
PAO
ASCR

1
00:00:03,669 --> 00:00:01,990
welcome back to mission control that was

2
00:00:05,510 --> 00:00:03,679
a look at some of the training that mike

3
00:00:07,909 --> 00:00:05,520
hopkins has been doing as he got ready

4
00:00:10,150 --> 00:00:07,919
for his launch yesterday at 3 58 p.m

5
00:00:13,030 --> 00:00:10,160
central time we have witness today uh

6
00:00:15,430 --> 00:00:13,040
mark gilliams who is uh one of the one

7
00:00:17,590 --> 00:00:15,440
of mike hopkins trainers and the lead

8
00:00:18,950 --> 00:00:17,600
conditioning and strength specialist for

9
00:00:20,150 --> 00:00:18,960
for us here at johnson's space center

10
00:00:22,550 --> 00:00:20,160
right

11
00:00:24,070 --> 00:00:22,560
joining us i think mark's going to be

12
00:00:25,670 --> 00:00:24,080
able to tell us a little bit about what

13
00:00:27,029 --> 00:00:25,680

mike has been doing and the importance

14
00:00:29,509 --> 00:00:27,039
of that in general but why don't we

15
00:00:31,429 --> 00:00:29,519
start out um by just talking about what

16
00:00:32,630 --> 00:00:31,439
what generally is required for astronaut

17
00:00:38,069 --> 00:00:32,640
training

18
00:00:39,350 --> 00:00:38,079
we start about two years out from flight

19
00:00:41,190 --> 00:00:39,360
with these guys

20
00:00:43,270 --> 00:00:41,200
and we just take them basically through

21
00:00:45,029 --> 00:00:43,280
physical conditioning so it'll it'll go

22
00:00:47,590 --> 00:00:45,039
from everything from

23
00:00:48,709 --> 00:00:47,600
uh just general running to weightlifting

24
00:00:51,270 --> 00:00:48,719
getting their

25
00:00:54,389 --> 00:00:51,280
the body prepared for flight if they're

26
00:00:55,990 --> 00:00:54,399
doing eva we'll do some special

27
00:00:58,389 --> 00:00:56,000
training for getting them prepared for

28
00:00:59,750 --> 00:00:58,399
doing eva

29
00:01:01,110 --> 00:00:59,760
and then

30
00:01:02,630 --> 00:01:01,120
other than that it's just general

31
00:01:04,390 --> 00:01:02,640
overall fitness

32
00:01:07,109 --> 00:01:04,400
so for people who who don't know the

33
00:01:09,910 --> 00:01:07,119
lingo eva that's a spacewalk what's some

34
00:01:13,270 --> 00:01:09,920
of the things that might be

35
00:01:15,109 --> 00:01:13,280
specific to that well with eva

36
00:01:16,070 --> 00:01:15,119
one of the the main

37
00:01:17,990 --> 00:01:16,080
because you're working against the

38
00:01:20,070 --> 00:01:18,000

pressurized suit you have a lot of hand

39
00:01:22,149 --> 00:01:20,080
and forearm fatigue so we'll do specific

40
00:01:23,670 --> 00:01:22,159
exercises that will work

41
00:01:25,510 --> 00:01:23,680
a lot of

42
00:01:27,990 --> 00:01:25,520
forearm and hand fatigue so we try to

43
00:01:30,230 --> 00:01:28,000
strengthen those up to get them used to

44
00:01:31,990 --> 00:01:30,240
that fatigue factor so you you think

45
00:01:33,429 --> 00:01:32,000
about what the requirements are for

46
00:01:35,190 --> 00:01:33,439
anything that the astronauts might be

47
00:01:37,749 --> 00:01:35,200
doing and what they might need the

48
00:01:40,230 --> 00:01:37,759
strength to do right yes yes okay well

49
00:01:42,230 --> 00:01:40,240
what generally just for somebody going

50
00:01:43,429 --> 00:01:42,240
into space what what what do they need

51
00:01:44,389 --> 00:01:43,439
to think about

52
00:01:46,550 --> 00:01:44,399
well

53
00:01:49,190 --> 00:01:46,560
there's one of the there's a couple of

54
00:01:50,789 --> 00:01:49,200
things once you get to flight

55
00:01:52,870 --> 00:01:50,799
zero g

56
00:01:54,789 --> 00:01:52,880
creates kind of the physiological

57
00:01:56,950 --> 00:01:54,799
changes that happen we lose muscle we

58
00:01:58,709 --> 00:01:56,960
lose not only muscle size but we lose

59
00:02:00,550 --> 00:01:58,719
muscle strength we

60
00:02:02,069 --> 00:02:00,560
lose power the

61
00:02:03,749 --> 00:02:02,079
ability to develop power we lose

62
00:02:05,350 --> 00:02:03,759
cardiovascular conditioning and then we

63
00:02:06,789 --> 00:02:05,360

also lose a lot of bone

64
00:02:08,150 --> 00:02:06,799
so when they get

65
00:02:09,910 --> 00:02:08,160
those things they need to be aware of

66
00:02:12,710 --> 00:02:09,920
and most of them are

67
00:02:15,270 --> 00:02:12,720
highly aware of what happens in zero g

68
00:02:18,309 --> 00:02:15,280
so when we put together our program here

69
00:02:20,150 --> 00:02:18,319
we're training them here in 1g to

70
00:02:21,670 --> 00:02:20,160
prepare them for in flight and the

71
00:02:24,309 --> 00:02:21,680
things that we need to do in flight to

72
00:02:26,070 --> 00:02:24,319
mitigate those particular losses

73
00:02:27,670 --> 00:02:26,080
so it's not necessarily i guess you know

74
00:02:29,670 --> 00:02:27,680
zero gravity you're not lifting heavy

75
00:02:32,630 --> 00:02:29,680
stuff it's all pretty pretty weightless

76
00:02:35,030 --> 00:02:32,640
i guess so it's not that you need to be

77
00:02:37,110 --> 00:02:35,040
particularly strong for the work but so

78
00:02:38,470 --> 00:02:37,120
that you can stay healthy in general yes

79
00:02:39,750 --> 00:02:38,480
yeah i mean we're lifting they're

80
00:02:42,550 --> 00:02:39,760
lifting some of these guys are lifting

81
00:02:44,150 --> 00:02:42,560
pretty heavy loads but i

82
00:02:45,910 --> 00:02:44,160
so

83
00:02:47,350 --> 00:02:45,920
but that's mainly just to counteract

84
00:02:48,710 --> 00:02:47,360
that stuff it has nothing to do with

85
00:02:50,869 --> 00:02:48,720
space flight i mean the ability to

86
00:02:53,190 --> 00:02:50,879
deadlift 450 pounds

87
00:02:54,949 --> 00:02:53,200
is not preparing them pretty much for

88
00:02:56,550 --> 00:02:54,959

something they're doing in space it's

89
00:02:59,190 --> 00:02:56,560
actually conditioning the bones for the

90
00:03:01,110 --> 00:02:59,200
bone loss and muscle mass loss well mike

91
00:03:03,509 --> 00:03:01,120
hopkins seems like he's probably a

92
00:03:05,589 --> 00:03:03,519
really good example of fitness um it

93
00:03:07,670 --> 00:03:05,599
seems watching that video it was pretty

94
00:03:09,190 --> 00:03:07,680
impressive what he can do yeah is that

95
00:03:10,790 --> 00:03:09,200
the norm or

96
00:03:11,830 --> 00:03:10,800
and i think this is maybe some some

97
00:03:13,430 --> 00:03:11,840
other video of his training that we're

98
00:03:15,670 --> 00:03:13,440
here we're seeing here uh looks like

99
00:03:17,110 --> 00:03:15,680
he's doing some weightlifting yeah he's

100
00:03:19,110 --> 00:03:17,120
actually doing some squatting there

101
00:03:20,229 --> 00:03:19,120
that's in that's our our gym in there in

102
00:03:21,589 --> 00:03:20,239
russia

103
00:03:23,830 --> 00:03:21,599
uh

104
00:03:25,990 --> 00:03:23,840
so i can't tell how much loads on there

105
00:03:26,949 --> 00:03:26,000
but it looks about 300 and some mod

106
00:03:28,869 --> 00:03:26,959
pounds

107
00:03:31,589 --> 00:03:28,879
so yeah he's getting pretty he's getting

108
00:03:34,309 --> 00:03:31,599
he's pretty strong guy

109
00:03:37,190 --> 00:03:34,319
so i am are most astronauts able to do

110
00:03:39,990 --> 00:03:37,200
that or is he the exception um well the

111
00:03:41,830 --> 00:03:40,000
the funny thing about zero g now

112
00:03:43,910 --> 00:03:41,840
you think about it from a 1g perspective

113
00:03:46,390 --> 00:03:43,920

he if he's doing 300 pounds and he

114
00:03:48,630 --> 00:03:46,400
weighs 200 pounds in flight that now

115
00:03:49,670 --> 00:03:48,640
becomes 500 pounds because body weight's

116
00:03:52,149 --> 00:03:49,680
removed

117
00:03:55,030 --> 00:03:52,159
so on certain exercises we actually add

118
00:03:56,789 --> 00:03:55,040
back in the body weight okay so to

119
00:03:57,830 --> 00:03:56,799
counter because we lose it once we get

120
00:04:01,190 --> 00:03:57,840
there so

121
00:04:03,190 --> 00:04:01,200
uh for him i mean you know for him to be

122
00:04:04,789 --> 00:04:03,200
able to squad 500 and some pounds in

123
00:04:06,789 --> 00:04:04,799
flight probably he's not he's already

124
00:04:09,110 --> 00:04:06,799
doing that down here so

125
00:04:11,509 --> 00:04:09,120
so for most people what it would it is

126
00:04:13,589 --> 00:04:11,519
very interesting is because you add that

127
00:04:15,190 --> 00:04:13,599
body weight back in a lot of them aren't

128
00:04:16,710 --> 00:04:15,200
used to having that much load

129
00:04:19,110 --> 00:04:16,720
particularly just on their back they're

130
00:04:21,270 --> 00:04:19,120
used to it being through the whole body

131
00:04:23,350 --> 00:04:21,280
okay so is that something that i know

132
00:04:25,350 --> 00:04:23,360
the the equipment they use in space is

133
00:04:27,110 --> 00:04:25,360
called the a red the advanced resistive

134
00:04:30,070 --> 00:04:27,120
exercise device which is basically

135
00:04:32,790 --> 00:04:30,080
weightlifting type exercise but in zero

136
00:04:34,790 --> 00:04:32,800
gravity right yes yeah and it enables us

137
00:04:35,749 --> 00:04:34,800
to pretty much do anything we can do in

138
00:04:38,469 --> 00:04:35,759

the gym

139
00:04:39,749 --> 00:04:38,479
so uh we squat with it we dead lift with

140
00:04:42,390 --> 00:04:39,759
it those which are our two main

141
00:04:45,270 --> 00:04:42,400
exercises for maintaining bone and

142
00:04:47,670 --> 00:04:45,280
muscle strength and uh it can go up to

143
00:04:50,150 --> 00:04:47,680
about 600 pounds so we can get a fairly

144
00:04:52,950 --> 00:04:50,160
good load out of it okay so that should

145
00:04:54,790 --> 00:04:52,960
be able to keep mike

146
00:04:57,670 --> 00:04:54,800
uh busy and

147
00:04:58,870 --> 00:04:57,680
keep it straining up um

148
00:05:00,469 --> 00:04:58,880
i don't think that most of the

149
00:05:03,110 --> 00:05:00,479
astronauts are quite that advanced

150
00:05:04,790 --> 00:05:03,120
though right or is that true or no i

151
00:05:06,710 --> 00:05:04,800
mean all of them are trained up really

152
00:05:08,230 --> 00:05:06,720
well before they get up there i mean

153
00:05:10,310 --> 00:05:08,240
every astronaut we have once they're

154
00:05:12,070 --> 00:05:10,320
assigned a flight

155
00:05:13,830 --> 00:05:12,080
you know they're squatting they're dead

156
00:05:15,590 --> 00:05:13,840
lifting they're doing those things in

157
00:05:16,710 --> 00:05:15,600
the gym prior to flight so when they get

158
00:05:18,710 --> 00:05:16,720
up there they're pretty much well

159
00:05:21,909 --> 00:05:18,720
prepared to do that and it'll vary i

160
00:05:23,430 --> 00:05:21,919
mean yeah i mean mike is the is is

161
00:05:24,950 --> 00:05:23,440
fairly strong i would say he's probably

162
00:05:27,909 --> 00:05:24,960
one of the strongest astronauts we have

163
00:05:30,150 --> 00:05:27,919

pound for pound but it's relative to any

164
00:05:32,950 --> 00:05:30,160
individual okay i mean if mike is

165
00:05:34,950 --> 00:05:32,960
lifting 90 of his strength

166
00:05:37,430 --> 00:05:34,960
you know you would be lifting 90 of your

167
00:05:39,670 --> 00:05:37,440
strength so it's relative to you so it's

168
00:05:41,749 --> 00:05:39,680
and that's kind of how

169
00:05:43,350 --> 00:05:41,759
that's how we do yes yes ma'am we we

170
00:05:45,909 --> 00:05:43,360
develop it off of

171
00:05:47,990 --> 00:05:45,919
from an individual standpoint so 90

172
00:05:50,310 --> 00:05:48,000
is 90 regardless of whether it's you or

173
00:05:53,749 --> 00:05:50,320
me so it's it's still relative to us

174
00:05:54,950 --> 00:05:53,759
okay um how how far ahead do you start

175
00:05:56,309 --> 00:05:54,960
working on

176
00:05:58,309 --> 00:05:56,319
coming up with the plan for the

177
00:05:59,670 --> 00:05:58,319
astronauts when they're in orbit and

178
00:06:02,390 --> 00:05:59,680
working with them on what they need to

179
00:06:03,990 --> 00:06:02,400
know well uh well we start working with

180
00:06:06,070 --> 00:06:04,000
them as soon as they actually come to

181
00:06:08,469 --> 00:06:06,080
nasa i mean we've been working with been

182
00:06:10,309 --> 00:06:08,479
working with mike since he's been here

183
00:06:11,670 --> 00:06:10,319
once he's assigned to a flight then

184
00:06:13,350 --> 00:06:11,680
we're going to get more much more

185
00:06:15,510 --> 00:06:13,360
general in what we're doing and try to

186
00:06:17,909 --> 00:06:15,520
be more excuse me more specific to what

187
00:06:19,590 --> 00:06:17,919
we're doing in related to flight

188
00:06:20,550 --> 00:06:19,600

um

189
00:06:22,230 --> 00:06:20,560
and then

190
00:06:24,309 --> 00:06:22,240
what was i'm sorry i've got the other

191
00:06:25,510 --> 00:06:24,319
close the other question about that

192
00:06:26,870 --> 00:06:25,520
how early do you start working with them

193
00:06:28,469 --> 00:06:26,880
it sounds like that's pretty early on

194
00:06:29,830 --> 00:06:28,479
yeah it's pretty early yes it's really

195
00:06:31,670 --> 00:06:29,840
early on so

196
00:06:33,590 --> 00:06:31,680
it you know we've had some crew members

197
00:06:35,029 --> 00:06:33,600
that we've started with and you know

198
00:06:37,029 --> 00:06:35,039
they could be in their mid-40s that have

199
00:06:38,710 --> 00:06:37,039
never really done a squat before so we

200
00:06:41,029 --> 00:06:38,720
we have to take that

201
00:06:41,749 --> 00:06:41,039
into account when we start training them

202
00:06:43,590 --> 00:06:41,759
so

203
00:06:46,150 --> 00:06:43,600
uh with mike i mean mike played football

204
00:06:47,590 --> 00:06:46,160
in college he's been he was doing squats

205
00:06:48,950 --> 00:06:47,600
for a long time so it wasn't a lot of

206
00:06:51,029 --> 00:06:48,960
training with him it was just more

207
00:06:52,550 --> 00:06:51,039
putting the program together and getting

208
00:06:54,309 --> 00:06:52,560
him to follow the program now as far as

209
00:06:56,390 --> 00:06:54,319
the in-flight program goes

210
00:06:59,189 --> 00:06:56,400
we pretty much have a set program that

211
00:07:01,110 --> 00:06:59,199
we use with every individual and we'll

212
00:07:03,350 --> 00:07:01,120
tailor it a little bit

213
00:07:05,350 --> 00:07:03,360

and maybe change a few things depending

214
00:07:07,270 --> 00:07:05,360
on a strength or weakness within that

215
00:07:10,070 --> 00:07:07,280
particular crew member if we need to for

216
00:07:12,550 --> 00:07:10,080
in flight okay well i know once they get

217
00:07:14,550 --> 00:07:12,560
up on orbit they work out about two

218
00:07:16,550 --> 00:07:14,560
hours a day is that right it's their

219
00:07:18,790 --> 00:07:16,560
schedule two and a half hours a day

220
00:07:20,870 --> 00:07:18,800
and that will include uh the resistive

221
00:07:22,629 --> 00:07:20,880
exercise portion as well as the aerobic

222
00:07:24,629 --> 00:07:22,639
proportion so

223
00:07:26,790 --> 00:07:24,639
and but that also includes

224
00:07:28,309 --> 00:07:26,800
they have to set up it's a little more

225
00:07:30,070 --> 00:07:28,319
overhead to get ready to run on the

226
00:07:32,070 --> 00:07:30,080
treadmill than it is down here you just

227
00:07:34,309 --> 00:07:32,080
run in and push the button and go you

228
00:07:36,070 --> 00:07:34,319
you have to clean up set up there's you

229
00:07:37,510 --> 00:07:36,080
have harnesses you have to hook into and

230
00:07:38,950 --> 00:07:37,520
different types of things so it's it's

231
00:07:40,790 --> 00:07:38,960
just a little more overhead but that

232
00:07:43,510 --> 00:07:40,800
time includes all that stuff as well

233
00:07:45,189 --> 00:07:43,520
okay um and then

234
00:07:46,629 --> 00:07:45,199
is that is there a requirement for

235
00:07:47,830 --> 00:07:46,639
before they go to flight how much they

236
00:07:50,309 --> 00:07:47,840
exercise

237
00:07:52,790 --> 00:07:50,319
a day or once they get back well there

238
00:07:54,469 --> 00:07:52,800

there is a minimum requirement of once

239
00:07:55,670 --> 00:07:54,479
they're scheduled once they're assigned

240
00:07:57,029 --> 00:07:55,680
that we

241
00:08:02,550 --> 00:07:57,039
they're

242
00:08:04,150 --> 00:08:02,560
week at least twice a week for two hours

243
00:08:05,830 --> 00:08:04,160
a day we try to usually break that up

244
00:08:07,430 --> 00:08:05,840
and try to get it to at least four days

245
00:08:09,670 --> 00:08:07,440
or one hour a day

246
00:08:10,869 --> 00:08:09,680
with mike for example mike

247
00:08:12,790 --> 00:08:10,879
it didn't matter when it was in his

248
00:08:14,550 --> 00:08:12,800
schedule his schedule is we work out at

249
00:08:16,230 --> 00:08:14,560
six o'clock in the morning so he works

250
00:08:17,830 --> 00:08:16,240
out before work so every morning prior

251
00:08:19,830 --> 00:08:17,840
to flight five days a week he and i are

252
00:08:22,390 --> 00:08:19,840
in the gym at six o'clock in the morning

253
00:08:24,710 --> 00:08:22,400
so okay yeah and then when he gets back

254
00:08:26,390 --> 00:08:24,720
will that will there be a set regime

255
00:08:29,350 --> 00:08:26,400
regimen for him to follow there as well

256
00:08:32,230 --> 00:08:29,360
yes uh once they return home for the

257
00:08:34,149 --> 00:08:32,240
next four about six weeks roughly

258
00:08:37,269 --> 00:08:34,159
there are two and a half hours a day

259
00:08:38,870 --> 00:08:37,279
seven days a week they're assigned to

260
00:08:40,709 --> 00:08:38,880
to us and we just go through

261
00:08:43,029 --> 00:08:40,719
reconditioning with them and at that

262
00:08:45,990 --> 00:08:43,039
point again we we pretty much have a set

263
00:08:47,670 --> 00:08:46,000

program that we use but depending on how

264
00:08:49,350 --> 00:08:47,680
each individual crew member comes back a

265
00:08:51,269 --> 00:08:49,360
little different than the next crew

266
00:08:55,590 --> 00:08:51,279
member depending on how spaceflight

267
00:08:59,590 --> 00:08:55,600
affects them and that then um

268
00:09:01,350 --> 00:08:59,600
tells us how fast we can progress into

269
00:09:03,750 --> 00:09:01,360
the next stage of training from a from a

270
00:09:05,190 --> 00:09:03,760
post-flight perspective okay well just

271
00:09:07,590 --> 00:09:05,200
one more question for you then i think

272
00:09:09,190 --> 00:09:07,600
um okay you know one of the things that

273
00:09:11,030 --> 00:09:09,200
we've been talking about a lot with mike

274
00:09:13,350 --> 00:09:11,040
hopkins is the train like an astronaut

275
00:09:16,870 --> 00:09:13,360
program and talking to kids about the

276
00:09:18,550 --> 00:09:16,880
importance of fitness and nutrition um

277
00:09:20,150 --> 00:09:18,560
i know you know in general you have to

278
00:09:22,230 --> 00:09:20,160
be basically physically fit to be an

279
00:09:24,389 --> 00:09:22,240
astronaut right would you what would you

280
00:09:26,550 --> 00:09:24,399
encourage kids to do now if they were

281
00:09:28,630 --> 00:09:26,560
going to want to be an astronaut well i

282
00:09:30,230 --> 00:09:28,640
think physical fitness not even just

283
00:09:32,230 --> 00:09:30,240
from not even an astronaut standpoint

284
00:09:34,150 --> 00:09:32,240
but just in general is extremely

285
00:09:36,310 --> 00:09:34,160
important it it

286
00:09:37,670 --> 00:09:36,320
you know when you talk about the obesity

287
00:09:40,070 --> 00:09:37,680
issues that we have in our country and

288
00:09:41,750 --> 00:09:40,080

you look at disease just you know high

289
00:09:45,269 --> 00:09:41,760
blood pressure diabetes all the things

290
00:09:46,310 --> 00:09:45,279
that we have that are very academic

291
00:09:48,230 --> 00:09:46,320
um

292
00:09:51,350 --> 00:09:48,240
academic proportions in this country

293
00:09:54,150 --> 00:09:51,360
then i think that exercise and physical

294
00:09:56,150 --> 00:09:54,160
fitness will definitely help those so to

295
00:09:58,230 --> 00:09:56,160
me you should always be moving you

296
00:09:59,670 --> 00:09:58,240
should always be doing something and

297
00:10:02,310 --> 00:09:59,680
it's going to help you in every aspect

298
00:10:03,670 --> 00:10:02,320
of your life so okay and i guess if you

299
00:10:05,350 --> 00:10:03,680
are interested in learning more about

300
00:10:06,630 --> 00:10:05,360
that the train like an astronaut program

301
00:10:08,389 --> 00:10:06,640
does have some

302
00:10:09,910 --> 00:10:08,399
suggestions on some of the exercises you

303
00:10:11,590 --> 00:10:09,920
might be interested in trying out and

304
00:10:14,150 --> 00:10:11,600
you can find out more about that by

305
00:10:15,910 --> 00:10:14,160
going to their facebook site at

306
00:10:17,590 --> 00:10:15,920
facebook.com

307
00:10:19,509 --> 00:10:17,600
train astronaut you can see that here on

308
00:10:21,350 --> 00:10:19,519
the bottom of your screen and you can

309
00:10:23,269 --> 00:10:21,360
also keep up with kind of the weekly

310
00:10:25,269 --> 00:10:23,279
workouts and fitness tips from mike

311
00:10:26,470 --> 00:10:25,279
hopkins and other astronauts

312
00:10:28,870 --> 00:10:26,480
at their twitter site which is

313
00:10:30,310 --> 00:10:28,880

twitter.comtrainastronaut

314
00:10:31,590 --> 00:10:30,320
thanks so much mark for talking with us