
PAO

1
00:00:04,070 --> 00:00:02,230
hey everybody welcome to mission control

2
00:00:06,150 --> 00:00:04,080
houston i'm dan hewitt joining me here

3
00:00:08,070 --> 00:00:06,160
is one of our fantastic spacesuit

4
00:00:09,750 --> 00:00:08,080
engineers heather paul

5
00:00:11,990 --> 00:00:09,760
again you're inside the international

6
00:00:13,430 --> 00:00:12,000
space station flight control room now so

7
00:00:15,110 --> 00:00:13,440
all the people in this room are

8
00:00:18,310 --> 00:00:15,120
monitoring systems on an orbiting

9
00:00:21,990 --> 00:00:18,320
laboratory traveling at 17 500 miles an

10
00:00:23,910 --> 00:00:22,000
hour over 260 miles over our heads so

11
00:00:26,470 --> 00:00:23,920
pretty ex

12
00:00:27,830 --> 00:00:26,480
excuse me incredible stuff going on

13
00:00:29,589 --> 00:00:27,840

some of the stuff going on on board the

14
00:00:30,630 --> 00:00:29,599
station today a lot of science work

15
00:00:33,190 --> 00:00:30,640
they're getting ready there's a

16
00:00:35,190 --> 00:00:33,200
spaceship about to dock with it tomorrow

17
00:00:37,350 --> 00:00:35,200
and all the guys and girls in this room

18
00:00:40,069 --> 00:00:37,360
are helping them get ready uh they're

19
00:00:41,590 --> 00:00:40,079
currently six astronauts on board and i

20
00:00:43,110 --> 00:00:41,600
know you guys have a lot of questions

21
00:00:45,350 --> 00:00:43,120
about just what happens to you when you

22
00:00:46,709 --> 00:00:45,360
go to space and things like that so why

23
00:00:53,670 --> 00:00:46,719
don't we go ahead and jump right in and

24
00:00:59,029 --> 00:00:56,150
we've discussed how muscle contracts and

25
00:01:01,750 --> 00:00:59,039
death what is the physiology of muscle

26
00:01:05,030 --> 00:01:01,760
atrophy knowing that is what happens to

27
00:01:06,950 --> 00:01:05,040
astronauts on the iss

28
00:01:08,070 --> 00:01:06,960
this is a really great question dan and

29
00:01:09,590 --> 00:01:08,080
it shows

30
00:01:11,429 --> 00:01:09,600
you know that they've been talking a lot

31
00:01:13,350 --> 00:01:11,439
about physiology in their class and

32
00:01:15,990 --> 00:01:13,360
that's really cool um

33
00:01:17,670 --> 00:01:16,000
you know muscles contract and expand and

34
00:01:19,830 --> 00:01:17,680
that's how we move around and when

35
00:01:22,070 --> 00:01:19,840
you're in microgravity because we don't

36
00:01:23,350 --> 00:01:22,080
have gravity acting upon our bodies our

37
00:01:24,950 --> 00:01:23,360
muscles tend to be a little bit more

38
00:01:27,190 --> 00:01:24,960

relaxed because they don't have to work

39
00:01:29,429 --> 00:01:27,200
as hard and that's why they atrophy or

40
00:01:31,429 --> 00:01:29,439
they degrade because they're really not

41
00:01:33,830 --> 00:01:31,439
having to work as hard to contract and

42
00:01:35,990 --> 00:01:33,840
relax contract and relax like we do here

43
00:01:38,310 --> 00:01:36,000
on earth and that's primarily what

44
00:01:40,789 --> 00:01:38,320
causes that atrophy or degradation of

45
00:01:42,710 --> 00:01:40,799
the muscle

46
00:01:47,270 --> 00:01:42,720
all right very cool okay next question

47
00:01:55,910 --> 00:01:50,710
how quickly does the muscle

48
00:01:58,069 --> 00:01:55,920
begin to occur once on the iss how

49
00:01:59,590 --> 00:01:58,079
quickly it's pretty fast actually you

50
00:02:02,310 --> 00:01:59,600
know in the early shuttle days we

51
00:02:03,590 --> 00:02:02,320
realized how important exercise was on

52
00:02:04,709 --> 00:02:03,600
when you're in microgravity whether

53
00:02:06,709 --> 00:02:04,719
you're on the space shuttle or the

54
00:02:09,109 --> 00:02:06,719
international space station and some of

55
00:02:11,430 --> 00:02:09,119
our early studies indicated that within

56
00:02:13,510 --> 00:02:11,440
just five even up to 11 days our

57
00:02:15,830 --> 00:02:13,520
astronauts were getting about 20 percent

58
00:02:17,430 --> 00:02:15,840
of muscle loss that's a lot of your

59
00:02:19,430 --> 00:02:17,440
muscle and i mean our muscles are really

60
00:02:21,030 --> 00:02:19,440
important to keep our body functioning

61
00:02:22,790 --> 00:02:21,040
and moving so while they don't have to

62
00:02:24,630 --> 00:02:22,800
work as hard in microgravity it's a

63
00:02:26,869 --> 00:02:24,640

concern when our astronauts come back

64
00:02:28,630 --> 00:02:26,879
down to earth that if they've lost all

65
00:02:30,869 --> 00:02:28,640
of that muscle they won't be as strong

66
00:02:32,710 --> 00:02:30,879
and capable of moving around so that's

67
00:02:34,390 --> 00:02:32,720
why the astronauts actually exercise for

68
00:02:37,350 --> 00:02:34,400
anywhere from you know two to three

69
00:02:38,869 --> 00:02:37,360
hours a day using our different exercise

70
00:02:40,949 --> 00:02:38,879
machines up there it's important that we

71
00:02:43,670 --> 00:02:40,959
don't lose that 20 muscle mass

72
00:02:45,350 --> 00:02:43,680
especially when five to 11 days is far

73
00:02:47,830 --> 00:02:45,360
shorter than our current mission

74
00:02:48,869 --> 00:02:47,840
duration of six months and even up to a

75
00:02:50,309 --> 00:02:48,879
year

76
00:02:52,309 --> 00:02:50,319
yeah i mean i've heard from a number of

77
00:02:55,110 --> 00:02:52,319
scientists it's amazing how quick the

78
00:02:57,589 --> 00:02:55,120
human body can adapt to very foreign i

79
00:02:59,270 --> 00:02:57,599
mean microgravity is something that your

80
00:03:01,190 --> 00:02:59,280
body will never experience basically

81
00:03:02,710 --> 00:03:01,200
throughout your entire life within five

82
00:03:04,790 --> 00:03:02,720
days it already starts

83
00:03:05,910 --> 00:03:04,800
completely changing that's absolutely

84
00:03:08,710 --> 00:03:05,920
insane

85
00:03:10,390 --> 00:03:08,720
all right next question guys

86
00:03:14,149 --> 00:03:10,400
thank you

87
00:03:18,869 --> 00:03:16,630
i cannot take supplements to help

88
00:03:22,390 --> 00:03:18,879

neglect the bone marks that the

89
00:03:25,830 --> 00:03:23,830
yes i think they asked the question

90
00:03:27,350 --> 00:03:25,840
about supplements okay you know and and

91
00:03:29,190 --> 00:03:27,360
this is important i bet we all take

92
00:03:31,110 --> 00:03:29,200
vitamins here on earth right well we

93
00:03:33,030 --> 00:03:31,120
have these really important people

94
00:03:35,350 --> 00:03:33,040
called food scientists that work with us

95
00:03:37,190 --> 00:03:35,360
here as part of our nasa team and their

96
00:03:39,670 --> 00:03:37,200
job is to make sure that the food that

97
00:03:40,949 --> 00:03:39,680
the astronauts eat contain all of the

98
00:03:42,869 --> 00:03:40,959
vitamins and supplements that the

99
00:03:44,550 --> 00:03:42,879
astronauts would need so they don't

100
00:03:46,789 --> 00:03:44,560
really take vitamins like what we do

101
00:03:48,390 --> 00:03:46,799
here on earth we make sure that the food

102
00:03:49,910 --> 00:03:48,400
contains all of the nutrients that they

103
00:03:51,589 --> 00:03:49,920
need but you know i've heard that they

104
00:03:53,830 --> 00:03:51,599
actually do have to take vitamin d

105
00:03:55,670 --> 00:03:53,840
supplements to help because here on

106
00:03:57,190 --> 00:03:55,680
earth we can go step outside in just a

107
00:03:59,830 --> 00:03:57,200
few minutes in the sun we get some

108
00:04:01,509 --> 00:03:59,840
vitamin d well they can't step outside

109
00:04:03,110 --> 00:04:01,519
the international space station so

110
00:04:04,869 --> 00:04:03,120
easily and the vitamin d they would get

111
00:04:06,229 --> 00:04:04,879
is it a little bit higher exposure than

112
00:04:08,390 --> 00:04:06,239
what we want that's why they wear the

113
00:04:10,710 --> 00:04:08,400

spacesuit so we do provide them with

114
00:04:12,949 --> 00:04:10,720
with some supplements for vitamin d okay

115
00:04:22,550 --> 00:04:12,959
i did not know that there you go

116
00:04:25,030 --> 00:04:24,230
what

117
00:04:27,749 --> 00:04:25,040
your

118
00:04:30,870 --> 00:04:27,759
physiology makes the iss

119
00:04:36,390 --> 00:04:30,880
astronauts knowledge's

120
00:04:40,150 --> 00:04:37,990
this is an important thing and when i

121
00:04:41,830 --> 00:04:40,160
first got my job here at nasa i was a

122
00:04:44,070 --> 00:04:41,840
student still studying engineering at

123
00:04:46,070 --> 00:04:44,080
the university and i got to work with

124
00:04:48,310 --> 00:04:46,080
our life science team and one of the

125
00:04:50,150 --> 00:04:48,320
things we were studying was space

126
00:04:51,830 --> 00:04:50,160
adaptation sickness a lot of our

127
00:04:53,830 --> 00:04:51,840
astronauts within the first two to three

128
00:04:55,510 --> 00:04:53,840
days of being in space

129
00:04:57,430 --> 00:04:55,520
whether they've flown before or not

130
00:04:58,550 --> 00:04:57,440
sometimes their stomachs can get upset

131
00:05:00,950 --> 00:04:58,560
and they get a little dizzy and

132
00:05:03,510 --> 00:05:00,960
definitely nauseous and a lot of that is

133
00:05:05,990 --> 00:05:03,520
attributed to the fact that your body

134
00:05:07,430 --> 00:05:06,000
has all these senses sensory organism

135
00:05:09,510 --> 00:05:07,440
and everything that's communicating back

136
00:05:11,510 --> 00:05:09,520
and forth with your eyes and your brain

137
00:05:13,749 --> 00:05:11,520
and it's really just confusing for all

138
00:05:15,909 --> 00:05:13,759

of these sensors in your body when

139
00:05:17,590 --> 00:05:15,919
suddenly here on earth we have a ceiling

140
00:05:19,909 --> 00:05:17,600
and we have a floor and we have walls

141
00:05:22,550 --> 00:05:19,919
and everything's upright and normal once

142
00:05:23,590 --> 00:05:22,560
you get in space there is really no up

143
00:05:25,590 --> 00:05:23,600
or down

144
00:05:26,950 --> 00:05:25,600
and so your eyes are looking at

145
00:05:29,590 --> 00:05:26,960
something and your brain is trying to

146
00:05:31,270 --> 00:05:29,600
understand it and your neural vestibular

147
00:05:33,590 --> 00:05:31,280
system that's working to keep you

148
00:05:35,110 --> 00:05:33,600
balanced all of these different sensors

149
00:05:37,189 --> 00:05:35,120
are talking to each other and the

150
00:05:38,710 --> 00:05:37,199
information isn't matching up

151
00:05:40,230 --> 00:05:38,720
and that causes you to feel maybe a

152
00:05:42,070 --> 00:05:40,240
little dizzy you might start to get a

153
00:05:44,390 --> 00:05:42,080
headache and sometimes our astronauts do

154
00:05:46,230 --> 00:05:44,400
feel nauseous but typically after a few

155
00:05:49,590 --> 00:05:46,240
days you get used to it because as dan

156
00:05:51,350 --> 00:05:49,600
said our bodies are so amazing we adapt

157
00:05:53,110 --> 00:05:51,360
nearly immediately so sometimes that

158
00:05:55,670 --> 00:05:53,120
adaptation process takes a little bit

159
00:05:57,830 --> 00:05:55,680
longer for some of our astronauts but

160
00:06:02,070 --> 00:05:57,840
they get better very quickly

161
00:06:05,189 --> 00:06:03,430
um

162
00:06:06,790 --> 00:06:05,199
is there anything different about the

163
00:06:11,830 --> 00:06:06,800

air pressure

164
00:06:14,390 --> 00:06:11,840
pressurization on the iss in relation to

165
00:06:16,950 --> 00:06:14,400
that of the sea level on earth if so

166
00:06:18,390 --> 00:06:16,960
does this have implications on the human

167
00:06:20,309 --> 00:06:18,400
body

168
00:06:22,230 --> 00:06:20,319
very good question i i'm excited about

169
00:06:24,469 --> 00:06:22,240
this one because what you're asking is

170
00:06:26,550 --> 00:06:24,479
something that i've actually worked with

171
00:06:28,710 --> 00:06:26,560
on our team of life support engineers

172
00:06:31,029 --> 00:06:28,720
and more specifically i've worked with

173
00:06:32,790 --> 00:06:31,039
your atmosphere within your spacesuit

174
00:06:34,550 --> 00:06:32,800
but our team that works on the

175
00:06:36,150 --> 00:06:34,560
atmosphere for the international space

176
00:06:37,749 --> 00:06:36,160
station does something similar and

177
00:06:39,670 --> 00:06:37,759
maintaining that environment is very

178
00:06:41,749 --> 00:06:39,680
important now the international space

179
00:06:44,070 --> 00:06:41,759
station is at the same atmospheric

180
00:06:47,270 --> 00:06:44,080
pressure as sea level so that's 14.7

181
00:06:49,189 --> 00:06:47,280
pounds per square inch absolute and the

182
00:06:50,629 --> 00:06:49,199
composition of gases is the same just

183
00:06:52,469 --> 00:06:50,639
like what we're breathing here on earth

184
00:06:54,790 --> 00:06:52,479
we have the same up there now the

185
00:06:56,629 --> 00:06:54,800
spacesuit on the other hand because

186
00:06:58,070 --> 00:06:56,639
you're inflated in the suit that's

187
00:07:00,469 --> 00:06:58,080
protecting you from those extreme

188
00:07:02,950 --> 00:07:00,479

environments we have that at a reduced

189
00:07:05,830 --> 00:07:02,960
pressure of 4.3 pounds per square inch

190
00:07:07,670 --> 00:07:05,840
but it's 100 pure oxygen so the

191
00:07:09,589 --> 00:07:07,680
spacesuit is slightly different but it's

192
00:07:11,430 --> 00:07:09,599
sea level and regular atmospheric

193
00:07:13,749 --> 00:07:11,440
composition on the space station so what

194
00:07:15,270 --> 00:07:13,759
would happen if the spacesuit was at an

195
00:07:17,589 --> 00:07:15,280
atmospheric

196
00:07:19,749 --> 00:07:17,599
like would they not be able to move

197
00:07:21,029 --> 00:07:19,759
exactly because when when you're

198
00:07:23,110 --> 00:07:21,039
inflating it's basically like a

199
00:07:25,029 --> 00:07:23,120
human-shaped balloon and the more you

200
00:07:26,469 --> 00:07:25,039
pressurize or inflate that balloon the

201
00:07:28,230 --> 00:07:26,479
harder it's going to be for the human

202
00:07:30,390 --> 00:07:28,240
being inside to move against those

203
00:07:33,110 --> 00:07:30,400
materials that's why we wouldn't want a

204
00:07:35,430 --> 00:07:33,120
suit that's made out of fabrics kind of

205
00:07:36,950 --> 00:07:35,440
like we have now and pressurize it to

206
00:07:39,110 --> 00:07:36,960
atmospheric pressure because it would

207
00:07:40,870 --> 00:07:39,120
just be really hard to move for

208
00:07:43,110 --> 00:07:40,880
astronaut and let's face it when they're

209
00:07:44,629 --> 00:07:43,120
out on a spacewalk hard enough already

210
00:07:46,070 --> 00:07:44,639
exactly we don't we want to make it as

211
00:07:53,589 --> 00:07:46,080
easy as possible

212
00:07:58,070 --> 00:07:55,749
okay is there anything different about

213
00:08:00,469 --> 00:07:58,080

the air pressurization on the iss in

214
00:08:02,150 --> 00:08:00,479
relation oh sorry is there anything

215
00:08:03,749 --> 00:08:02,160
different about the proportions of

216
00:08:05,990 --> 00:08:03,759
different gases that make up the air

217
00:08:08,390 --> 00:08:06,000
aboard the iss

218
00:08:10,550 --> 00:08:08,400
nothing different at all nothing at all

219
00:08:13,430 --> 00:08:10,560
now sometimes when we're getting ready

220
00:08:15,749 --> 00:08:13,440
to do a spacewalk the astronauts will go

221
00:08:17,589 --> 00:08:15,759
into the airlock and we might decrease

222
00:08:19,990 --> 00:08:17,599
the atmospheric pressure a little bit

223
00:08:22,469 --> 00:08:20,000
and we might ask them to put on masks to

224
00:08:24,309 --> 00:08:22,479
breathe pure oxygen and the intent there

225
00:08:26,790 --> 00:08:24,319
is when you're going from an atmospheric

226
00:08:28,710 --> 00:08:26,800
pressure of regular air composition to a

227
00:08:30,629 --> 00:08:28,720
space suit pressure that's a lot lower

228
00:08:32,870 --> 00:08:30,639
100 oxygen

229
00:08:35,589 --> 00:08:32,880
we want to get out all of those extra

230
00:08:37,509 --> 00:08:35,599
gases like nitrogen that stay in our

231
00:08:39,670 --> 00:08:37,519
blood and our tissues if you've ever

232
00:08:41,350 --> 00:08:39,680
heard about scuba diving you know that

233
00:08:43,670 --> 00:08:41,360
the astronauts if they spend too much

234
00:08:45,990 --> 00:08:43,680
time under water at depth they have to

235
00:08:48,070 --> 00:08:46,000
take their time coming back up to sea

236
00:08:50,470 --> 00:08:48,080
level because they've saturated their

237
00:08:52,710 --> 00:08:50,480
tissues with nitrogen and those nitrogen

238
00:08:54,470 --> 00:08:52,720

bubbles want to expand as you reduce the

239
00:08:56,550 --> 00:08:54,480
pressure around them we're doing the

240
00:08:59,190 --> 00:08:56,560
same thing when we go from a high

241
00:09:00,710 --> 00:08:59,200
pressure sea level atmosphere down to a

242
00:09:02,470 --> 00:09:00,720
low pressure space you don't want those

243
00:09:03,990 --> 00:09:02,480
nitrogen bubbles to expand because that

244
00:09:05,430 --> 00:09:04,000
could be pretty dangerous to our

245
00:09:07,590 --> 00:09:05,440
astronauts health

246
00:09:09,430 --> 00:09:07,600
so that's why sometimes they do what we

247
00:09:11,590 --> 00:09:09,440
call a camp out in the airlock and they

248
00:09:13,430 --> 00:09:11,600
get to overnight with their spacewalking

249
00:09:15,670 --> 00:09:13,440
buddy have a little slumber party in the

250
00:09:18,230 --> 00:09:15,680
airlock at a lower pressure to get them

251
00:09:20,230 --> 00:09:18,240
ready for that lower even lower pressure

252
00:09:22,389 --> 00:09:20,240
of the spacesuit but the regular cabin

253
00:09:24,550 --> 00:09:22,399
environment is just like breathing air

254
00:09:26,470 --> 00:09:24,560
here at sea level

255
00:09:28,870 --> 00:09:26,480
all right very cool stuff next question

256
00:09:32,630 --> 00:09:31,190
and and the kids were dying to have us

257
00:09:34,550 --> 00:09:32,640
let you know that we just went stupid i

258
00:09:35,670 --> 00:09:34,560
think we learned all about that so

259
00:09:37,910 --> 00:09:35,680
well

260
00:09:39,590 --> 00:09:37,920
there you go so see now it's kind of the

261
00:09:42,070 --> 00:09:39,600
opposite when you think about it scuba

262
00:09:43,590 --> 00:09:42,080
diving you go down in depth and the

263
00:09:45,269 --> 00:09:43,600

pressure increases and then you come up

264
00:09:46,310 --> 00:09:45,279
to sea level while in space we're

265
00:09:48,550 --> 00:09:46,320
floating

266
00:09:50,470 --> 00:09:48,560
and we're at sea level and we go down to

267
00:09:52,550 --> 00:09:50,480
space suit pressure so it's a little bit

268
00:09:54,230 --> 00:09:52,560
different but we do the same kinds of

269
00:09:55,350 --> 00:09:54,240
things to prepare

270
00:09:57,190 --> 00:09:55,360
just like you would if you're a scuba

271
00:09:59,670 --> 00:09:57,200
diver coming up to sea level taking it

272
00:10:01,829 --> 00:09:59,680
slow we take them slow from 14.7 down to

273
00:10:04,790 --> 00:10:01,839
4.3

274
00:10:07,430 --> 00:10:04,800
all right cool next question

275
00:10:09,190 --> 00:10:07,440
okay what is the most common noticeable

276
00:10:11,030 --> 00:10:09,200
effect that astronauts still have when

277
00:10:12,949 --> 00:10:11,040
they return to earth from a stint on the

278
00:10:14,710 --> 00:10:12,959
iss

279
00:10:17,750 --> 00:10:14,720
that's a really good question and it's a

280
00:10:19,590 --> 00:10:17,760
very personal response so each astronaut

281
00:10:21,829 --> 00:10:19,600
reacts a little bit different we've had

282
00:10:23,350 --> 00:10:21,839
some astronauts that come back and they

283
00:10:25,110 --> 00:10:23,360
hop out of their seats walk out of the

284
00:10:27,110 --> 00:10:25,120
space shuttle they're waving and feeling

285
00:10:29,670 --> 00:10:27,120
great there are some astronauts that

286
00:10:31,750 --> 00:10:29,680
come back and maybe they feel a little

287
00:10:33,430 --> 00:10:31,760
bit dizzy or even nauseous sometimes

288
00:10:34,949 --> 00:10:33,440

it's a little harder to feel all of a

289
00:10:36,550 --> 00:10:34,959
sudden your arms are really heavy you

290
00:10:39,030 --> 00:10:36,560
know just to pick yourself up out of the

291
00:10:41,269 --> 00:10:39,040
seat could be exhausting and really the

292
00:10:43,269 --> 00:10:41,279
response depends on how long you've been

293
00:10:45,030 --> 00:10:43,279
up in space so the space shuttle

294
00:10:47,030 --> 00:10:45,040
astronauts who were up there for maybe a

295
00:10:49,269 --> 00:10:47,040
couple of days to two weeks at a time at

296
00:10:51,350 --> 00:10:49,279
a time it was much easier for them to

297
00:10:52,710 --> 00:10:51,360
adapt when they got back to earth than

298
00:10:54,630 --> 00:10:52,720
some of our astronauts that live on

299
00:10:55,910 --> 00:10:54,640
these increment missions for six months

300
00:10:57,829 --> 00:10:55,920
at a time

301
00:11:00,230 --> 00:10:57,839
so it's really very different for each

302
00:11:01,910 --> 00:11:00,240
astronaut but one of the most common

303
00:11:04,069 --> 00:11:01,920
things that i've heard happens is they

304
00:11:05,990 --> 00:11:04,079
feel a little bit light-headed and

305
00:11:07,430 --> 00:11:06,000
that's because in space we get what we

306
00:11:09,829 --> 00:11:07,440
call a fluid shift due to the

307
00:11:11,750 --> 00:11:09,839
microgravity environment our fluids

308
00:11:13,509 --> 00:11:11,760
which on earth tend to pull down in the

309
00:11:15,910 --> 00:11:13,519
lower half of our body because gravity

310
00:11:17,509 --> 00:11:15,920
is pulling down well all of those fluids

311
00:11:19,670 --> 00:11:17,519
redistribute in the body and they tend

312
00:11:21,829 --> 00:11:19,680
to kind of creep up into the upper half

313
00:11:23,269 --> 00:11:21,839

of the body which is why our astronauts

314
00:11:25,269 --> 00:11:23,279
sometimes when you see a picture of them

315
00:11:26,949 --> 00:11:25,279
on earth versus in space in space they

316
00:11:28,389 --> 00:11:26,959
look like they've gained weight well

317
00:11:29,990 --> 00:11:28,399
they haven't gained weight at all

318
00:11:32,150 --> 00:11:30,000
they've just got a little bit more fluid

319
00:11:33,750 --> 00:11:32,160
in their upper body and their faces puff

320
00:11:35,750 --> 00:11:33,760
out just a bit more

321
00:11:37,509 --> 00:11:35,760
now your heart

322
00:11:39,509 --> 00:11:37,519
gets used to that and it thinks that's

323
00:11:41,590 --> 00:11:39,519
cool i don't have to worry about making

324
00:11:43,350 --> 00:11:41,600
so much blood and pumping so much blood

325
00:11:45,030 --> 00:11:43,360
and so when you get back to earth and

326
00:11:47,190 --> 00:11:45,040
our astronauts land and gravity pulls

327
00:11:48,470 --> 00:11:47,200
the fluids back down into the lower body

328
00:11:49,829 --> 00:11:48,480
sometimes our astronauts get a little

329
00:11:51,590 --> 00:11:49,839
bit dizzy

330
00:11:54,069 --> 00:11:51,600
you know they feel a little disoriented

331
00:11:54,949 --> 00:11:54,079
but again they they adapt pretty quickly

332
00:11:56,710 --> 00:11:54,959
to their

333
00:11:58,389 --> 00:11:56,720
back home environment one of my

334
00:12:00,470 --> 00:11:58,399
favorites that i have heard from a few

335
00:12:02,550 --> 00:12:00,480
astronauts not really a physiological

336
00:12:03,829 --> 00:12:02,560
almost more of a psychological is

337
00:12:06,550 --> 00:12:03,839
they'll forget that they're not in

338
00:12:08,389 --> 00:12:06,560

microgravity so they'll hop out of bed

339
00:12:11,110 --> 00:12:08,399
one morning grab a glass of water and

340
00:12:13,350 --> 00:12:11,120
then go to just let it float away and

341
00:12:15,350 --> 00:12:13,360
plop drops right in the ground so it can

342
00:12:17,350 --> 00:12:15,360
be it can be difficult when you i mean

343
00:12:18,710 --> 00:12:17,360
live a certain way for six months to

344
00:12:20,230 --> 00:12:18,720
suddenly go back to the complete

345
00:12:22,550 --> 00:12:20,240
opposite even if it's where you've lived

346
00:12:25,269 --> 00:12:22,560
for your entire life or your body adapts

347
00:12:30,310 --> 00:12:25,279
very quickly and your mind does as well

348
00:12:35,590 --> 00:12:32,949
all right so at what point in time were

349
00:12:39,350 --> 00:12:35,600
the exercise machines that are currently

350
00:12:41,190 --> 00:12:39,360
being used on the iss installed

351
00:12:43,110 --> 00:12:41,200
that's a good question now remember

352
00:12:45,110 --> 00:12:43,120
before we built this the space station

353
00:12:47,030 --> 00:12:45,120
we were flying the space shuttle so we'd

354
00:12:49,430 --> 00:12:47,040
already been doing a lot of experiments

355
00:12:51,430 --> 00:12:49,440
to understand to what extent we needed

356
00:12:53,590 --> 00:12:51,440
to exercise if we lived for long

357
00:12:55,910 --> 00:12:53,600
duration in the space station and what

358
00:12:57,910 --> 00:12:55,920
kinds of machines we would need so i

359
00:13:00,069 --> 00:12:57,920
don't know exactly when we first started

360
00:13:02,550 --> 00:13:00,079
bringing up exercise equipment i believe

361
00:13:04,870 --> 00:13:02,560
it was when we first brought humans up

362
00:13:06,710 --> 00:13:04,880
one of the very first pieces of exercise

363
00:13:08,790 --> 00:13:06,720

equipment that was on board the station

364
00:13:11,509 --> 00:13:08,800
actually just left the station it was

365
00:13:12,790 --> 00:13:11,519
the very first treadmill which was on

366
00:13:15,269 --> 00:13:12,800
one of the russian segments that

367
00:13:17,829 --> 00:13:15,279
launched back in 19 the first russian

368
00:13:19,990 --> 00:13:17,839
segment that launched back in 1998 so

369
00:13:22,550 --> 00:13:20,000
there has been exercise equipment on

370
00:13:24,310 --> 00:13:22,560
board the station you know since the

371
00:13:26,230 --> 00:13:24,320
station's been in existence humans got

372
00:13:28,069 --> 00:13:26,240
there in 2000 there was already exercise

373
00:13:29,430 --> 00:13:28,079
equipment waiting for them one of the

374
00:13:32,069 --> 00:13:29,440
more one of the ones you might have

375
00:13:33,910 --> 00:13:32,079
heard of is known as the colbert it's

376
00:13:35,509 --> 00:13:33,920
one of the

377
00:13:37,509 --> 00:13:35,519
treadmills on board the international

378
00:13:39,110 --> 00:13:37,519
space station this was named after

379
00:13:40,870 --> 00:13:39,120
stephen colbert you may have heard of

380
00:13:42,389 --> 00:13:40,880
him it's the combined operational

381
00:13:45,430 --> 00:13:42,399
load-bearing external resistance

382
00:13:47,829 --> 00:13:45,440
treadmill we love acronyms but that one

383
00:13:49,190 --> 00:13:47,839
launched back in 2009 on one of the

384
00:13:51,030 --> 00:13:49,200
space shuttles and that's one of the

385
00:13:52,949 --> 00:13:51,040
more recent pieces on board the

386
00:13:54,629 --> 00:13:52,959
international space station and we've

387
00:13:56,790 --> 00:13:54,639
definitely been making upgrades to the

388
00:13:58,389 --> 00:13:56,800

equipment as we learn more about what

389
00:14:00,230 --> 00:13:58,399
the astronauts like to do

390
00:14:01,829 --> 00:14:00,240
and the effects of that exercise on

391
00:14:03,430 --> 00:14:01,839
their bodies you know we can't do

392
00:14:05,829 --> 00:14:03,440
traditional weightlifting in space

393
00:14:08,230 --> 00:14:05,839
because you're weightless so so would

394
00:14:09,670 --> 00:14:08,240
those big barbells that you'd be lifting

395
00:14:11,430 --> 00:14:09,680
so learning how to do something like

396
00:14:13,269 --> 00:14:11,440
resistive exercise so it's not just

397
00:14:15,509 --> 00:14:13,279
about the cardiovascular effect of

398
00:14:16,389 --> 00:14:15,519
running on a treadmill or working on a

399
00:14:17,910 --> 00:14:16,399
bicycle

400
00:14:20,870 --> 00:14:17,920
we have to really make sure that we're

401
00:14:22,069 --> 00:14:20,880
doing that resistance exercise as well

402
00:14:24,310 --> 00:14:22,079
to make sure that they're maintaining

403
00:14:27,189 --> 00:14:24,320
their bones and muscles yep

404
00:14:30,230 --> 00:14:27,199
all right next question

405
00:14:31,829 --> 00:14:30,240
um acronym mate was the acronym came

406
00:14:33,670 --> 00:14:31,839
first and then you decided even after

407
00:14:35,829 --> 00:14:33,680
colbert was at first we had to find an

408
00:14:38,389 --> 00:14:35,839
acronym that fits for stephen colbert we

409
00:14:41,189 --> 00:14:38,399
had to find an acronym that fit

410
00:14:42,870 --> 00:14:41,199
we sometimes you'll get a cool name and

411
00:14:44,870 --> 00:14:42,880
we have some very talented people here

412
00:14:46,629 --> 00:14:44,880
coming up with acronyms

413
00:14:48,150 --> 00:14:46,639

yes as an engineer that works on a lot

414
00:14:50,150 --> 00:14:48,160
of different pieces of hardware we're

415
00:14:51,829 --> 00:14:50,160
always really trying to figure out how

416
00:14:53,990 --> 00:14:51,839
could i make the name heather into an

417
00:14:55,990 --> 00:14:54,000
acronym for that piece of equipment one

418
00:14:58,470 --> 00:14:56,000
of our engineers came very close his

419
00:15:00,710 --> 00:14:58,480
name is hep h h-i-e-p and we were

420
00:15:04,790 --> 00:15:00,720
working on something that became e-hip

421
00:15:07,430 --> 00:15:04,800
so he got really close he was so excited

422
00:15:09,750 --> 00:15:07,440
all right next question guys

423
00:15:12,230 --> 00:15:09,760
astronauts um always known that they

424
00:15:15,750 --> 00:15:12,240
needed to exercise while in space to

425
00:15:18,230 --> 00:15:15,760
combat muscle asthma astrophy

426
00:15:20,470 --> 00:15:18,240
atrophy and bone loss since the

427
00:15:23,990 --> 00:15:20,480
beginning of iss or is it releasing

428
00:15:29,030 --> 00:15:26,470
yes absolutely you know um it's a big

429
00:15:31,110 --> 00:15:29,040
concern because again microgravity your

430
00:15:32,470 --> 00:15:31,120
bones and muscles your tissues they tend

431
00:15:34,150 --> 00:15:32,480
to relax it's almost like they're on a

432
00:15:36,389 --> 00:15:34,160
vacation because they don't have to work

433
00:15:38,710 --> 00:15:36,399
as hard and that muscle atrophy is

434
00:15:40,470 --> 00:15:38,720
really serious um like like i said

435
00:15:42,310 --> 00:15:40,480
earlier you can lose up to about twenty

436
00:15:44,550 --> 00:15:42,320
percent within the first five to eleven

437
00:15:47,430 --> 00:15:44,560
days if you're not exercising

438
00:15:49,430 --> 00:15:47,440

and it's not as critical up there i mean

439
00:15:50,790 --> 00:15:49,440
unless you're a spacewalking engineer

440
00:15:52,389 --> 00:15:50,800
astronaut and then you definitely have

441
00:15:54,550 --> 00:15:52,399
to make sure that you are still strong

442
00:15:56,870 --> 00:15:54,560
enough to do the operations but there's

443
00:15:59,030 --> 00:15:56,880
more of a concern here on earth you know

444
00:16:00,710 --> 00:15:59,040
and the other thing is the bone loss

445
00:16:02,389 --> 00:16:00,720
that has been a big source of our

446
00:16:04,629 --> 00:16:02,399
studies because

447
00:16:06,310 --> 00:16:04,639
your bones degrade at a much faster rate

448
00:16:08,470 --> 00:16:06,320
in microgravity compared to here on

449
00:16:11,189 --> 00:16:08,480
earth and in fact they can lose about 10

450
00:16:13,350 --> 00:16:11,199
bone loss in one year in microgravity

451
00:16:15,990 --> 00:16:13,360
that's equivalent 10 bone loss is

452
00:16:18,550 --> 00:16:16,000
equivalent to what someone age 50 or

453
00:16:20,550 --> 00:16:18,560
higher would lose in 10 years here on

454
00:16:23,189 --> 00:16:20,560
earth so really making sure that our

455
00:16:24,710 --> 00:16:23,199
astronauts are eating a good diet that

456
00:16:26,389 --> 00:16:24,720
provides all the supplementation and

457
00:16:28,389 --> 00:16:26,399
nutrients that they need and they're

458
00:16:30,150 --> 00:16:28,399
doing that exercise for about two to

459
00:16:31,509 --> 00:16:30,160
three hours a day

460
00:16:33,590 --> 00:16:31,519
and

461
00:16:35,350 --> 00:16:33,600
also part of your question this is this

462
00:16:36,949 --> 00:16:35,360
is something that we've been aware of

463
00:16:39,430 --> 00:16:36,959

you know we've been doing space flights

464
00:16:41,430 --> 00:16:39,440
since the 60s so it is something

465
00:16:43,910 --> 00:16:41,440
if it only takes five days to appear

466
00:16:46,470 --> 00:16:43,920
then you can have noticeable effects

467
00:16:48,389 --> 00:16:46,480
it's really become a priority you know

468
00:16:50,389 --> 00:16:48,399
since the advent of space stations in

469
00:16:53,189 --> 00:16:50,399
space like the old russian mir

470
00:16:54,550 --> 00:16:53,199
and also the u.s skylab missions but

471
00:16:56,710 --> 00:16:54,560
especially on the international space

472
00:16:59,749 --> 00:16:56,720
station and it's such a huge

473
00:17:01,829 --> 00:16:59,759
part of the iss nowadays because we have

474
00:17:03,990 --> 00:17:01,839
these continuous crews these i mean

475
00:17:05,909 --> 00:17:04,000
we've had people in space since the year

476
00:17:08,150 --> 00:17:05,919
2000 like human beings have been a

477
00:17:09,270 --> 00:17:08,160
space-faring civilization since the year

478
00:17:11,669 --> 00:17:09,280
2000

479
00:17:13,750 --> 00:17:11,679
so we now have the capability to do

480
00:17:15,669 --> 00:17:13,760
constant research and have lots of test

481
00:17:18,309 --> 00:17:15,679
subjects so we can really you know

482
00:17:20,949 --> 00:17:18,319
examine what causes this much muscle

483
00:17:22,470 --> 00:17:20,959
atrophy and bone loss and how can we

484
00:17:23,829 --> 00:17:22,480
really combat it

485
00:17:25,029 --> 00:17:23,839
you know it's really exciting dan

486
00:17:27,669 --> 00:17:25,039
because

487
00:17:29,510 --> 00:17:27,679
we have selected our first astronaut and

488
00:17:32,310 --> 00:17:29,520

cosmonaut to do a one-year stint on the

489
00:17:33,990 --> 00:17:32,320
space station and that astronaut has an

490
00:17:35,669 --> 00:17:34,000
astronaut twin brother who's going to

491
00:17:37,510 --> 00:17:35,679
stay here on earth

492
00:17:40,630 --> 00:17:37,520
and our international space station

493
00:17:42,710 --> 00:17:40,640
program uh science office has set out a

494
00:17:44,870 --> 00:17:42,720
notice to scientists around the world

495
00:17:46,630 --> 00:17:44,880
saying we've got one astronaut brother

496
00:17:48,390 --> 00:17:46,640
up and one astronaut brother down and

497
00:17:49,909 --> 00:17:48,400
they're the first you know set of twins

498
00:17:51,350 --> 00:17:49,919
where one will be in space and one here

499
00:17:53,029 --> 00:17:51,360
for a full year

500
00:17:54,870 --> 00:17:53,039
what can we do to study the effects of

501
00:17:56,950 --> 00:17:54,880
microgravity on one versus the other i

502
00:17:58,470 --> 00:17:56,960
think that's so amazing it's really

503
00:18:00,549 --> 00:17:58,480
exciting stuff coming up in the next

504
00:18:02,230 --> 00:18:00,559
year or two absolutely the research

505
00:18:05,830 --> 00:18:02,240
never stops

506
00:18:11,190 --> 00:18:08,630
okay so

507
00:18:14,870 --> 00:18:11,200
does the lack of restful sleep

508
00:18:18,070 --> 00:18:14,880
and that most astronauts tell us on the

509
00:18:19,909 --> 00:18:18,080
iss contribute to the muscle astrophy

510
00:18:21,430 --> 00:18:19,919
and our bone loss

511
00:18:23,350 --> 00:18:21,440
you know i haven't heard that lack of

512
00:18:25,510 --> 00:18:23,360
sleep really contributes to that i think

513
00:18:26,710 --> 00:18:25,520

it's more the environment around them

514
00:18:28,390 --> 00:18:26,720
but what

515
00:18:29,990 --> 00:18:28,400
lack of sleep might do is just make them

516
00:18:31,669 --> 00:18:30,000
a little bit more tired throughout their

517
00:18:33,190 --> 00:18:31,679
day although most of my astronaut

518
00:18:35,190 --> 00:18:33,200
friends that i've talked to said after

519
00:18:36,950 --> 00:18:35,200
that few first few days of getting used

520
00:18:37,909 --> 00:18:36,960
to things they actually sleep really

521
00:18:39,669 --> 00:18:37,919
well

522
00:18:41,110 --> 00:18:39,679
when they're on the space station and i

523
00:18:42,390 --> 00:18:41,120
think one of my favorite things when i

524
00:18:44,789 --> 00:18:42,400
think about how they sleep they're

525
00:18:46,710 --> 00:18:44,799
basically in a sleeping bag but we had

526
00:18:48,789 --> 00:18:46,720
to develop a head strap because

527
00:18:50,470 --> 00:18:48,799
naturally when you're in space your arms

528
00:18:52,630 --> 00:18:50,480
are going to float up and your head will

529
00:18:55,750 --> 00:18:52,640
tilt forward and then that's a little

530
00:18:58,470 --> 00:18:55,760
bit uncomfortable for the neck so our

531
00:19:00,310 --> 00:18:58,480
engineers who designed their sleepwear

532
00:19:01,750 --> 00:19:00,320
had to design a comfortable head strap

533
00:19:03,510 --> 00:19:01,760
so that the astronauts can strap their

534
00:19:05,350 --> 00:19:03,520
head back and

535
00:19:07,029 --> 00:19:05,360
get that sense of the contact of the

536
00:19:10,470 --> 00:19:07,039
back of their head on the sleeping bag

537
00:19:20,950 --> 00:19:10,480
almost like they're sleeping on a pillow

538
00:19:25,029 --> 00:19:23,110

what is the process for re-entry into

539
00:19:26,789 --> 00:19:25,039
the earth like for astronauts it would

540
00:19:28,789 --> 00:19:26,799
take you a while to become accustomed to

541
00:19:31,190 --> 00:19:28,799
gravity again

542
00:19:33,590 --> 00:19:31,200
so i think the question is about reentry

543
00:19:35,110 --> 00:19:33,600
yes so um it takes quite a bit of time

544
00:19:36,630 --> 00:19:35,120
because you know it's basically like

545
00:19:38,230 --> 00:19:36,640
they're packing up after they've been on

546
00:19:41,430 --> 00:19:38,240
a really long trip they want to make

547
00:19:42,630 --> 00:19:41,440
sure everything is packed up and secure

548
00:19:44,390 --> 00:19:42,640
and they want to make sure that their

549
00:19:45,830 --> 00:19:44,400
suits that they're wearing for re-entry

550
00:19:47,669 --> 00:19:45,840
are working well so they do a lot of

551
00:19:49,430 --> 00:19:47,679
different checkouts so it can take

552
00:19:51,350 --> 00:19:49,440
several hours for them to prepare for

553
00:19:53,590 --> 00:19:51,360
re-entry and then really once we're

554
00:19:55,350 --> 00:19:53,600
ready for them to go they strap into

555
00:19:56,390 --> 00:19:55,360
their seats and then we fly them back

556
00:19:58,150 --> 00:19:56,400
home

557
00:20:00,390 --> 00:19:58,160
and once they're down like heather had

558
00:20:02,630 --> 00:20:00,400
said earlier it affects the astronauts

559
00:20:04,630 --> 00:20:02,640
differently we've had some that they

560
00:20:06,549 --> 00:20:04,640
land they hop out they can walk on their

561
00:20:08,310 --> 00:20:06,559
own they're totally fine others might

562
00:20:11,750 --> 00:20:08,320
need a little assistance

563
00:20:27,990 --> 00:20:11,760

it really varies from the individual

564
00:20:31,590 --> 00:20:29,830
activities did the astronauts do on

565
00:20:35,029 --> 00:20:31,600
earth to prepare them for

566
00:20:37,830 --> 00:20:35,039
um for the rigors of living zero gravity

567
00:20:39,669 --> 00:20:37,840
short-term training

568
00:20:41,270 --> 00:20:39,679
well the astronauts do a lot of training

569
00:20:42,950 --> 00:20:41,280
once they get selected for a mission it

570
00:20:44,390 --> 00:20:42,960
can be several years and part of that

571
00:20:45,830 --> 00:20:44,400
training is to

572
00:20:47,110 --> 00:20:45,840
get them used to the different things

573
00:20:49,350 --> 00:20:47,120
they're going to be doing on the space

574
00:20:52,310 --> 00:20:49,360
station so we have a lot of different

575
00:20:53,909 --> 00:20:52,320
trainers here some of which stay gravity

576
00:20:55,990 --> 00:20:53,919
based you know and they just do their

577
00:20:57,430 --> 00:20:56,000
operations in our mockups but we have a

578
00:20:59,510 --> 00:20:57,440
really big swimming pool called the

579
00:21:02,549 --> 00:20:59,520
neutral buoyancy laboratory

580
00:21:04,710 --> 00:21:02,559
and it's big enough to sink several of

581
00:21:06,310 --> 00:21:04,720
our modules for the space station when

582
00:21:07,830 --> 00:21:06,320
we were flying the shuttle we we sunk

583
00:21:09,750 --> 00:21:07,840
the cargo bay of the space shuttle as

584
00:21:11,750 --> 00:21:09,760
well and that's where our astronauts get

585
00:21:13,669 --> 00:21:11,760
the most training for every one hour

586
00:21:15,750 --> 00:21:13,679
that they're on a spacewalk they do

587
00:21:17,510 --> 00:21:15,760
about eight hours underwater now that's

588
00:21:19,830 --> 00:21:17,520

mostly for that's primarily for our

589
00:21:22,230 --> 00:21:19,840
space walking astronauts

590
00:21:23,909 --> 00:21:22,240
with our astronauts that maybe are early

591
00:21:25,350 --> 00:21:23,919
on their selection process or need to

592
00:21:27,029 --> 00:21:25,360
get that feeling of what it's like to

593
00:21:29,110 --> 00:21:27,039
float in microgravity we also have a

594
00:21:31,669 --> 00:21:29,120
very special aircraft

595
00:21:34,549 --> 00:21:31,679
called the vomit comet for reasons that

596
00:21:36,549 --> 00:21:34,559
flies parabolas over the gulf of mexico

597
00:21:38,630 --> 00:21:36,559
and when you're on that downward part of

598
00:21:39,990 --> 00:21:38,640
the parabola everyone's floating inside

599
00:21:41,750 --> 00:21:40,000
because you're not strapped in it's like

600
00:21:43,350 --> 00:21:41,760
a big roller coaster that you fly up and

601
00:21:44,710 --> 00:21:43,360
down multiple times and that's a good

602
00:21:46,310 --> 00:21:44,720
way to get them

603
00:21:48,470 --> 00:21:46,320
kind of a feel for what it's like to be

604
00:21:50,630 --> 00:21:48,480
in microgravity but you're only

605
00:21:52,950 --> 00:21:50,640
floating and free falling on that plane

606
00:21:54,789 --> 00:21:52,960
for about 20 to 30 seconds

607
00:21:56,470 --> 00:21:54,799
so other than that

608
00:21:57,909 --> 00:21:56,480
you know it's really hard to tell people

609
00:21:59,750 --> 00:21:57,919
what it's going to be like to float in

610
00:22:02,070 --> 00:21:59,760
space until they get there

611
00:22:04,549 --> 00:22:02,080
and the best simulation we can do is

612
00:22:06,149 --> 00:22:04,559
really to float in water

613
00:22:17,990 --> 00:22:06,159

that's about it though

614
00:22:21,990 --> 00:22:19,350
um

615
00:22:23,830 --> 00:22:22,000
were they all athletes to begin with if

616
00:22:26,710 --> 00:22:23,840
so what were their favorite sports

617
00:22:28,870 --> 00:22:26,720
activities that kept them in shape what

618
00:22:31,909 --> 00:22:28,880
did some of them have to put themselves

619
00:22:33,990 --> 00:22:31,919
in the shape or in order to apply to be

620
00:22:35,750 --> 00:22:34,000
an astronaut

621
00:22:37,669 --> 00:22:35,760
well you know the health is the health

622
00:22:40,470 --> 00:22:37,679
consideration is a very big part of the

623
00:22:43,029 --> 00:22:40,480
astronaut selection process we do a full

624
00:22:44,230 --> 00:22:43,039
physical we do several psychological

625
00:22:46,149 --> 00:22:44,240
interviews

626
00:22:48,230 --> 00:22:46,159
so the astronauts have to be very

627
00:22:50,070 --> 00:22:48,240
healthy before they even get selected

628
00:22:52,070 --> 00:22:50,080
and then a big part of their training is

629
00:22:53,669 --> 00:22:52,080
to maintain their health we actually

630
00:22:56,310 --> 00:22:53,679
have personal trainers that work with

631
00:22:57,590 --> 00:22:56,320
the astronauts every day to make sure

632
00:23:00,149 --> 00:22:57,600
that they are getting enough

633
00:23:01,669 --> 00:23:00,159
cardiovascular work exercise they're

634
00:23:03,909 --> 00:23:01,679
maintaining their bone and muscle mass

635
00:23:05,909 --> 00:23:03,919
here on earth and even maybe bulking up

636
00:23:07,830 --> 00:23:05,919
a little bit before they go so that when

637
00:23:09,350 --> 00:23:07,840
they lose a little bit of that bone and

638
00:23:11,029 --> 00:23:09,360

muscle even with all the exercise

639
00:23:13,430 --> 00:23:11,039
they're doing they'll still be strong

640
00:23:15,750 --> 00:23:13,440
enough to return home now several of our

641
00:23:17,510 --> 00:23:15,760
astronauts maybe weren't necessarily

642
00:23:19,029 --> 00:23:17,520
athletes like professional athletes

643
00:23:21,750 --> 00:23:19,039
although i do know of one who was a

644
00:23:24,070 --> 00:23:21,760
professional football player

645
00:23:26,950 --> 00:23:24,080
but most definitely our astronauts are

646
00:23:29,510 --> 00:23:26,960
very athletic and a lot of them grew up

647
00:23:31,750 --> 00:23:29,520
on you know football teams basketball

648
00:23:33,350 --> 00:23:31,760
teams volleyball teams growing up

649
00:23:35,110 --> 00:23:33,360
through high school and maybe even in

650
00:23:36,630 --> 00:23:35,120
college so

651
00:23:39,110 --> 00:23:36,640
definitely the astronauts we select

652
00:23:41,350 --> 00:23:39,120
recognize the importance of health and

653
00:23:43,909 --> 00:23:41,360
exercise and a lot of our astronauts

654
00:23:45,750 --> 00:23:43,919
today still do many different athletics

655
00:23:47,350 --> 00:23:45,760
intramurals and they're on clubs and

656
00:23:48,710 --> 00:23:47,360
teams

657
00:23:50,310 --> 00:23:48,720
all right well unfortunately i think

658
00:23:51,830 --> 00:23:50,320
that's all the time that we have today

659
00:23:53,750 --> 00:23:51,840
for questions really want to thank you

660
00:23:55,830 --> 00:23:53,760
guys for you know coming on and asking

661
00:23:57,909 --> 00:23:55,840
us hope we gave you a couple of cool

662
00:24:00,549 --> 00:23:57,919
answers and you enjoyed getting a look

663
00:24:02,549 --> 00:24:00,559

inside of mission control houston here

664
00:24:04,789 --> 00:24:02,559
again it was a real pleasure for us

665
00:24:06,470 --> 00:24:04,799
thanks again

666
00:24:07,909 --> 00:24:06,480
yes thank you so much and i'm excited

667
00:24:10,390 --> 00:24:07,919
that you guys are in durango i've been