:09,090 --> 00:02:05,889
let's take a look at one of the

47
00:02:11,010 --> 00:02:09,100
consequences of this fluid shift we have

48
00:02:13,320 --> 00:02:11,020
recently identified that some astronauts

49
00:02:14,520 --> 00:02:13,330
experience changes in their vision which

50
00:02:17,670 --> 00:02:14,530
might be related to the cardiovascular

51
00:02:19,740 --> 00:02:17,680
system our hearts pump blood around our

52
00:02:21,570 --> 00:02:19,750
body through blood vessels special

53
00:02:23,699 --> 00:02:21,580
adaptations in our bodies ensure that

54
00:02:24,670 --> 00:02:23,709
fluid is evenly distributed despite the

55
00:02:28,220 --> 00:02:24,680
pool of grass

56
00:02:29,690 --> 00:02:28,230
in space astronauts no longer

57
00:02:31,970 --> 00:02:29,700
experienced the downward pull of gravity

58
00:02:34,210 --> 00:02:31,980
and the fluid in their bodies tends to

59
00:02:37,310 --> 00:02:34,220
move towards the upper body in the head

60
00:02:38,990 --> 00:02:37,320
our cranium is a rigid container as the

61
00:02:40,610 --> 00:02:39,000
fluid moves towards the head it causes

62
00:02:42,650 --> 00:02:40,620
the pressure inside the skull to rise

63
00:02:45,830 --> 00:02:42,660

this is known as increased intracranial

64
00:02:47,780 --> 00:02:45,840
pressure the optic nerve travels from

65
00:02:49,610 --> 00:02:47,790
the brain to the eye the increased

66
00:02:51,980 --> 00:02:49,620
pressure from the cranium travels down

67
00:02:53,840 --> 00:02:51,990
the nerve and affects the eye it causes

68
00:02:55,610 --> 00:02:53,850
the optic nerve to be squeezed in the

69
00:02:57,950 --> 00:02:55,620
optic disc where the optic nerve meets

70
00:02:59,960 --> 00:02:57,960
the eye to swell the back of the eyeball

71
00:03:01,640 --> 00:02:59,970
flattens as pressure builds behind it

72
00:03:04,730 --> 00:03:01,650
and the blood vessels in the back of the

73
00:03:06,980 --> 00:03:04,740
eyeball also swell these changes can

74
00:03:08,840 --> 00:03:06,990
affect the astronauts vision one change

75
00:03:10,699 --> 00:03:08,850
is that the astronauts become farsighted

76
00:03:13,460 --> 00:03:10,709
a second change is that they can develop

77
00:03:15,110 --> 00:03:13,470
cotton-wool spots which represent damage

78
00:03:17,720 --> 00:03:15,120
of the nerve fibers in the back of the

79
00:03:21,260 --> 00:03:17,730
eye these can cause discrete areas of

80
00:03:22,820 --> 00:03:21,270
vision loss NASA is working to

81
00:03:24,440 --> 00:03:22,830
understand to prevent these changes in

82
00:03:26,240 --> 00:03:24,450
astronauts which may also help us

83
00:03:53,140 --> 00:03:26,250
understand and prevent related vision

84
00:03:58,220 --> 00:03:56,390
in space and on earth we have physicians

85
00:04:00,440 --> 00:03:58,230
that help maintain our health meet my

86
00:04:01,880 --> 00:04:00,450
good friend dr. Joe Schmidt Joe good

87
00:04:04,070 --> 00:04:01,890
morning Tracy good morning welcome to

88
00:04:05,150 --> 00:04:04,080

station life it's great to be here it's

89
00:04:07,370 --> 00:04:05,160
so great to have you

90
00:04:08,780 --> 00:04:07,380
you know Joe Schmidt was my flight

91
00:04:10,130 --> 00:04:08,790
surgeon when I was on board the

92
00:04:12,530 --> 00:04:10,140
International Space Station but our

93
00:04:14,600 --> 00:04:12,540
relationship began way before that even

94
00:04:16,219 --> 00:04:14,610
before we started to be flight surgeon

95
00:04:18,229 --> 00:04:16,229
and crew member we actually played in a

96
00:04:20,780 --> 00:04:18,239
band together but more importantly we

97
00:04:21,979 --> 00:04:20,790
started working together about 17 months

98
00:04:23,960 --> 00:04:21,989
before I actually launched into space

99
00:04:24,950 --> 00:04:23,970
through all my training and preparation

100
00:04:27,170 --> 00:04:24,960
for this mission

101
00:04:28,580 --> 00:04:27,180
Joe talk a little bit about what it's

102
00:04:31,520 --> 00:04:28,590
called what it's like to be a flight

103
00:04:33,650 --> 00:04:31,530
surgeon a flight surgeon yes for me it's

104
00:04:35,690 --> 00:04:33,660
the best job on the planet we get to

105
00:04:38,240 --> 00:04:35,700
take care of extremely healthy and fit

106
00:04:41,270 --> 00:04:38,250
individuals and take them and allow them

107
00:04:43,190 --> 00:04:41,280
to go from the earth to orbit and orbit

108
00:04:45,230 --> 00:04:43,200
be in a place that's a vacuum with and

109
00:04:46,850 --> 00:04:45,240
with lots of radiation and you're in

110
00:04:47,930 --> 00:04:46,860
microgravity and we're going to ensure

111
00:04:49,640 --> 00:04:47,940
that you're just going to stay healthy

112
00:04:51,890 --> 00:04:49,650
and fit throughout your mission and

113
00:04:53,600 --> 00:04:51,900

you're not just in a doctor's office or

114
00:04:55,460 --> 00:04:53,610
a clinic you're also in Mission Control

115
00:04:57,230 --> 00:04:55,470
and you're in you're at the launch site

116
00:04:59,210 --> 00:04:57,240
you're everywhere well that's when it's

117
00:05:00,890 --> 00:04:59,220
true and for the benefit of you being

118
00:05:02,960 --> 00:05:00,900
able to call me Tracy will call me from

119
00:05:05,150 --> 00:05:02,970
orbit and you know I have a special

120
00:05:07,340 --> 00:05:05,160
number on here that says ISS Tracy

121
00:05:09,320 --> 00:05:07,350
Caldwell Dyson Tony and I have to take

122
00:05:12,020 --> 00:05:09,330
the call to my patients so it's it is

123
00:05:13,070 --> 00:05:12,030
the ultimate in telemedicine okay can

124
00:05:14,690 --> 00:05:13,080
you talk a little bit about the

125
00:05:16,129 --> 00:05:14,700
difference between we have space

126
00:05:17,750 --> 00:05:16,139
medicine and we have traditional

127
00:05:19,580 --> 00:05:17,760
medicine what makes space medicine so

128
00:05:22,159 --> 00:05:19,590
different so I'm a family practice

129
00:05:23,750 --> 00:05:22,169
physician by training and then I had

130
00:05:25,879 --> 00:05:23,760
some additional training as a aerospace

131
00:05:27,950 --> 00:05:25,889
medicine and our job is basically to

132
00:05:30,050 --> 00:05:27,960
keep you healthy and keep you flying so

133
00:05:31,790 --> 00:05:30,060
as we said we're going to take you there

134
00:05:33,860 --> 00:05:31,800
very healthy and fit and we're going to

135
00:05:36,409 --> 00:05:33,870
expose you to the extremes of space and

136
00:05:38,629 --> 00:05:36,419
other environments and we have to ensure

137
00:05:41,240 --> 00:05:38,639
that you are fit your hardest fit your

138
00:05:44,719 --> 00:05:41,250

bones are fit your brain is fit and your

139
00:05:46,190 --> 00:05:44,729
and your psychological evaluations are

140
00:05:48,230 --> 00:05:46,200
all good to go so that's what we're

141
00:05:49,730 --> 00:05:48,240
gonna do take you to work oh and you did

142
00:05:51,980 --> 00:05:49,740
and you took really good care of me Joe

143
00:05:53,870 --> 00:05:51,990
I remember one of the most exciting and

144
00:05:56,060 --> 00:05:53,880
extreme things I got to do was a space

145
00:05:57,710 --> 00:05:56,070
walk or two and there you were you were

146
00:05:59,690 --> 00:05:57,720
with me through the whole thing it was

147
00:06:00,360 --> 00:05:59,700
exciting for me too I have the I have a

148
00:06:01,640 --> 00:06:00,370
cat bird

149
00:06:04,770 --> 00:06:01,650
see and that I'm in mission control

150
00:06:07,350 --> 00:06:04,780
monitoring your your systems as well as

151
00:06:09,450 --> 00:06:07,360
your space suit systems so I monitor

152
00:06:12,090 --> 00:06:09,460
your EKG as you're doing your spacewalk

153
00:06:13,260 --> 00:06:12,100
I monitor your your suit systems to

154
00:06:14,159 --> 00:06:13,270
ensure that you have enough oxygen

155
00:06:16,080 --> 00:06:14,169
remaining

156
00:06:18,270 --> 00:06:16,090
that your carbon dioxide hasn't built up

157
00:06:20,189 --> 00:06:18,280
and I'm also listening to your voice to

158
00:06:22,409 --> 00:06:20,199
deter the Cure not getting overly

159
00:06:23,850 --> 00:06:22,419
fatigued and that you're doing well in

160
00:06:26,370 --> 00:06:23,860
your space ball you know one of the

161
00:06:28,140 --> 00:06:26,380
things that drew us closer as well

162
00:06:30,390 --> 00:06:28,150
is some of the experiments that I did on

163
00:06:32,120 --> 00:06:30,400

orbit and and others as well where we're

164
00:06:34,110 --> 00:06:32,130
actually using remote guidance

165
00:06:36,810 --> 00:06:34,120
ultrasound techniques are one of the

166
00:06:40,200 --> 00:06:36,820
most common you act you are correct you

167
00:06:42,300 --> 00:06:40,210
are our hot hands eyes and actually

168
00:06:44,010 --> 00:06:42,310
doing all the tests for us on orbit so

169
00:06:45,570 --> 00:06:44,020
of course you've had the hours and hours

170
00:06:47,760 --> 00:06:45,580
of training but you know exactly which

171
00:06:50,400 --> 00:06:47,770
which angle to use for the heart which

172
00:06:52,740 --> 00:06:50,410
angular use for the carotid the eyes you

173
00:06:54,330 --> 00:06:52,750
studied your own body on orbit you are

174
00:06:56,700 --> 00:06:54,340
the person doing all that sort of

175
00:06:58,980 --> 00:06:56,710
testing on on yourself with the

176
00:07:00,659 --> 00:06:58,990
ultrasound yeah but I couldn't have done

177
00:07:02,850 --> 00:07:00,669
it if it weren't for you guys there in

178
00:07:04,020 --> 00:07:02,860
Mission Control guiding me through it

179
00:07:05,879 --> 00:07:04,030
that's that's one of the important

180
00:07:07,770 --> 00:07:05,889
relationships and we on orbit are the

181
00:07:10,950 --> 00:07:07,780
ones that are holding the probe we're

182
00:07:13,050 --> 00:07:10,960
pushing the buttons but it would be

183
00:07:15,240 --> 00:07:13,060
difficult to get the kind of results

184
00:07:17,460 --> 00:07:15,250
that we see these very detailed images

185
00:07:19,320 --> 00:07:17,470
very useful data if it weren't for the

186
00:07:21,000 --> 00:07:19,330
expertise that we have such as Joe

187
00:07:23,790 --> 00:07:21,010
sitting in Mission Control and our other

188
00:07:25,469 --> 00:07:23,800

investigators well it is important

189
00:07:27,839 --> 00:07:25,479
because we're taking you we've studied

190
00:07:29,940 --> 00:07:27,849
you on the ground we studied your EKG

191
00:07:31,770 --> 00:07:29,950
we've studied your echocardiogram that

192
00:07:34,110 --> 00:07:31,780
ultrasound of the heart we've started

193
00:07:36,390 --> 00:07:34,120
the vo2 max how much you actually

194
00:07:38,219 --> 00:07:36,400
breathe how much oxygen your body uses

195
00:07:40,020 --> 00:07:38,229
while you're exercising and why do we

196
00:07:42,000 --> 00:07:40,030
need to do that we have to do it because

197
00:07:44,100 --> 00:07:42,010
we have to ensure that your body is

198
00:07:46,589 --> 00:07:44,110
still fit enough to continue for a

199
00:07:48,270 --> 00:07:46,599
six-month mission and you have to be fit

200
00:07:51,659 --> 00:07:48,280
enough to go out and do a spacewalk and

201
00:07:53,460 --> 00:07:51,669
as we compare the data from on-orbit to

202
00:07:55,560 --> 00:07:53,470
on the ground we can say with surety

203
00:08:07,170 --> 00:07:55,570
that Tracy Caldwell Dyson is ready to go

204
00:08:11,760 --> 00:08:10,080
on board the space station one of the

205
00:08:13,800 --> 00:08:11,770
tools that we have to study heart health

206
00:08:15,690 --> 00:08:13,810
is the ultrasound device which uses

207
00:08:18,030 --> 00:08:15,700
harmless sound waves to take detailed

208
00:08:19,890 --> 00:08:18,040
images of the inside of our bodies these

209
00:08:22,470 --> 00:08:19,900
images are then viewed by doctors and

210
00:08:23,880 --> 00:08:22,480
researchers inside Mission Control so

211
00:08:26,250 --> 00:08:23,890
with minimal training on ultrasound

212
00:08:28,230 --> 00:08:26,260
remote guidance techniques developed by

213
00:08:31,020 --> 00:08:28,240

NASA allow US astronauts to take

214
00:08:33,120 --> 00:08:31,030
detailed images of our own heart in our

215
00:08:34,830 --> 00:08:33,130
next segment we're going to travel to a

216
00:08:36,600 --> 00:08:34,840
small community in Brazil that has

217
00:08:38,310 --> 00:08:36,610
benefited from remote medicine

218
00:08:40,230 --> 00:08:38,320
techniques that were advanced by

219
00:08:53,730 --> 00:08:40,240
research onboard the International Space

220
00:08:55,500 --> 00:08:53,740
Station miniaturize is a large state our

221
00:08:57,360 --> 00:08:55,510
territory is about the size of France

222
00:09:00,380 --> 00:08:57,370
and we consist of eight hundred and

223
00:09:03,000 --> 00:09:00,390
fifty three units and municipalities

224
00:09:05,460 --> 00:09:03,010
there are large distances between our

225
00:09:11,100 --> 00:09:05,470
communities and many very isolated rural

226
00:09:15,630 --> 00:09:13,680
we are using new technology that impacts

227
00:09:17,910 --> 00:09:15,640
the quality of prenatal care and the

228
00:09:19,800 --> 00:09:17,920
diagnostic capacity of the primary care

229
00:09:29,100 --> 00:09:19,810
doctor in these situations involving

230
00:09:31,290 --> 00:09:29,110
distant isolated communities providing

231
00:09:33,600 --> 00:09:31,300
medical care for people in remote

232
00:09:36,000 --> 00:09:33,610
locations like this in rural communities

233
00:09:38,340 --> 00:09:36,010
or the International Space Station can

234
00:09:42,420 --> 00:09:38,350
be difficult because trained medical

235
00:09:45,180 --> 00:09:42,430
personnel are not always available NASA

236
00:09:47,190 --> 00:09:45,190
research teams develop techniques that

237
00:09:49,590 --> 00:09:47,200
enable astronauts aboard the space

238
00:09:52,320 --> 00:09:49,600

station with minimal training to operate

239
00:09:56,880 --> 00:09:52,330
an ultrasound device using simple

240
00:09:59,370 --> 00:09:56,890
printed cutting the ultrasound images

241
00:10:01,740 --> 00:09:59,380
are transmitted in real-time to adopt

242
00:10:03,990 --> 00:10:01,750
her back on earth who can make medical

243
00:10:07,350 --> 00:10:04,000
decisions without actually being aboard

244
00:10:09,090 --> 00:10:07,360
the station these same techniques have

245
00:10:11,970 --> 00:10:09,100
been adapted for use with portable

246
00:10:13,650 --> 00:10:11,980
ultrasound devices in communities where

247
00:10:21,240 --> 00:10:13,660
expert medical care is not always

248
00:10:23,280 --> 00:10:21,250
available we are also incorporating the

249
00:10:25,050 --> 00:10:23,290
first-aid and emergency care components

250
00:10:27,090 --> 00:10:25,060
and improving first-aid at the scene of

251
00:10:28,980 --> 00:10:27,100
the accident and enabling the use of

252
00:10:36,660 --> 00:10:28,990
ultrasound to communicate to the medical

253
00:10:38,760 --> 00:10:36,670
communication center in the ambulance we

254
00:10:41,070 --> 00:10:38,770
can use ultrasound in various situations

255
00:10:43,290 --> 00:10:41,080
in those situations where time really

256
00:10:47,630 --> 00:10:43,300
matters in which you have little time to

257
00:10:52,200 --> 00:10:50,280
the idea of using ultrasound for

258
00:10:55,350 --> 00:10:52,210
healthcare is like an extension of the

259
00:10:57,920 --> 00:10:55,360
physical examination you are able to

260
00:11:00,270 --> 00:10:57,930
conduct the exam with much more detail

261
00:11:02,160 --> 00:11:00,280
and you can use it at the time

262
00:11:04,170 --> 00:11:02,170
to make a decision or you can use

263
00:11:06,030 --> 00:11:04,180

telemedicine platforms to obtain a

264
00:11:12,020 --> 00:11:06,040
second opinion from someone at a

265
00:11:18,120 --> 00:11:15,600
or monomers right here the Eugenie's my

266
00:11:22,380 --> 00:11:18,130
name is Yorick engineers I'm a doctor in

267
00:11:24,420 --> 00:11:22,390
the town of manga among the people live

268
00:11:26,060 --> 00:11:24,430
with the particularity and that is

269
00:11:29,190 --> 00:11:26,070
isolation

270
00:11:31,650 --> 00:11:29,200
nós temos know bhai - yo graphical news

271
00:11:34,470 --> 00:11:31,660
overseas we have a geographical barrier

272
00:11:36,450 --> 00:11:34,480
that is the San Francisco River which is

273
00:11:42,930 --> 00:11:36,460
both a blessing for the region but it

274
00:11:45,660 --> 00:11:42,940
also isolates us we live in a region

275
00:11:47,610 --> 00:11:45,670
where financial resources are few people

276
00:11:50,070 --> 00:11:47,620
do not have a lot of work but they are

277
00:11:53,010 --> 00:11:50,080
honest good people who do not have much

278
00:11:55,350 --> 00:11:53,020
opportunity so there are many needy

279
00:11:57,210 --> 00:11:55,360
people who need these resources and rely

280
00:12:02,130 --> 00:11:57,220
only on this institution to provide

281
00:12:14,970 --> 00:12:02,140
assistance this is a technology that

282
00:12:16,530 --> 00:12:14,980
helps us so many problems that was the

283
00:12:18,840 --> 00:12:16,540
case of a patient who came to the

284
00:12:20,910 --> 00:12:18,850
hospital with severe respiratory failure

285
00:12:24,990 --> 00:12:20,920
and the people realized she would die in

286
00:12:26,460 --> 00:12:25,000
just twenty to thirty minutes we ran we

287
00:12:27,960 --> 00:12:26,470
talked with doctor Preseli

288
00:12:30,270 --> 00:12:27,970

who was training us to use the

289
00:12:32,579 --> 00:12:30,280
ultrasound he came and applied the

290
00:12:35,610 --> 00:12:32,589
ultrasound and discovered large amounts

291
00:12:37,560 --> 00:12:35,620
of fluid around her lungs and heart we

292
00:12:41,400 --> 00:12:37,570
performed a procedure and drained a lot

293
00:12:42,990 --> 00:12:41,410
of fluids in 20 minutes 10 minutes the

294
00:12:45,180 --> 00:12:43,000
woman immediately experienced an

295
00:12:47,810 --> 00:12:45,190
improvement and in half an hour was

296
00:12:52,050 --> 00:12:47,820
already walking it was like a miracle

297
00:12:53,700 --> 00:12:52,060
arise and walk she was dying in front of

298
00:12:56,369 --> 00:12:53,710
us without people knowing what was

299
00:13:13,989 --> 00:12:59,799
this ultrasound was instrumental in

300
00:13:15,579 --> 00:13:13,999
saving the life of that patient so now

301
00:13:17,499 --> 00:13:15,589
let's hear from some researchers who are

302
00:13:25,840 --> 00:13:17,509
studying the cardiovascular system off

303
00:13:28,780 --> 00:13:25,850
the earth for the earth but we're

304
00:13:30,970 --> 00:13:28,790
looking at a diverse number of

305
00:13:33,069 --> 00:13:30,980
cardiovascular parameters and how they

306
00:13:35,579 --> 00:13:33,079
change with spaceflight and how changes

307
00:13:39,579 --> 00:13:35,589
in the heart function or the heart

308
00:13:41,650 --> 00:13:39,589
structure will affect the ability to do

309
00:13:45,309 --> 00:13:41,660
exercise will affect the ability to

310
00:13:47,559 --> 00:13:45,319
stand after return to gravity and what

311
00:13:49,720 --> 00:13:47,569
influence that might have on the

312
00:13:55,890 --> 00:13:49,730
generation of cardiac rhythm

313
00:14:01,870 --> 00:13:58,930

we've learned that if you measure the

314
00:14:04,000 --> 00:14:01,880
change in the amount of work part work

315
00:14:06,910 --> 00:14:04,010
now not physical work but cardiac work

316
00:14:08,890 --> 00:14:06,920
that's done in space versus on the

317
00:14:10,720 --> 00:14:08,900
ground because the theory is that in

318
00:14:12,310 --> 00:14:10,730
space your heart is doing less work than

319
00:14:15,070 --> 00:14:12,320
it's doing on the ground but if you

320
00:14:17,410 --> 00:14:15,080
measure that change in work and then you

321
00:14:20,440 --> 00:14:17,420
can relate that directly to how much

322
00:14:23,470 --> 00:14:20,450
mass or how big or small the heart is

323
00:14:26,080 --> 00:14:23,480
and a change in cardiac mass so we've

324
00:14:29,190 --> 00:14:26,090
verified that for that and we've seen

325
00:14:33,040 --> 00:14:29,200
changes in heart size in the astronauts

326
00:14:35,800 --> 00:14:33,050
from pre-flight to post flight then our

327
00:14:38,110 --> 00:14:35,810
secondary goals for the experiment are

328
00:14:41,350 --> 00:14:38,120
to look at those changes and see whether

329
00:14:44,050 --> 00:14:41,360
these reflect in changes in their

330
00:14:47,140 --> 00:14:44,060
ability to perform in an exercise regime

331
00:14:49,570 --> 00:14:47,150
or their ability to perform in standing

332
00:14:51,790 --> 00:14:49,580
upright pre or post flight or does it

333
00:14:57,769 --> 00:14:51,800
relate to the generation of any as I

334
00:15:02,690 --> 00:15:00,200
well we think this have some some

335
00:15:05,760 --> 00:15:02,700
applications to the earth particularly

336
00:15:08,850 --> 00:15:05,770
we've had for decades nASA has used

337
00:15:10,170 --> 00:15:08,860
bedrest as an analog or spaceflight

338
00:15:12,990 --> 00:15:10,180

particularly as it relates to the

339
00:15:15,800 --> 00:15:13,000
cardiovascular system so this may have

340
00:15:18,660 --> 00:15:15,810
implications for those people who are

341
00:15:20,550 --> 00:15:18,670
otherwise relegated to sedentary

342
00:15:24,000 --> 00:15:20,560
positions either because of injury or

343
00:15:26,340 --> 00:15:24,010
because of disease or there may indeed

344
00:15:29,310 --> 00:15:26,350
be some parallels between people who

345
00:15:31,140 --> 00:15:29,320
have heart failure and decreases in

346
00:15:33,390 --> 00:15:31,150
cardiac mass that we might see with with

347
00:15:35,460 --> 00:15:33,400
spaceflight so we're looking to make

348
00:15:42,510 --> 00:15:35,470
those kinds of analogies in the future

349
00:15:44,130 --> 00:15:42,520
as well well you know there's there's

350
00:15:47,790 --> 00:15:44,140
certainly a whole lot more people on

351
00:15:51,450 --> 00:15:47,800
earth and there are in space so if there

352
00:15:53,840 --> 00:15:51,460
are either equivalent situations on

353
00:15:56,340 --> 00:15:53,850
earth that could help supplement our

354
00:15:59,700 --> 00:15:56,350
knowledge base for spaceflight or

355
00:16:01,590 --> 00:15:59,710
conversely if in order to prevent some

356
00:16:03,180 --> 00:16:01,600
of the changes we see in spaceflight we

357
00:16:05,910 --> 00:16:03,190
develop certain countermeasures these

358
00:16:08,040 --> 00:16:05,920
may be applicable as put in quotes

359
00:16:21,790 --> 00:16:08,050
treatments in the clinical environment

360
00:16:21,800 --> 00:16:27,690
No

361
00:16:33,010 --> 00:16:30,700
so with all this exercise going on is it

362
00:16:34,180 --> 00:16:33,020
really working well researchers along

363
00:16:35,770 --> 00:16:34,190

with the astronauts strength

364
00:16:37,330 --> 00:16:35,780
conditioning and rehabilitation

365
00:16:39,760 --> 00:16:37,340
specialists have made great progress

366
00:16:41,920 --> 00:16:39,770
before we had a full gym onboard the

367
00:16:43,630 --> 00:16:41,930
International Space Station astronauts

368
00:16:45,390 --> 00:16:43,640
needed quite a bit of recovery time when

369
00:16:47,440 --> 00:16:45,400
they came back home to earth but today

370
00:16:50,170 --> 00:16:47,450
astronauts are coming back home and

371
00:16:52,150 --> 00:16:50,180
excellent health my name is Mark

372
00:16:55,180 --> 00:16:52,160
Williams I'm the lead astronaut strength

373
00:16:56,560 --> 00:16:55,190
and conditioning coach onboard the

374
00:16:58,540 --> 00:16:56,570
International Space Station we have

375
00:17:01,450 --> 00:16:58,550
three pieces of hardware we have a cycle

376
00:17:03,280 --> 00:17:01,460
which we call seevis we have a treadmill

377
00:17:05,140 --> 00:17:03,290
which is called t2 and we have a

378
00:17:08,310 --> 00:17:05,150
resistive exercise device which is

379
00:17:10,360 --> 00:17:08,320
called a red in each device is

380
00:17:12,790 --> 00:17:10,370
specifically designed to do certain

381
00:17:15,580 --> 00:17:12,800
things for the astronaut we try to do

382
00:17:17,920 --> 00:17:15,590
one of those particular vices every

383
00:17:19,630 --> 00:17:17,930
other day one of them we're going to get

384
00:17:21,310 --> 00:17:19,640
a little bit better cardiovascular

385
00:17:22,960 --> 00:17:21,320
fitness out of it the other one we get a

386
00:17:24,850 --> 00:17:22,970
little bit more impact loading like

387
00:17:27,010 --> 00:17:24,860
running on the ground you get so that

388
00:17:30,360 --> 00:17:27,020

affects muscle it affect a little bit of

389
00:17:32,560 --> 00:17:30,370
bone those things those are the

390
00:17:35,140 --> 00:17:32,570
physiological aspects of it but then

391
00:17:37,060 --> 00:17:35,150
also making sure when they come home

392
00:17:39,400 --> 00:17:37,070
from a six-month flight if they don't

393
00:17:41,650 --> 00:17:39,410
come home like a bowl of jell-o you know

394
00:17:43,990 --> 00:17:41,660
they're gonna lose muscle they're gonna

395
00:17:45,160 --> 00:17:44,000
lose strength they're gonna lose bone

396
00:17:47,740 --> 00:17:45,170
they're gonna lose

397
00:17:50,350 --> 00:17:47,750
cardiovascular fitness but at the same

398
00:17:52,150 --> 00:17:50,360
time then we have to take them get them

399
00:17:53,890 --> 00:17:52,160
back to where they were before they left

400
00:17:55,990 --> 00:17:53,900
which is what we do in our post-flight

401
00:17:58,060 --> 00:17:56,000
period once they come home for about six

402
00:17:59,890 --> 00:17:58,070
to eight weeks and just get them

403
00:18:02,170 --> 00:17:59,900
prepared back to normal life you know

404
00:18:03,910 --> 00:18:02,180
doing their job work doing their family

405
00:18:16,760 --> 00:18:03,920
doing yard work whatever that happens to

406
00:18:21,360 --> 00:18:19,230
being an educator today is not easy

407
00:18:23,340 --> 00:18:21,370
we here at Hight's elementary school are

408
00:18:25,350 --> 00:18:23,350
not here simply to educate our students

409
00:18:26,610 --> 00:18:25,360
in the academic realm it's so important

410
00:18:28,500 --> 00:18:26,620
for our students to be lifelong learners

411
00:18:30,630 --> 00:18:28,510
and we have to think about ways that we

412
00:18:33,660 --> 00:18:30,640
motivate them to do so there are so many

413
00:18:37,230 --> 00:18:33,670

distractions that we have to compete

414
00:18:38,820 --> 00:18:37,240
with iPads Xbox video games Internet far

415
00:18:41,820 --> 00:18:38,830
too many channels of cable television

416
00:18:44,550 --> 00:18:41,830
what we need is something that kids will

417
00:18:46,650 --> 00:18:44,560
be highly motivated about something to

418
00:18:58,680 --> 00:18:46,660
keep them physically fit as well as

419
00:19:03,960 --> 00:19:01,200
what we needed was a new tool to help

420
00:19:05,820 --> 00:19:03,970
these kids think about diet and exercise

421
00:19:08,460 --> 00:19:05,830
in order to make the healthy choices

422
00:19:10,200 --> 00:19:08,470
they need to I knew what that tool was

423
00:19:12,110 --> 00:19:10,210
it was something that inspired me as a

424
00:19:16,740 --> 00:19:12,120
kid and continues to inspire me today

425
00:19:18,450 --> 00:19:16,750
the space program the importance of an

426
00:19:20,760 --> 00:19:18,460
astronaut's physical exercise and proper

427
00:19:22,560 --> 00:19:20,770
diet cannot be understated not just for

428
00:19:24,120 --> 00:19:22,570
the fitness of the astronaut but also to

429
00:19:25,650 --> 00:19:24,130
ensure that they stay mentally focused

430
00:19:27,330 --> 00:19:25,660
and productive during their stay on

431
00:19:29,220 --> 00:19:27,340
International Space Station and for

432
00:19:32,040 --> 00:19:29,230
future missions whether due to asteroids

433
00:19:34,740 --> 00:19:32,050
and then on Mars in response to the

434
00:19:38,370 --> 00:19:34,750
rising childhood obesity rate nASA has

435
00:19:40,710 --> 00:19:38,380
developed a series of activities based

436
00:19:43,770 --> 00:19:40,720
on astronaut training and we call that

437
00:19:45,840 --> 00:19:43,780
train like an astronaut example so

438
00:19:48,120 --> 00:19:45,850

between like an asura activities include

439
00:19:51,360 --> 00:19:48,130
things that we do exactly as we do on

440
00:19:54,840 --> 00:19:51,370
the ISS cycling resistance training and

441
00:19:57,810 --> 00:19:54,850
cardiovascular and then onto dexterity

442
00:20:00,960 --> 00:19:57,820
putting puzzles together making healthy

443
00:20:03,870 --> 00:20:00,970
food choices and working as a team all

444
00:20:06,150 --> 00:20:03,880
activities as they truly do on the ISS

445
00:20:07,710 --> 00:20:06,160
train like an astronaut activities are

446
00:20:09,810 --> 00:20:07,720
flexible enough to be used in

447
00:20:12,240 --> 00:20:09,820
conjunction with other programs like NFL

448
00:20:14,850 --> 00:20:12,250
play 60 what makes this program unique

449
00:20:18,930 --> 00:20:14,860
is that we're using the human challenges

450
00:20:20,970 --> 00:20:18,940
of spaceflight to inspire as well as

451
00:20:22,680 --> 00:20:20,980
motivate our children to make healthy

452
00:20:25,160 --> 00:20:22,690
choices throughout their life we're

453
00:20:27,780 --> 00:20:25,170
currently in 24 countries with over

454
00:20:30,060 --> 00:20:27,790
24,000 participants and growing every

455
00:20:32,520 --> 00:20:30,070
year this is expanded to such an

456
00:20:34,680 --> 00:20:32,530
incredible opportunity for both myself

457
00:20:37,110 --> 00:20:34,690
and for educators around the world to

458
00:20:38,940 --> 00:20:37,120
make such an impact on the lives of

459
00:20:39,370 --> 00:20:38,950
children both with fitness as well as

460
00:20:42,040 --> 00:20:39,380
nature

461
00:20:43,600 --> 00:20:42,050
it was excitement for the whole thing to

462
00:20:45,010 --> 00:20:43,610
the students you were just doing

463
00:20:46,750 --> 00:20:45,020

exercises anymore

464
00:20:49,360 --> 00:20:46,760
they were training like an astronaut

465
00:20:53,710 --> 00:20:49,370
true success of this program is the

466
00:20:57,130 --> 00:20:53,720
educators an example of a teacher that

467
00:20:59,530 --> 00:20:57,140
has worked and motivated his children is

468
00:21:02,320 --> 00:20:59,540
an outstanding educator by the name of

469
00:21:04,090 --> 00:21:02,330
Tim burrito this gentleman excited them

470
00:21:07,780 --> 00:21:04,100
and inspired him in ways that we never

471
00:21:10,600 --> 00:21:07,790
could do it and with that he's helping

472
00:21:13,570 --> 00:21:10,610
us grow the 21st century leadership that

473
00:21:15,550 --> 00:21:13,580
we so desperately need mr. Verger Ito is

474
00:21:17,560 --> 00:21:15,560
extremely passionate about the train

475
00:21:20,140 --> 00:21:17,570
like an astronaut program I think he

476
00:21:21,760 --> 00:21:20,150
himself would like to be an astronaut he

477
00:21:23,710 --> 00:21:21,770
comes to life when he's teaching the

478
00:21:26,170 --> 00:21:23,720
kids and talking about the program the

479
00:21:29,020 --> 00:21:26,180
kids feel that enthusiasm we're just so

480
00:21:35,539 --> 00:21:29,030
fortunate to have him oh it's truly the

481
00:21:40,109 --> 00:21:37,859
they say your astronaut training doesn't

482
00:21:41,759 --> 00:21:40,119
begin when NASA hires cool it begins

483
00:21:44,009 --> 00:21:41,769
when you're young by learning about

484
00:21:47,039 --> 00:21:44,019
space and the world around us and by

485
00:21:48,659 --> 00:21:47,049
making healthy choices in life today I'd

486
00:21:51,659 --> 00:21:48,669
like to recognize an outstanding

487
00:21:53,519 --> 00:21:51,669
physical education teacher Tim vigor Ito

488
00:21:55,529 --> 00:21:53,529

for being a champion from the train like

489
00:21:58,109 --> 00:21:55,539
an astronaut program and influencing

490
00:21:59,909 --> 00:21:58,119
thousands of students today it is

491
00:22:01,799 --> 00:21:59,919
educators like you that truly make a

492
00:22:03,749 --> 00:22:01,809
difference in this world and who will

493
00:22:06,060 --> 00:22:03,759
inspire the next generation to propel

494
00:22:10,690 --> 00:22:06,070
humankind on future missions to Mars and

495
00:22:18,580 --> 00:22:15,100
this is too much for me it's become a

496
00:22:20,230 --> 00:22:18,590
way of life and I'm just so thankful to

497
00:22:21,880 --> 00:22:20,240
everyone for what it's done for me I

498
00:22:24,670 --> 00:22:21,890
just want to share that with my students

499
00:22:26,550 --> 00:22:24,680
maybe it'll inspire them to reach a

500
00:22:29,170 --> 00:22:26,560
little deeper to go a little further

501
00:22:35,320 --> 00:22:29,180
maybe to try a little harder whatever it

502
00:22:41,900 --> 00:22:39,830
as you can see our International Space

503
00:22:44,240 --> 00:22:41,910
Station is an unprecedented research

504
00:22:46,460 --> 00:22:44,250
platform in space allowing doctors and

505
00:22:49,190 --> 00:22:46,470
scientists to conduct experiments that

506
00:22:51,289 --> 00:22:49,200
can't be done anywhere else for NASA

507
00:22:53,240 --> 00:22:51,299
solving these problems are vital for

508
00:22:56,930 --> 00:22:53,250
continuing the journey off the earth

509
00:22:59,000 --> 00:22:56,940
here on the earth as in space the keys

510
00:23:02,480 --> 00:22:59,010
to good heart health are proper

511
00:23:04,370 --> 00:23:02,490
nutrition and vigorous exercise well

512
00:23:05,510 --> 00:23:04,380
thanks for joining us on station life at

513
00:23:07,340 --> 00:23:05,520

our behind the scenes look at

514
00:23:08,960 --> 00:23:07,350
cardiovascular research being done on

515
00:23:11,210 --> 00:23:08,970
board the International Space Station

516
00:23:13,070 --> 00:23:11,220
and be sure to follow us on Facebook and

517
00:23:15,200 --> 00:23:13,080
Twitter for the latest research news and

518
00:23:15,890 --> 00:23:15,210
don't forget to download our new app on

519
00:23:18,560 --> 00:23:15,900
your mobile device