



GMT 190: 18: 46: 25
PVC FE-6 00: 10: 25



PAO

ASCR
Coastal
Ecosystems

1
00:00:05,349 --> 00:00:03,270
good day and welcome to mission control

2
00:00:08,390 --> 00:00:05,359
houston i'm kelly humphries and with me

3
00:00:10,310 --> 00:00:08,400
today is mark williams who is the lead

4
00:00:12,950 --> 00:00:10,320
astronaut strength conditioning and

5
00:00:14,470 --> 00:00:12,960
rehabilitation trainer for astronauts

6
00:00:17,109 --> 00:00:14,480
aboard the international space station

7
00:00:19,269 --> 00:00:17,119
welcome mark thank you um we're here

8
00:00:21,429 --> 00:00:19,279
today to talk because we're having a

9
00:00:23,429 --> 00:00:21,439
special day today today is the

10
00:00:25,589 --> 00:00:23,439
international space station crew

11
00:00:27,269 --> 00:00:25,599
briefing uh in particular for mike

12
00:00:28,870 --> 00:00:27,279
hopkins so one of the next nasa

13
00:00:31,429 --> 00:00:28,880

astronauts is going to be flying up to

14

00:00:33,750 --> 00:00:31,439

the international space station and mike

15

00:00:35,510 --> 00:00:33,760

hopkins has a special affinity for

16

00:00:37,750 --> 00:00:35,520

training and fitness and he's been

17

00:00:39,910 --> 00:00:37,760

working a lot with mark to get ready for

18

00:00:41,510 --> 00:00:39,920

his expedition aboard the international

19

00:00:43,590 --> 00:00:41,520

space station

20

00:00:45,110 --> 00:00:43,600

and that news conference is going to be

21

00:00:46,950 --> 00:00:45,120

at one o'clock today there's also going

22

00:00:48,389 --> 00:00:46,960

to be a google hangout

23

00:00:50,549 --> 00:00:48,399

that's going to involve a number of

24

00:00:53,110 --> 00:00:50,559

fitness experts and we're going to have

25

00:00:54,869 --> 00:00:53,120

uh this afternoon a session where you

26

00:00:56,630 --> 00:00:54,879

can train like an astronaut here at the

27

00:00:58,790 --> 00:00:56,640

johnson space center a lot of social

28

00:01:01,029 --> 00:00:58,800

media folks and or and media are going

29

00:01:02,630 --> 00:01:01,039

to be here to see exactly how that works

30

00:01:04,390 --> 00:01:02,640

and mark's been involved in preparing

31

00:01:06,149 --> 00:01:04,400

for all that and getting mike ready for

32

00:01:07,590 --> 00:01:06,159

a space station expedition

33

00:01:08,390 --> 00:01:07,600

tell us a little bit about what you do

34

00:01:10,310 --> 00:01:08,400

mark

35

00:01:13,910 --> 00:01:10,320

well what we do is there's a group of us

36

00:01:15,830 --> 00:01:13,920

there's four individual trainers and

37

00:01:17,510 --> 00:01:15,840

we get assigned to

38

00:01:19,270 --> 00:01:17,520

a crew member about two years out from

39

00:01:21,350 --> 00:01:19,280

flight so we'll start training with them

40

00:01:22,630 --> 00:01:21,360

about two years out from flight we'll be

41

00:01:24,230 --> 00:01:22,640

with them through that whole training

42

00:01:26,710 --> 00:01:24,240

phase of pre-flight we'll be with them

43

00:01:29,109 --> 00:01:26,720

in flight which is six months we do all

44

00:01:30,069 --> 00:01:29,119

the exercise prescriptions in flight as

45

00:01:32,149 --> 00:01:30,079

well

46

00:01:33,990 --> 00:01:32,159

with some help from the exercise lab

47

00:01:35,670 --> 00:01:34,000

that actually helps us do some of the

48

00:01:37,270 --> 00:01:35,680

development of that and then we're with

49

00:01:39,270 --> 00:01:37,280

them for about six to eight weeks post

50

00:01:41,109 --> 00:01:39,280

flight once they return home to get to

51
00:01:42,550 --> 00:01:41,119
recondition them back to a 1g

52
00:01:43,990 --> 00:01:42,560
environment so we're with them about two

53
00:01:45,429 --> 00:01:44,000
and a half to three years through their

54
00:01:47,830 --> 00:01:45,439
whole mission

55
00:01:49,270 --> 00:01:47,840
wow and and i bet mike has been a bit of

56
00:01:51,270 --> 00:01:49,280
an extra challenge because he's such a

57
00:01:53,429 --> 00:01:51,280
fitness nut huh actually no it makes it

58
00:01:54,710 --> 00:01:53,439
easier it's uh the fact that you don't

59
00:01:56,709 --> 00:01:54,720
have to beat him over the head to get

60
00:01:57,830 --> 00:01:56,719
him to exercise he actually loves doing

61
00:02:01,990 --> 00:01:57,840
it

62
00:02:03,510 --> 00:02:02,000
he's in great shape right yes he is he's

63
00:02:05,109 --> 00:02:03,520

in very good shape

64

00:02:06,389 --> 00:02:05,119

so tell us what kind of exercise

65

00:02:08,229 --> 00:02:06,399

equipment we have aboard the

66

00:02:10,229 --> 00:02:08,239

international space station to help him

67

00:02:12,710 --> 00:02:10,239

maintain his good shape and his health

68

00:02:14,630 --> 00:02:12,720

for returning to when gravity okay well

69

00:02:16,550 --> 00:02:14,640

we have we have a cycle

70

00:02:18,470 --> 00:02:16,560

and we have a treadmill so we use that

71

00:02:20,390 --> 00:02:18,480

for primary aerobic fitness and then we

72

00:02:23,910 --> 00:02:20,400

have a resistive exercise device that

73

00:02:25,910 --> 00:02:23,920

allows us to do a multitude of exercises

74

00:02:27,910 --> 00:02:25,920

you would do in the gym here it allows

75

00:02:29,910 --> 00:02:27,920

us we can do squats and dead lifts which

76

00:02:31,670 --> 00:02:29,920

are the main exercises that we do you

77

00:02:33,830 --> 00:02:31,680

can do bench press and shoulder press

78

00:02:35,350 --> 00:02:33,840

and i'll bend over rows pretty much

79

00:02:38,309 --> 00:02:35,360

anything you think about you can do in a

80

00:02:41,030 --> 00:02:38,319

gym we can almost do on space station

81

00:02:43,270 --> 00:02:41,040

and that sounds easy but it's not

82

00:02:44,630 --> 00:02:43,280

because you don't have gravity to help

83

00:02:46,630 --> 00:02:44,640

with the weight lifting right no you

84

00:02:49,350 --> 00:02:46,640

don't the resistive exercise device for

85

00:02:51,670 --> 00:02:49,360

example works off a vacuum system

86

00:02:54,630 --> 00:02:51,680

and as you're exercising it pulls a

87

00:02:56,630 --> 00:02:54,640

vacuum that creates the load so we can

88

00:02:58,229 --> 00:02:56,640

get the loads to about 600 pounds and

89

00:03:00,550 --> 00:02:58,239

when we tell people that people look oh

90

00:03:02,229 --> 00:03:00,560

these guys are doing 600 well you think

91

00:03:05,350 --> 00:03:02,239

about you removing their body weight out

92

00:03:07,350 --> 00:03:05,360

of the system as well so we also have to

93

00:03:09,430 --> 00:03:07,360

calculate their body weight back into

94

00:03:12,470 --> 00:03:09,440

certain exercises to account for the

95

00:03:13,830 --> 00:03:12,480

loss of the 1g or the g and 1g

96

00:03:17,110 --> 00:03:13,840

environment

97

00:03:18,869 --> 00:03:17,120

okay and similarly when they walk or run

98

00:03:21,509 --> 00:03:18,879

on the treadmill

99

00:03:24,229 --> 00:03:21,519

your job there is to try and put force

100

00:03:25,830 --> 00:03:24,239

on their skeletal system to help

101
00:03:27,030 --> 00:03:25,840
generate that

102
00:03:29,430 --> 00:03:27,040
bone

103
00:03:31,750 --> 00:03:29,440
density

104
00:03:33,509 --> 00:03:31,760
regeneration that happens every day here

105
00:03:35,110 --> 00:03:33,519
on earth

106
00:03:36,630 --> 00:03:35,120
but they would float away from a

107
00:03:38,710 --> 00:03:36,640
treadmill if they didn't have some

108
00:03:40,309 --> 00:03:38,720
special harnesses so what they use is

109
00:03:42,229 --> 00:03:40,319
basically a harness that looks almost

110
00:03:44,630 --> 00:03:42,239
like similar to a backpack comes over

111
00:03:46,390 --> 00:03:44,640
the the shoulders and attaches at the

112
00:03:47,670 --> 00:03:46,400
waist and then we use a bungee system

113
00:03:50,149 --> 00:03:47,680

that comes up from the bottom that they

114

00:03:52,710 --> 00:03:50,159

clip into and that's how we control

115

00:03:54,070 --> 00:03:52,720

their load that they're running at

116

00:03:55,910 --> 00:03:54,080

so that's where we're going to get the

117

00:03:57,350 --> 00:03:55,920

impact loads the propulsion force just

118

00:03:59,429 --> 00:03:57,360

same thing you would just walking around

119

00:04:02,070 --> 00:03:59,439

and running down here okay and we showed

120

00:04:03,270 --> 00:04:02,080

a picture of the treadmill uh system uh

121

00:04:05,110 --> 00:04:03,280

that we uh

122

00:04:07,190 --> 00:04:05,120

were using and helped me with the

123

00:04:09,190 --> 00:04:07,200

acronym it's colbert and it got that

124

00:04:11,589 --> 00:04:09,200

name because there was a contest yeah

125

00:04:14,229 --> 00:04:11,599

module but it's the combined operational

126
00:04:16,150 --> 00:04:14,239
load-bearing treadmill resistive

127
00:04:18,229 --> 00:04:16,160
resistive treadmill right yeah we call

128
00:04:19,990 --> 00:04:18,239
it just t2 for sure

129
00:04:21,830 --> 00:04:20,000
because it's the second treadmill we had

130
00:04:24,390 --> 00:04:21,840
an earlier one called the treadmill

131
00:04:26,150 --> 00:04:24,400
vibration isolation system

132
00:04:27,590 --> 00:04:26,160
and that's since been replaced by a new

133
00:04:29,510 --> 00:04:27,600
system because

134
00:04:30,790 --> 00:04:29,520
we loaned it over to the russians right

135
00:04:32,469 --> 00:04:30,800
yes and this one actually gives us a

136
00:04:34,550 --> 00:04:32,479
little bit more capability it allows us

137
00:04:36,629 --> 00:04:34,560
to run at faster speeds and also allows

138
00:04:39,110 --> 00:04:36,639

us to do a lot more programming of

139

00:04:41,670 --> 00:04:39,120

individual programs into the system so

140

00:04:43,189 --> 00:04:41,680

it helps a lot so i know that astronauts

141

00:04:45,749 --> 00:04:43,199

on orbit try and get about two and a

142

00:04:48,150 --> 00:04:45,759

half hours of exercise in every day

143

00:04:50,950 --> 00:04:48,160

and that's primarily to keep from losing

144

00:04:53,350 --> 00:04:50,960

too much bone density and muscle density

145

00:04:55,670 --> 00:04:53,360

um how much exercise do they get as

146

00:04:57,670 --> 00:04:55,680

they're getting ready to go on orbit um

147

00:04:59,909 --> 00:04:57,680

it varies again per crew member i mean

148

00:05:01,670 --> 00:04:59,919

mike probably exercises every single day

149

00:05:03,110 --> 00:05:01,680

so i usually meet him here we're here

150

00:05:04,550 --> 00:05:03,120

about six o'clock in the mornings and

151

00:05:07,350 --> 00:05:04,560

we're training until

152

00:05:09,189 --> 00:05:07,360

7 30 or so pretty much every morning

153

00:05:10,950 --> 00:05:09,199

five days a week what he does on the

154

00:05:12,550 --> 00:05:10,960

weekends kind of on his own he you know

155

00:05:13,830 --> 00:05:12,560

he he'll go out and run or he'll do some

156

00:05:15,830 --> 00:05:13,840

things like that

157

00:05:18,070 --> 00:05:15,840

okay now not to get specific about in a

158

00:05:19,590 --> 00:05:18,080

particular exercise routine but in

159

00:05:21,029 --> 00:05:19,600

general do you follow the kind of things

160

00:05:23,350 --> 00:05:21,039

that other trainers do where you

161

00:05:24,950 --> 00:05:23,360

alternate muscle groups scenarios we

162

00:05:27,189 --> 00:05:24,960

don't we don't look at it from that

163

00:05:28,950 --> 00:05:27,199

perspective what we

164

00:05:31,029 --> 00:05:28,960

what we look at it at from our

165

00:05:33,270 --> 00:05:31,039

perspective is we're training what we

166

00:05:35,270 --> 00:05:33,280

call movement patterns so we look at how

167

00:05:36,469 --> 00:05:35,280

astronauts are going to be doing certain

168

00:05:38,550 --> 00:05:36,479

things in flight like training for an

169

00:05:40,390 --> 00:05:38,560

eva and we're going to try to mimic

170

00:05:41,590 --> 00:05:40,400

those patterns within the weight room

171

00:05:45,110 --> 00:05:41,600

and then there's certain things that we

172

00:05:46,950 --> 00:05:45,120

will do regardless of what we

173

00:05:48,629 --> 00:05:46,960

what specific

174

00:05:50,150 --> 00:05:48,639

training we're trying to do so we're

175

00:05:51,909 --> 00:05:50,160

going to squat we're going to deadlift

176

00:05:54,150 --> 00:05:51,919

but then we then take things like

177

00:05:56,469 --> 00:05:54,160

they're doing in the eva and the pool

178

00:05:58,870 --> 00:05:56,479

training for evas and we'll try to mimic

179

00:06:01,510 --> 00:05:58,880

those movements to prepare them to do

180

00:06:03,510 --> 00:06:01,520

better and be more functional in flight

181

00:06:05,749 --> 00:06:03,520

yeah i'm sure one area is the hands

182

00:06:07,029 --> 00:06:05,759

because the gloves you're working

183

00:06:08,870 --> 00:06:07,039

against pressure when you're doing a

184

00:06:10,950 --> 00:06:08,880

space walk and and i know there's a lot

185

00:06:12,550 --> 00:06:10,960

of work goes into beefing up your hands

186

00:06:14,309 --> 00:06:12,560

yeah there's a well it's it's basically

187

00:06:15,909 --> 00:06:14,319

forearm fatigue so we'll do a lot of

188

00:06:17,189 --> 00:06:15,919

things where we're just carrying was

189

00:06:18,950 --> 00:06:17,199

actually it's an exercise called a

190

00:06:21,110 --> 00:06:18,960

farmer's walk and you probably if you've

191

00:06:22,870 --> 00:06:21,120

ever seen like the world's strongest man

192

00:06:24,309 --> 00:06:22,880

these guys walk around with 400 pounds

193

00:06:27,029 --> 00:06:24,319

in their hand just carrying it and it's

194

00:06:28,550 --> 00:06:27,039

a grip strength forearm building we do

195

00:06:31,189 --> 00:06:28,560

that would be an exercise that we would

196

00:06:32,629 --> 00:06:31,199

do not with 400 pounds but we

197

00:06:35,029 --> 00:06:32,639

those are the types of things that we do

198

00:06:37,749 --> 00:06:35,039

yes okay that's really interesting

199

00:06:39,189 --> 00:06:37,759

um tell us a little bit about you uh

200

00:06:40,550 --> 00:06:39,199

where are you from where'd you go to

201
00:06:42,950 --> 00:06:40,560
school how did you get into this line of

202
00:06:44,150 --> 00:06:42,960
work um well i i grew up in houston i've

203
00:06:45,749 --> 00:06:44,160
been here my whole life so i've been

204
00:06:47,510 --> 00:06:45,759
around the space program my whole life

205
00:06:49,909 --> 00:06:47,520
my uncle actually

206
00:06:51,430 --> 00:06:49,919
worked here starting back in the very

207
00:06:53,430 --> 00:06:51,440
beginning i mean he was one of the first

208
00:06:55,749 --> 00:06:53,440
engineers here he retired a few years

209
00:06:57,270 --> 00:06:55,759
ago so i've been around it my whole life

210
00:06:58,790 --> 00:06:57,280
and it never really dawned on me to even

211
00:07:00,390 --> 00:06:58,800
work at the space program i've been

212
00:07:03,189 --> 00:07:00,400
involved in athletics

213
00:07:05,430 --> 00:07:03,199

most of my life when i went to school i

214

00:07:06,870 --> 00:07:05,440

kind of fell into physiology exercise

215

00:07:07,909 --> 00:07:06,880

physiology

216

00:07:10,230 --> 00:07:07,919

and

217

00:07:12,390 --> 00:07:10,240

myself growing up i i always loved

218

00:07:13,990 --> 00:07:12,400

lifting and competing and doing that

219

00:07:14,950 --> 00:07:14,000

stuff and it was just a natural fit for

220

00:07:17,189 --> 00:07:14,960

me

221

00:07:20,070 --> 00:07:17,199

back in the early 90s i kind of when i

222

00:07:21,830 --> 00:07:20,080

started my graduate work i uh i did an

223

00:07:23,270 --> 00:07:21,840

internship here and then i just kind of

224

00:07:24,469 --> 00:07:23,280

fell into it because we were just

225

00:07:25,909 --> 00:07:24,479

starting to do

226

00:07:27,270 --> 00:07:25,919

a lot of research with resistive

227

00:07:29,110 --> 00:07:27,280

training and how resistive training

228

00:07:30,629 --> 00:07:29,120

would affect space flight and

229

00:07:32,070 --> 00:07:30,639

that kind of stuff so i just kind of

230

00:07:33,430 --> 00:07:32,080

fell into it i've been here ever since

231

00:07:35,510 --> 00:07:33,440

i've been here about 20 years and i've

232

00:07:38,150 --> 00:07:35,520

been the strength coach for about 16

233

00:07:40,390 --> 00:07:38,160

years now great and i understand there's

234

00:07:42,309 --> 00:07:40,400

more to this than just exercise that

235

00:07:46,150 --> 00:07:42,319

we're working a lot with pairing

236

00:07:48,070 --> 00:07:46,160

exercise with nutrition to help minimize

237

00:07:49,589 --> 00:07:48,080

the kind of problems that you can have

238

00:07:51,990 --> 00:07:49,599

if you live in microgravity for a long

239

00:07:54,070 --> 00:07:52,000

time yes sir and there's a there's

240

00:07:56,150 --> 00:07:54,080

another group within nasa this is the

241

00:07:57,510 --> 00:07:56,160

nutrition group that works primarily

242

00:07:59,110 --> 00:07:57,520

with that

243

00:08:00,790 --> 00:07:59,120

so we don't really deal with a lot of

244

00:08:02,550 --> 00:08:00,800

the nutrition stuff that goes on in

245

00:08:03,510 --> 00:08:02,560

flight that's more in their their kind

246

00:08:05,350 --> 00:08:03,520

of realm

247

00:08:07,589 --> 00:08:05,360

right right but but it is interesting

248

00:08:10,150 --> 00:08:07,599

that you pair the the nutrition with the

249

00:08:12,790 --> 00:08:10,160

exercise workouts to help do that and

250

00:08:13,670 --> 00:08:12,800

some of that just as a sidelight is it's

251

00:08:16,150 --> 00:08:13,680

it's

252

00:08:17,749 --> 00:08:16,160

not necessarily intuitive uh you might

253

00:08:19,589 --> 00:08:17,759

think that more protein would help you

254

00:08:21,990 --> 00:08:19,599

get muscle density but it may be the

255

00:08:24,469 --> 00:08:22,000

other way around so yeah we'll talk to a

256

00:08:25,589 --> 00:08:24,479

nutritionist about that later but but we

257

00:08:27,350 --> 00:08:25,599

are seeing some of that we're seeing

258

00:08:29,110 --> 00:08:27,360

some increased uh

259

00:08:31,350 --> 00:08:29,120

increase of protein intake in flight but

260

00:08:32,870 --> 00:08:31,360

then that runs into other problems that

261

00:08:34,630 --> 00:08:32,880

there's other physiological problems

262

00:08:37,029 --> 00:08:34,640

that happen with too much protein from a

263

00:08:39,190 --> 00:08:37,039

Og environment so you kind of it's it's

264

00:08:41,750 --> 00:08:39,200

very balanced system and how you got to

265

00:08:43,829 --> 00:08:41,760

deal with it okay and then just a little

266

00:08:45,030 --> 00:08:43,839

bit more about what you do when they get

267

00:08:48,150 --> 00:08:45,040

back on the ground how do you get them

268

00:08:50,710 --> 00:08:48,160

back to normal activities after they've

269

00:08:52,790 --> 00:08:50,720

been in orbit and microgravity for so

270

00:08:55,269 --> 00:08:52,800

long right now it's pretty simple they

271

00:08:56,550 --> 00:08:55,279

return once they land from a six-month

272

00:08:58,230 --> 00:08:56,560

mention they land they come home the

273

00:09:00,310 --> 00:08:58,240

next day so we start

274

00:09:01,910 --> 00:09:00,320

our reconditioning

275

00:09:04,150 --> 00:09:01,920

the very next day

276
00:09:06,630 --> 00:09:04,160
and we just start out with very simple

277
00:09:09,910 --> 00:09:06,640
things from just walking

278
00:09:11,910 --> 00:09:09,920
and moving just basic stuff that we take

279
00:09:14,389 --> 00:09:11,920
for granted and it's not the sense that

280
00:09:16,470 --> 00:09:14,399
they can't do it but because of the

281
00:09:18,550 --> 00:09:16,480
vestibular system and the effect of

282
00:09:19,509 --> 00:09:18,560
balance and coordination

283
00:09:21,590 --> 00:09:19,519
and

284
00:09:23,829 --> 00:09:21,600
the muscles have to learn to fire in the

285
00:09:25,350 --> 00:09:23,839
quick sequence to do certain things

286
00:09:27,110 --> 00:09:25,360
again you would think walking i mean you

287
00:09:28,550 --> 00:09:27,120
watch somebody walk and they're walking

288
00:09:30,310 --> 00:09:28,560

but the muscles aren't firing in the

289

00:09:32,310 --> 00:09:30,320

correct sequence that they need to be

290

00:09:33,910 --> 00:09:32,320

normal you have in a normal so it's just

291

00:09:35,509 --> 00:09:33,920

trained retraining the neurological

292

00:09:37,110 --> 00:09:35,519

system and the muscular system and the

293

00:09:38,949 --> 00:09:37,120

vestibular system

294

00:09:40,790 --> 00:09:38,959

to start handling those things again

295

00:09:43,110 --> 00:09:40,800

okay and i understand you even have to

296

00:09:45,269 --> 00:09:43,120

build up some things like houses because

297

00:09:46,630 --> 00:09:45,279

they're not walking a lot up there and

298

00:09:48,710 --> 00:09:46,640

they actually lose those all those

299

00:09:52,070 --> 00:09:48,720

things yeah and i hear that it's kind of

300

00:09:53,829 --> 00:09:52,080

like uh walking on those those funny

301
00:09:56,310 --> 00:09:53,839
shoes that you use for shower shoes that

302
00:09:58,710 --> 00:09:56,320
have the little the little plastic yeah

303
00:10:00,790 --> 00:09:58,720
and and and and you can actually have

304
00:10:01,829 --> 00:10:00,800
some feet pain when they come back just

305
00:10:04,230 --> 00:10:01,839
from

306
00:10:06,150 --> 00:10:04,240
um just being in the 1g and how the

307
00:10:08,870 --> 00:10:06,160
bones and the ligaments within the foot

308
00:10:10,710 --> 00:10:08,880
act because in in space

309
00:10:13,670 --> 00:10:10,720
22 hours out of the day

310
00:10:14,870 --> 00:10:13,680
they're basically curled up and it's

311
00:10:16,630 --> 00:10:14,880
almost like sometimes if you've ever

312
00:10:18,790 --> 00:10:16,640
gotten up in the morning after

313
00:10:20,470 --> 00:10:18,800

a good long sleep and you the first step

314

00:10:22,949 --> 00:10:20,480

you take can be painful sometimes it's

315

00:10:25,509 --> 00:10:22,959

kind of like that so you know it happens

316

00:10:27,829 --> 00:10:25,519

fairly rarely actually so okay

317

00:10:29,590 --> 00:10:27,839

well mark uh williams i want to thank

318

00:10:31,430 --> 00:10:29,600

you again for being here today and and

319

00:10:33,750 --> 00:10:31,440

wish you well on all of our activities

320

00:10:36,710 --> 00:10:33,760

with mike hopkins and and showing off

321

00:10:38,710 --> 00:10:36,720

how we train astronauts and and how uh

322

00:10:40,710 --> 00:10:38,720

even young folks out there can train

323

00:10:42,389 --> 00:10:40,720

like an astronaut we'll have some

324

00:10:43,590 --> 00:10:42,399

demonstrations on that later today for

325

00:10:45,590 --> 00:10:43,600

folks that are visiting us here in

326

00:10:47,110 --> 00:10:45,600

houston uh and good luck with getting

327

00:10:48,550 --> 00:10:47,120

mike ready for his flight and keeping

328

00:10:50,230 --> 00:10:48,560

him healthy while he's there all right