1
00:00:04,950 --> 00:00:02,710
well good afternoon everybody and

2
00:00:07,110 --> 00:00:04,960
welcome to nasa's johnson space center

3
00:00:09,509 --> 00:00:07,120
i'm dan hewitt and we are of course here

4
00:00:12,150 --> 00:00:09,519
to talk about the one-year mission

5
00:00:13,509 --> 00:00:12,160
scott's home after 340 days in space he

6
00:00:15,430 --> 00:00:13,519
was doing a lot of really important

7
00:00:16,950 --> 00:00:15,440
science on board which is continuing now

8
00:00:18,470 --> 00:00:16,960
that he's back on the ground so we're

9
00:00:19,349 --> 00:00:18,480
here to talk a little bit more about

10
00:00:21,750 --> 00:00:19,359
that

11
00:00:25,269 --> 00:00:21,760
i'm joined today by dr julie robinson

12
00:00:26,870 --> 00:00:25,279
the chief iss program scientist i'm also

13
00:00:28,470 --> 00:00:26,880

joined by dr john charles the chief

14
00:00:30,550 --> 00:00:28,480
scientist from nasa's human research

15
00:00:32,470 --> 00:00:30,560
program and then of course mark kelly

16
00:00:34,310 --> 00:00:32,480
there on the end you might recognize him

17
00:00:36,709 --> 00:00:34,320
he's scott's twin brother and was a

18
00:00:38,630 --> 00:00:36,719
participant in this twin study that took

19
00:00:40,069 --> 00:00:38,640
place down here on the ground we have a

20
00:00:41,750 --> 00:00:40,079
lot of folks here in the room and a lot

21
00:00:42,950 --> 00:00:41,760
on the phone so i won't waste too much

22
00:00:45,430 --> 00:00:42,960
time but

23
00:00:47,350 --> 00:00:45,440
just to give our participants a a quick

24
00:00:49,510 --> 00:00:47,360
moment to start off julie

25
00:00:51,830 --> 00:00:49,520
i'll start with you now scott was up

26
00:00:53,830 --> 00:00:51,840
there for 340 days obviously human

27
00:00:55,670 --> 00:00:53,840
research was a big part but there was a

28
00:00:57,430 --> 00:00:55,680
lot of research taking place onboard the

29
00:00:59,910 --> 00:00:57,440
station give us just a quick idea of

30
00:01:01,670 --> 00:00:59,920
just the breadth of studies that he was

31
00:01:04,149 --> 00:01:01,680
involved in during the year in space

32
00:01:05,830 --> 00:01:04,159
yeah there were over 450 investigations

33
00:01:08,230 --> 00:01:05,840
that were done on iss while scott was

34
00:01:10,149 --> 00:01:08,240
there and the breadth covers almost the

35
00:01:12,630 --> 00:01:10,159
entire breadth of science there were

36
00:01:14,870 --> 00:01:12,640
life sciences investigations with stem

37
00:01:16,630 --> 00:01:14,880
cells and worms and other kinds of

38
00:01:19,510 --> 00:01:16,640

organisms helping us to understand the

39
00:01:20,710 --> 00:01:19,520
mechanisms of how life responds to space

40
00:01:22,469 --> 00:01:20,720
there were physical sciences

41
00:01:24,070 --> 00:01:22,479
investigations with

42
00:01:25,190 --> 00:01:24,080
fuels burning in a controlled

43
00:01:27,190 --> 00:01:25,200
environment

44
00:01:29,429 --> 00:01:27,200
fluids like colloids being tested for

45
00:01:30,550 --> 00:01:29,439
their self-assembly processes

46
00:01:32,630 --> 00:01:30,560
and then there were technology

47
00:01:35,990 --> 00:01:32,640
demonstrations where we were evaluating

48
00:01:38,390 --> 00:01:36,000
future technologies for life support

49
00:01:39,910 --> 00:01:38,400
autonomous rendezvous and docking there

50
00:01:41,830 --> 00:01:39,920
were education activities that

51
00:01:44,149 --> 00:01:41,840
accompanied some of these like we had

52
00:01:45,830 --> 00:01:44,159
these spheres on iss floating around

53
00:01:47,910 --> 00:01:45,840
they were testing autonomous rendezvous

54
00:01:49,510 --> 00:01:47,920
and docking and structure of fuel tanks

55
00:01:50,950 --> 00:01:49,520
but students also got the opportunity to

56
00:01:53,030 --> 00:01:50,960
program those as part of the zero

57
00:01:55,350 --> 00:01:53,040
robotics competition so there were great

58
00:01:56,709 --> 00:01:55,360
things that that were added to some of

59
00:01:58,950 --> 00:01:56,719
our investigations to make them

60
00:02:00,310 --> 00:01:58,960
important to students on earth and then

61
00:02:02,389 --> 00:02:00,320
outside the space station there are

62
00:02:04,389 --> 00:02:02,399
really important instruments attached

63
00:02:06,389 --> 00:02:04,399

the alpha magnetic spectrometer is

64
00:02:08,070 --> 00:02:06,399
measuring the nature of dark matter and

65
00:02:09,430 --> 00:02:08,080
dark energy by looking at galactic

66
00:02:10,550 --> 00:02:09,440
cosmic rays

67
00:02:15,350 --> 00:02:10,560
and

68
00:02:17,430 --> 00:02:15,360
are looking at the earth so rapidscat

69
00:02:19,190 --> 00:02:17,440
was really key data for modeling the

70
00:02:22,790 --> 00:02:19,200
intensification of hurricanes throughout

71
00:02:24,470 --> 00:02:22,800
the entire last season all based on iss

72
00:02:27,270 --> 00:02:24,480
commercial companies are doing a lot of

73
00:02:28,949 --> 00:02:27,280
research on iss there were

74
00:02:31,430 --> 00:02:28,959
both cubesats that were deployed for

75
00:02:33,990 --> 00:02:31,440
different commercial companies and also

76
00:02:35,990 --> 00:02:34,000
a lot of experiments done inside the iss

77
00:02:37,670 --> 00:02:36,000
for research and development efforts so

78
00:02:39,110 --> 00:02:37,680
this huge amount of research was going

79
00:02:41,910 --> 00:02:39,120
on of course people are going to want to

80
00:02:43,509 --> 00:02:41,920
know all about the experiments with the

81
00:02:45,190 --> 00:02:43,519
twin study and the experiments on human

82
00:02:47,270 --> 00:02:45,200
physiology but it's just good to have

83
00:02:50,309 --> 00:02:47,280
that context of what an amazing research

84
00:02:51,910 --> 00:02:50,319
laboratory the iss is today okay and

85
00:02:53,750 --> 00:02:51,920
john charles again our chief scientist

86
00:02:55,430 --> 00:02:53,760
for the human research program now at

87
00:02:57,030 --> 00:02:55,440
the core of the year in space a lot of

88
00:02:59,030 --> 00:02:57,040

it was that human research what were

89
00:03:00,869 --> 00:02:59,040
some of the different studies you guys

90
00:03:02,390 --> 00:03:00,879
were doing the different bodily systems

91
00:03:05,990 --> 00:03:02,400
that you were looking at during scott's

92
00:03:08,710 --> 00:03:06,000
year in space julie mentioned 450

93
00:03:10,869 --> 00:03:08,720
investigations on this mission only 18

94
00:03:13,190 --> 00:03:10,879
were human research program missions but

95
00:03:14,790 --> 00:03:13,200
we seem to be few a number but take lots

96
00:03:17,110 --> 00:03:14,800
of crew time and lots of effort and of

97
00:03:19,430 --> 00:03:17,120
course fairly highly visible

98
00:03:21,110 --> 00:03:19,440
of there are 18 including the twins

99
00:03:23,430 --> 00:03:21,120
study which is one of our investigations

100
00:03:25,509 --> 00:03:23,440
where scott was also doing

101
00:03:26,869 --> 00:03:25,519
two investigations from the russians and

102
00:03:29,430 --> 00:03:26,879
two from the japanese as part of our

103
00:03:31,990 --> 00:03:29,440
truly multinational collaborative effort

104
00:03:33,830 --> 00:03:32,000
and the studies were typical of space

105
00:03:36,550 --> 00:03:33,840
station kinds of studies

106
00:03:38,229 --> 00:03:36,560
some of them were carryovers from his

107
00:03:40,710 --> 00:03:38,239
previous six-month flight so we would

108
00:03:42,470 --> 00:03:40,720
have some basis of comparison between

109
00:03:44,470 --> 00:03:42,480
his time and space for six months and

110
00:03:46,470 --> 00:03:44,480
his time and space for one year

111
00:03:48,390 --> 00:03:46,480
and some were new for this

112
00:03:49,750 --> 00:03:48,400
this mission and they are continuing on

113
00:03:52,550 --> 00:03:49,760

other missions

114
00:03:55,670 --> 00:03:52,560
the two flagship investigations were the

115
00:03:58,149 --> 00:03:55,680
in in flight fluid shift study which

116
00:03:59,990 --> 00:03:58,159
was a truly international investigation

117
00:04:01,429 --> 00:04:00,000
that required moving a lot of american

118
00:04:03,429 --> 00:04:01,439
monitoring hardware into the russian

119
00:04:05,830 --> 00:04:03,439
segment and using the russian

120
00:04:08,070 --> 00:04:05,840
medical system including a device that

121
00:04:09,990 --> 00:04:08,080
relocates body fluids

122
00:04:11,830 --> 00:04:10,000
as a way to investigate the changes in

123
00:04:14,229 --> 00:04:11,840
fluid distribution in the body and see

124
00:04:15,910 --> 00:04:14,239
how they might or might not impact the

125
00:04:18,710 --> 00:04:15,920
changes in visual acuity that occur in

126
00:04:20,629 --> 00:04:18,720
space flight and another one of is the

127
00:04:22,390 --> 00:04:20,639
post landing field test

128
00:04:26,390 --> 00:04:22,400
which was done immediately after landing

129
00:04:28,469 --> 00:04:26,400
when when both scott and mikhail were

130
00:04:29,990 --> 00:04:28,479
escorted from the soyuz into the medical

131
00:04:33,030 --> 00:04:30,000
tent and in the medical tent they were

132
00:04:35,030 --> 00:04:33,040
both asked to do a say or a series of of

133
00:04:37,350 --> 00:04:35,040
activities that mimic those an astronaut

134
00:04:39,830 --> 00:04:37,360
newly landed on mars might be asked to

135
00:04:41,590 --> 00:04:39,840
do standing up recovering from a fall

136
00:04:43,749 --> 00:04:41,600
walking

137
00:04:45,749 --> 00:04:43,759
bending lifting things like that as well

138
00:04:47,909 --> 00:04:45,759

as some additional vestibular and

139
00:04:49,350 --> 00:04:47,919
sensory motor tests so those are the

140
00:04:50,390 --> 00:04:49,360
those are the flagship investigations

141
00:04:53,510 --> 00:04:50,400
but otherwise we did other

142
00:04:55,909 --> 00:04:53,520
investigations on uh cognitive function

143
00:04:57,909 --> 00:04:55,919
in flight to be followed up post with uh

144
00:04:58,870 --> 00:04:57,919
with cognitive testing that involves

145
00:05:00,870 --> 00:04:58,880
actually

146
00:05:02,870 --> 00:05:00,880
doing tasks while the brains are being

147
00:05:04,790 --> 00:05:02,880
scanned inside of an mri

148
00:05:07,110 --> 00:05:04,800
a lot of metabolic studies lots of blood

149
00:05:09,029 --> 00:05:07,120
draws over almost a half a liter of

150
00:05:11,350 --> 00:05:09,039
blood was drawn from scott during his

151
00:05:12,950 --> 00:05:11,360
time in flight in a series of blood

152
00:05:15,029 --> 00:05:12,960
draws periodically throughout the flight

153
00:05:16,870 --> 00:05:15,039
and other bodily fluids were collected

154
00:05:19,670 --> 00:05:16,880
as well

155
00:05:21,909 --> 00:05:19,680
and generally just assessing his uh his

156
00:05:23,430 --> 00:05:21,919
ongoing capabilities as a functioning

157
00:05:24,390 --> 00:05:23,440
crew member on the international space

158
00:05:26,710 --> 00:05:24,400
station

159
00:05:28,790 --> 00:05:26,720
as a model for people moving in uh

160
00:05:30,070 --> 00:05:28,800
beyond low earth orbit on expiration

161
00:05:32,629 --> 00:05:30,080
missions beyond

162
00:05:34,150 --> 00:05:32,639
low earth orbit of say to mars so i

163
00:05:36,469 --> 00:05:34,160

essentially expand the gamut of

164
00:05:37,350 --> 00:05:36,479
physiological and psychological systems

165
00:05:39,270 --> 00:05:37,360
and

166
00:05:40,870 --> 00:05:39,280
now we're in the phase of of collecting

167
00:05:42,550 --> 00:05:40,880
the data and starting to analyze the

168
00:05:43,990 --> 00:05:42,560
data and uh seeing what we really

169
00:05:45,830 --> 00:05:44,000
learned from this mission

170
00:05:47,670 --> 00:05:45,840
all right and then mark kelly former

171
00:05:49,830 --> 00:05:47,680
nasa astronaut space shuttle commander

172
00:05:52,070 --> 00:05:49,840
you were no stranger to doing science

173
00:05:53,510 --> 00:05:52,080
and other things in space but you took a

174
00:05:55,430 --> 00:05:53,520
different role for the last year what

175
00:05:56,710 --> 00:05:55,440
was the urine space like for you down

176
00:05:59,670 --> 00:05:56,720
here on the ground

177
00:06:01,430 --> 00:05:59,680
you know my first flight we had some

178
00:06:02,629 --> 00:06:01,440
rodents on board where they were the

179
00:06:04,390 --> 00:06:02,639
subject

180
00:06:06,710 --> 00:06:04,400
and now on this flight

181
00:06:09,189 --> 00:06:06,720
for this last year i've been the subject

182
00:06:10,629 --> 00:06:09,199
at least the control on the ground so a

183
00:06:12,550 --> 00:06:10,639
little bit different role than actually

184
00:06:14,309 --> 00:06:12,560
flying the spacecraft but it's uh you

185
00:06:15,830 --> 00:06:14,319
know it's it's it's been an interesting

186
00:06:17,029 --> 00:06:15,840
experience i've made

187
00:06:18,390 --> 00:06:17,039
probably

188
00:06:20,230 --> 00:06:18,400

maybe four

189
00:06:21,990 --> 00:06:20,240
trips or so here to the johnson space

190
00:06:23,270 --> 00:06:22,000
center where i'll spend some time in a

191
00:06:25,430 --> 00:06:23,280
laboratory

192
00:06:27,670 --> 00:06:25,440
hooked up to all kinds of equipment

193
00:06:29,909 --> 00:06:27,680
might be an ultrasound machine

194
00:06:32,309 --> 00:06:29,919
or this lower

195
00:06:34,950 --> 00:06:32,319
body negative pressure garment

196
00:06:36,469 --> 00:06:34,960
given a lot of blood and urine and other

197
00:06:38,790 --> 00:06:36,479
samples

198
00:06:42,309 --> 00:06:38,800
yesterday i was over doing a stand-up

199
00:06:44,550 --> 00:06:42,319
mri i have a two and a half hour mri

200
00:06:46,950 --> 00:06:44,560
tomorrow if there's anybody in here that

201
00:06:48,629 --> 00:06:46,960
doesn't like being in an mri machine

202
00:06:50,230 --> 00:06:48,639
just think of uh

203
00:06:52,150 --> 00:06:50,240
think of me sitting there for two and a

204
00:06:53,110 --> 00:06:52,160
half hours or laying there tomorrow as i

205
00:06:55,029 --> 00:06:53,120
do this

206
00:06:56,790 --> 00:06:55,039
but it's been a good experience working

207
00:06:58,309 --> 00:06:56,800
with the with the researchers here at

208
00:06:59,270 --> 00:06:58,319
nasa some really

209
00:07:01,830 --> 00:06:59,280
smart

210
00:07:03,830 --> 00:07:01,840
and top-notch people

211
00:07:05,749 --> 00:07:03,840
who are trying to collect data not

212
00:07:07,749 --> 00:07:05,759
necessarily for themselves but data that

213
00:07:10,469 --> 00:07:07,759

they're going to be sharing with the 10

214
00:07:12,550 --> 00:07:10,479
research universities

215
00:07:14,629 --> 00:07:12,560
around the world if you count at the one

216
00:07:17,510 --> 00:07:14,639
university in europe

217
00:07:20,469 --> 00:07:17,520
so it's been a good experience uh at a

218
00:07:21,510 --> 00:07:20,479
number of times uh nasa came to me

219
00:07:24,870 --> 00:07:21,520
to take

220
00:07:25,909 --> 00:07:24,880
arizona or in some other city in the

221
00:07:28,469 --> 00:07:25,919
country

222
00:07:30,390 --> 00:07:28,479
um so it's been a positive experience

223
00:07:32,629 --> 00:07:30,400
but what i'm really looking forward to

224
00:07:34,230 --> 00:07:32,639
is seeing the results of all this

225
00:07:35,990 --> 00:07:34,240
research and that's going to take a

226
00:07:37,350 --> 00:07:36,000
little bit of time i get the impression

227
00:07:39,830 --> 00:07:37,360
that some of these studies are going to

228
00:07:41,110 --> 00:07:39,840
start to have you know some initial

229
00:07:43,510 --> 00:07:41,120
findings

230
00:07:45,110 --> 00:07:43,520
but others i imagine would take

231
00:07:47,189 --> 00:07:45,120
you know maybe up to six months or a

232
00:07:48,790 --> 00:07:47,199
year before they you know start writing

233
00:07:53,029 --> 00:07:48,800
the research papers

234
00:07:54,790 --> 00:07:53,039
and making conclusions on this longer

235
00:07:56,390 --> 00:07:54,800
trip into space

236
00:07:57,909 --> 00:07:56,400
all right well now we want to start

237
00:08:00,070 --> 00:07:57,919
taking questions from everybody gathered

238
00:08:02,390 --> 00:08:00,080

here everybody on the phone and also on

239
00:08:04,309 --> 00:08:02,400
social media a reminder for those on the

240
00:08:06,710 --> 00:08:04,319
phone if you have a question you need to

241
00:08:08,869 --> 00:08:06,720
press star 1 to get into our queue and

242
00:08:10,710 --> 00:08:08,879
you can press star 2 to withdraw and if

243
00:08:13,589 --> 00:08:10,720
you're following on social media use the

244
00:08:15,430 --> 00:08:13,599
hashtag asknasa so for those in the room

245
00:08:17,670 --> 00:08:15,440
just raise your hand state your name

246
00:08:21,270 --> 00:08:17,680
affiliation and who's it for

247
00:08:23,350 --> 00:08:21,280
okay hi tom costello with nbc news um dr

248
00:08:25,670 --> 00:08:23,360
charles you know mark just mentioned it

249
00:08:27,909 --> 00:08:25,680
is early you still have to disseminate

250
00:08:29,430 --> 00:08:27,919
the raw data to the universities you

251
00:08:32,469 --> 00:08:29,440
look for some sort of

252
00:08:34,870 --> 00:08:32,479
um result is there anything early are

253
00:08:36,630 --> 00:08:34,880
there any early uh

254
00:08:38,310 --> 00:08:36,640
interesting findings that you've already

255
00:08:39,589 --> 00:08:38,320
come up with no

256
00:08:41,190 --> 00:08:39,599
nothing at all

257
00:08:43,589 --> 00:08:41,200
nothing i can tell you about but the

258
00:08:45,269 --> 00:08:43,599
point is the point is we the the data

259
00:08:47,269 --> 00:08:45,279
analysis is only now beginning in

260
00:08:49,190 --> 00:08:47,279
earnest we have especially for the the

261
00:08:50,470 --> 00:08:49,200
twin study the the metabolic data that

262
00:08:52,470 --> 00:08:50,480
required they're going to be batch

263
00:08:54,070 --> 00:08:52,480

analyzed which means that all the

264
00:08:55,670 --> 00:08:54,080
samples or most of the samples will be

265
00:08:57,190 --> 00:08:55,680
analyzed by the same technician and the

266
00:08:59,670 --> 00:08:57,200
same hardware at the same time in the

267
00:09:01,590 --> 00:08:59,680
same place so any differences we see are

268
00:09:03,350 --> 00:09:01,600
not related to variations between the

269
00:09:04,630 --> 00:09:03,360
technician or the location or the time

270
00:09:05,750 --> 00:09:04,640
or how long they're in the freezer and

271
00:09:07,430 --> 00:09:05,760
so forth

272
00:09:08,790 --> 00:09:07,440
and don't forget some of those samples

273
00:09:10,550 --> 00:09:08,800
are still on the station right now

274
00:09:12,870 --> 00:09:10,560
they're not coming back until may on

275
00:09:14,550 --> 00:09:12,880
spacex the next landing which carries a

276
00:09:15,829 --> 00:09:14,560
freezer the soyuz doesn't have a freezer

277
00:09:17,110 --> 00:09:15,839
on board so it can't bring back the

278
00:09:19,750 --> 00:09:17,120
frozen samples

279
00:09:21,430 --> 00:09:19,760
so literally no not yet

280
00:09:23,590 --> 00:09:21,440
scott did mention something about his

281
00:09:25,910 --> 00:09:23,600
vision change

282
00:09:27,430 --> 00:09:25,920
yes he did

283
00:09:28,870 --> 00:09:27,440
his vision changed after his first

284
00:09:30,230 --> 00:09:28,880
flight he's made that

285
00:09:32,310 --> 00:09:30,240
you know clear

286
00:09:34,550 --> 00:09:32,320
which is a

287
00:09:36,630 --> 00:09:34,560
you know not an uncommon thing to happen

288
00:09:38,070 --> 00:09:36,640

for long duration crew members so it's

289
00:09:40,550 --> 00:09:38,080
happened in the past it happened on his

290
00:09:42,630 --> 00:09:40,560
last flight and uh you know i think he's

291
00:09:45,030 --> 00:09:42,640
just starting to get a sense of

292
00:09:46,389 --> 00:09:45,040
of the impact on his vision from this

293
00:09:48,389 --> 00:09:46,399
year-long mission i don't know if he's

294
00:09:50,710 --> 00:09:48,399
done a vision test yet but just

295
00:09:53,670 --> 00:09:50,720
anecdotally i think there there

296
00:09:58,670 --> 00:09:53,680
was an observation that he had there

297
00:10:05,190 --> 00:10:02,470
um before the launch there was talk of

298
00:10:07,110 --> 00:10:05,200
doing one of these long-term flights

299
00:10:09,110 --> 00:10:07,120
so-called one-year flights

300
00:10:10,630 --> 00:10:09,120
a couple things have changed

301
00:10:12,389 --> 00:10:10,640
since then

302
00:10:14,710 --> 00:10:12,399
one

303
00:10:16,150 --> 00:10:14,720
you legislatively have more time on the

304
00:10:18,790 --> 00:10:16,160
space station

305
00:10:21,030 --> 00:10:18,800
and two you begin to talk about in-space

306
00:10:22,470 --> 00:10:21,040
habitat that also might be a setting for

307
00:10:24,550 --> 00:10:22,480
this kind of

308
00:10:28,230 --> 00:10:24,560
research i wonder are there going to be

309
00:10:29,430 --> 00:10:28,240
more and if there are will it be soon

310
00:10:31,430 --> 00:10:29,440
and where

311
00:10:33,590 --> 00:10:31,440
yeah well of course scientifically the

312
00:10:35,030 --> 00:10:33,600
question is very clear and and john and

313
00:10:37,350 --> 00:10:35,040

his colleagues have done the analysis

314
00:10:39,750 --> 00:10:37,360
and we really would like to see 10 or 12

315
00:10:42,150 --> 00:10:39,760
crew members with long duration data in

316
00:10:43,670 --> 00:10:42,160
order to be confident that sometime when

317
00:10:45,750 --> 00:10:43,680
we go around the table and health and

318
00:10:47,190 --> 00:10:45,760
medical says they're go for mars that we

319
00:10:49,110 --> 00:10:47,200
know what all the risks are and we've

320
00:10:51,670 --> 00:10:49,120
alleviated them all so at its core

321
00:10:53,750 --> 00:10:51,680
scientifically we need more subjects now

322
00:10:55,990 --> 00:10:53,760
there are a lot of partnership issues

323
00:10:58,150 --> 00:10:56,000
that we have to work out in deciding who

324
00:10:59,910 --> 00:10:58,160
those subjects would be when those such

325
00:11:01,670 --> 00:10:59,920
subjects would fly and we're still

326
00:11:03,190 --> 00:11:01,680
working on that with our partners and

327
00:11:05,910 --> 00:11:03,200
one thing that's really important is

328
00:11:07,829 --> 00:11:05,920
having this first set of data back as we

329
00:11:09,670 --> 00:11:07,839
get some of the early results over the

330
00:11:11,350 --> 00:11:09,680
next year to two years

331
00:11:13,030 --> 00:11:11,360
and as we work with our russian

332
00:11:14,870 --> 00:11:13,040
colleagues and the data because it's not

333
00:11:16,790 --> 00:11:14,880
just the data on scott it's also the

334
00:11:18,790 --> 00:11:16,800
data on misha and as that data gets

335
00:11:20,069 --> 00:11:18,800
together we're going to start seeing if

336
00:11:21,990 --> 00:11:20,079
it is

337
00:11:23,590 --> 00:11:22,000
absolutely urgent that we get some more

338
00:11:25,190 --> 00:11:23,600

crew members right away or is it

339
00:11:26,870 --> 00:11:25,200
something we could backload maybe at the

340
00:11:31,030 --> 00:11:26,880
end of iss so we still don't have that

341
00:11:34,790 --> 00:11:32,710
so i just want to make sure that you

342
00:11:37,030 --> 00:11:34,800
want to have a representative oh

343
00:11:38,630 --> 00:11:37,040
absolutely nasa never distinguishes

344
00:11:40,630 --> 00:11:38,640
between men and women in anything

345
00:11:42,630 --> 00:11:40,640
regarding employment it's true my career

346
00:11:43,990 --> 00:11:42,640
and it's true for astronauts as well

347
00:11:45,829 --> 00:11:44,000
there might be other diversity of

348
00:11:47,750 --> 00:11:45,839
factors and i'll be quiet for that but i

349
00:11:51,269 --> 00:11:47,760
just wonder you know what would be the

350
00:11:53,190 --> 00:11:51,279
ideal makeup of the additional example

351
00:11:54,710 --> 00:11:53,200
i think primarily what we're going to

352
00:11:56,310 --> 00:11:54,720
look at is we're always going to look at

353
00:11:58,230 --> 00:11:56,320
the training profile of the crew and

354
00:11:59,190 --> 00:11:58,240
their radiation profile and those two

355
00:12:01,110 --> 00:11:59,200
things

356
00:12:02,710 --> 00:12:01,120
with one year crew members if you're

357
00:12:04,550 --> 00:12:02,720
naming them to a mission that's coming

358
00:12:05,990 --> 00:12:04,560
pretty soon and this happened when we

359
00:12:08,150 --> 00:12:06,000
chose scott you have to make sure they

360
00:12:10,150 --> 00:12:08,160
have enough training that they don't

361
00:12:11,990 --> 00:12:10,160
need all the extra training so they can

362
00:12:13,509 --> 00:12:12,000
actually slot into the flow the mission

363
00:12:15,910 --> 00:12:13,519

flow so it's going to be those kinds of

364
00:12:17,509 --> 00:12:15,920
practical things that determine uh which

365
00:12:18,949 --> 00:12:17,519
crew members would be selected should we

366
00:12:20,790 --> 00:12:18,959
get an agreement to go forward with

367
00:12:23,590 --> 00:12:20,800
future one-year missions probably

368
00:12:25,350 --> 00:12:23,600
wouldn't want to send somebody who has

369
00:12:27,509 --> 00:12:25,360
not flown in space before

370
00:12:28,870 --> 00:12:27,519
right i would think that that would

371
00:12:31,990 --> 00:12:28,880
likely be

372
00:12:34,629 --> 00:12:32,710
yeah

373
00:12:36,949 --> 00:12:34,639
in the back here hi i'm natalie heath

374
00:12:39,509 --> 00:12:36,959
with fox 26 news and i'm wondering if

375
00:12:41,670 --> 00:12:39,519
there were any really big surprises from

376
00:12:43,509 --> 00:12:41,680
this trip or what's what do you think

377
00:12:47,829 --> 00:12:43,519
the biggest thing is that you learn from

378
00:12:51,670 --> 00:12:49,509
biggest thing i've learned is a year is

379
00:12:53,190 --> 00:12:51,680
a long time

380
00:12:54,949 --> 00:12:53,200
you know what i every time i would say

381
00:13:01,430 --> 00:12:54,959
to my brother hey this is going by

382
00:13:04,389 --> 00:13:02,470
i would say

383
00:13:05,269 --> 00:13:04,399
one thing that was honestly surprising

384
00:13:09,269 --> 00:13:05,279
to me

385
00:13:10,710 --> 00:13:09,279
is um is the focus that everybody had on

386
00:13:12,550 --> 00:13:10,720
this particular crew member in this

387
00:13:15,110 --> 00:13:12,560
particular mission it's kind of funny

388
00:13:16,310 --> 00:13:15,120

how we can be doing the same important

389
00:13:18,230 --> 00:13:16,320
research all the way through and we're

390
00:13:20,550 --> 00:13:18,240
making discoveries all the way along but

391
00:13:22,389 --> 00:13:20,560
boy if you get a first um then everybody

392
00:13:24,069 --> 00:13:22,399
pays more attention so so that was a

393
00:13:25,990 --> 00:13:24,079
surprise to me just as a scientist to

394
00:13:28,389 --> 00:13:26,000
see that it takes one of these first to

395
00:13:30,949 --> 00:13:28,399
get folks to pay attention to but at the

396
00:13:32,710 --> 00:13:30,959
same time we're improving people's life

397
00:13:34,069 --> 00:13:32,720
on earth improving people's health and

398
00:13:36,470 --> 00:13:34,079
it's harder to get that kind of out

399
00:13:38,069 --> 00:13:36,480
there in the news

400
00:13:40,310 --> 00:13:38,079
to learn the effects

401
00:13:42,470 --> 00:13:40,320
that this trip had on his body i mean

402
00:13:44,949 --> 00:13:42,480
how much longer would you study him and

403
00:13:45,910 --> 00:13:44,959
really know what that trip did to his

404
00:13:48,550 --> 00:13:45,920
body

405
00:13:51,509 --> 00:13:48,560
um we're we have plans for data

406
00:13:53,189 --> 00:13:51,519
collection on both scott and mark up to

407
00:13:55,750 --> 00:13:53,199
nine months after this landing and

408
00:13:57,430 --> 00:13:55,760
that's that's just data collection

409
00:13:58,949 --> 00:13:57,440
not even including the analysis time

410
00:14:00,550 --> 00:13:58,959
obviously you can't analyze data that's

411
00:14:02,389 --> 00:14:00,560
collected collected nine months from now

412
00:14:03,990 --> 00:14:02,399
until after you've collected it and i

413
00:14:06,069 --> 00:14:04,000

already mentioned the the data coming or

414
00:14:07,110 --> 00:14:06,079
the samples coming down via spacex in

415
00:14:09,189 --> 00:14:07,120
may

416
00:14:10,230 --> 00:14:09,199
but the just because the flight's over

417
00:14:12,069 --> 00:14:10,240
doesn't mean the mission's over and

418
00:14:14,069 --> 00:14:12,079
we've got lots of other

419
00:14:15,910 --> 00:14:14,079
investigations lots of other

420
00:14:17,910 --> 00:14:15,920
little surprises to spring on scott and

421
00:14:20,470 --> 00:14:17,920
mark as we continue on and this and this

422
00:14:22,150 --> 00:14:20,480
process of collecting the data on them

423
00:14:24,230 --> 00:14:22,160
and then nasa likes to give the

424
00:14:25,910 --> 00:14:24,240
investigators a good solid year to

425
00:14:27,509 --> 00:14:25,920
analyze their data and then to write it

426
00:14:28,870 --> 00:14:27,519
up for publication so i can go into the

427
00:14:30,949 --> 00:14:28,880
publication into the scientific

428
00:14:32,629 --> 00:14:30,959
literature and be peer reviewed by

429
00:14:33,990 --> 00:14:32,639
people that know as much about the the

430
00:14:35,990 --> 00:14:34,000
data and what it should like as the

431
00:14:38,230 --> 00:14:36,000
investigators to see whether it really

432
00:14:40,310 --> 00:14:38,240
does hold together so this time next

433
00:14:42,150 --> 00:14:40,320
year i'm hopeful we'll start seeing the

434
00:14:44,389 --> 00:14:42,160
initial results come out from the

435
00:14:46,310 --> 00:14:44,399
investigations that were fairly quickly

436
00:14:47,990 --> 00:14:46,320
completed and fairly

437
00:14:50,310 --> 00:14:48,000
quickly analyzed

438
00:14:52,550 --> 00:14:50,320

and then i looked for a constant stream

439
00:14:53,990 --> 00:14:52,560
of insights and

440
00:14:55,590 --> 00:14:54,000
results from this mission for at least

441
00:14:57,430 --> 00:14:55,600
another year after that

442
00:14:59,269 --> 00:14:57,440
but you know every astronaut that flies

443
00:15:01,110 --> 00:14:59,279
essentially is part of a broader

444
00:15:03,269 --> 00:15:01,120
experiment so astronauts that have left

445
00:15:04,870 --> 00:15:03,279
the agency come back year after year

446
00:15:06,550 --> 00:15:04,880
they participate in something we call

447
00:15:08,389 --> 00:15:06,560
the long story long-term study of

448
00:15:10,470 --> 00:15:08,399
astronaut health because not every

449
00:15:11,750 --> 00:15:10,480
effect is going to happen right away

450
00:15:13,110 --> 00:15:11,760
there have been interesting there's been

451
00:15:14,870 --> 00:15:13,120
interesting work done in the past on

452
00:15:16,470 --> 00:15:14,880
things like cataract and cataract

453
00:15:18,470 --> 00:15:16,480
incidents other kinds of long-term

454
00:15:20,230 --> 00:15:18,480
cancer risks those things happen over

455
00:15:21,910 --> 00:15:20,240
very long-term studies so the the

456
00:15:23,829 --> 00:15:21,920
research investigation in some senses

457
00:15:27,110 --> 00:15:23,839
never ends

458
00:15:31,189 --> 00:15:28,150
what were you and the rest of your

459
00:15:33,030 --> 00:15:31,199
family able to do to help scott

460
00:15:35,189 --> 00:15:33,040
through this year psychologically and

461
00:15:37,509 --> 00:15:35,199
what kind of family support were you

462
00:15:39,269 --> 00:15:37,519
able to apply

463
00:15:40,710 --> 00:15:39,279

you know when he's on earth i'd often

464
00:15:43,189 --> 00:15:40,720
you know he might call me i might be in

465
00:15:44,870 --> 00:15:43,199
the middle of something and i might go

466
00:15:46,870 --> 00:15:44,880
straight to voicemail

467
00:15:49,269 --> 00:15:46,880
when he's in space i don't do that you

468
00:15:51,030 --> 00:15:49,279
know i'll always take his call

469
00:15:53,269 --> 00:15:51,040
you know as you know obviously sometimes

470
00:15:55,509 --> 00:15:53,279
i would just miss them but by accident

471
00:15:58,069 --> 00:15:55,519
but not intentionally so i'd always try

472
00:16:00,230 --> 00:15:58,079
to have my ringer on be available there

473
00:16:02,230 --> 00:16:00,240
you know to talk to him when he wants to

474
00:16:05,110 --> 00:16:02,240
wants to talk you can't call up to the

475
00:16:06,790 --> 00:16:05,120
space station you can only call down

476
00:16:08,710 --> 00:16:06,800
so there's no really calling somebody

477
00:16:10,150 --> 00:16:08,720
back when you missed the call so i think

478
00:16:10,949 --> 00:16:10,160
you know it might seem like a small

479
00:16:14,230 --> 00:16:10,959
thing

480
00:16:17,350 --> 00:16:14,240
but i think to him and also you know

481
00:16:19,829 --> 00:16:17,360
having that experience myself at a much

482
00:16:21,910 --> 00:16:19,839
reduced period of time i think that's

483
00:16:23,430 --> 00:16:21,920
that's that's really important so just

484
00:16:26,550 --> 00:16:23,440
to try to keep that

485
00:16:28,069 --> 00:16:26,560
communication with people on earth and

486
00:16:29,910 --> 00:16:28,079
that connection

487
00:16:32,790 --> 00:16:29,920
is is something that's really critical

488
00:16:34,949 --> 00:16:32,800

for a long-duration crew member

489
00:16:36,949 --> 00:16:34,959
uh kevin reese with khau here in houston

490
00:16:39,350 --> 00:16:36,959
um while we're waiting on the science of

491
00:16:41,269 --> 00:16:39,360
mr kelly anecdotally between you and

492
00:16:43,430 --> 00:16:41,279
your brother you've met you've talked

493
00:16:44,870 --> 00:16:43,440
all of these things um are there things

494
00:16:46,790 --> 00:16:44,880
that you have

495
00:16:48,710 --> 00:16:46,800
noticed about each other other than he's

496
00:16:50,230 --> 00:16:48,720
probably taller than you now

497
00:16:51,670 --> 00:16:50,240
are there other things that that would

498
00:16:54,550 --> 00:16:51,680
not taint the science that you could

499
00:16:55,910 --> 00:16:54,560
share that you guys are already noticing

500
00:16:57,990 --> 00:16:55,920
well i saw him last night when he got

501
00:17:00,550 --> 00:16:58,000
off the airplane we had dinner last

502
00:17:02,710 --> 00:17:00,560
night but he was pretty tired

503
00:17:04,949 --> 00:17:02,720
you know it's uh

504
00:17:06,789 --> 00:17:04,959
you know there's the jet lag from space

505
00:17:08,789 --> 00:17:06,799
is pretty serious so

506
00:17:10,710 --> 00:17:08,799
so he was kind of tired so we haven't

507
00:17:13,510 --> 00:17:10,720
talked a lot about it you know there's

508
00:17:15,110 --> 00:17:13,520
some things that he pointed out

509
00:17:16,870 --> 00:17:15,120
and but i'll let him

510
00:17:20,069 --> 00:17:16,880
share that with all of you

511
00:17:22,230 --> 00:17:20,079
um and how he feels he did say he feels

512
00:17:25,270 --> 00:17:22,240
different now than he did after spending

513
00:17:28,309 --> 00:17:26,710

he'll talk about that

514
00:17:29,590 --> 00:17:28,319
i think he will

515
00:17:31,669 --> 00:17:29,600
what's that you can't elaborate on

516
00:17:33,830 --> 00:17:31,679
different that's i could but i think

517
00:17:35,590 --> 00:17:33,840
that's that should be for him to talk

518
00:17:36,630 --> 00:17:35,600
about because that's his you know

519
00:17:39,270 --> 00:17:36,640
personal

520
00:17:41,590 --> 00:17:39,280
health situation and and how he feels

521
00:17:46,710 --> 00:17:44,310
with cbs news um he probably now holds

522
00:17:48,710 --> 00:17:46,720
the record for social media presence

523
00:17:51,510 --> 00:17:48,720
while in space too he was tweeting and

524
00:17:53,430 --> 00:17:51,520
instagramming so much uh how important

525
00:17:55,510 --> 00:17:53,440
was that for this mission

526
00:17:57,190 --> 00:17:55,520
and what was it like to be able to just

527
00:17:59,029 --> 00:17:57,200
at least get a daily update of what he's

528
00:18:02,070 --> 00:17:59,039
doing out there i think it's important

529
00:18:04,390 --> 00:18:02,080
for nasa you know i i mean nasa relies

530
00:18:05,669 --> 00:18:04,400
on congressional support which means

531
00:18:08,230 --> 00:18:05,679
that you have to have strong public

532
00:18:10,310 --> 00:18:08,240
support and any opportunity to engage

533
00:18:12,870 --> 00:18:10,320
with the public on a positive

534
00:18:14,870 --> 00:18:12,880
uh you know in a positive way i think is

535
00:18:16,950 --> 00:18:14,880
really important to the agency you know

536
00:18:19,270 --> 00:18:16,960
the agency needs to

537
00:18:23,110 --> 00:18:19,280
you know tell the story of human space

538
00:18:25,190 --> 00:18:23,120

flight and science in general so the

539
00:18:26,390 --> 00:18:25,200
you know so he took that very seriously

540
00:18:29,350 --> 00:18:26,400
i mean that he was going to try to

541
00:18:31,830 --> 00:18:29,360
engage with the public on a very regular

542
00:18:35,669 --> 00:18:31,840
basis i think he went over a million

543
00:18:38,789 --> 00:18:35,679
twitter followers yesterday um so

544
00:18:40,950 --> 00:18:38,799
uh you know it's it's it's

545
00:18:44,070 --> 00:18:40,960
in my opinion it is uh you know the

546
00:18:45,590 --> 00:18:44,080
public outreach and engagement and

547
00:18:48,310 --> 00:18:45,600
sharing the story

548
00:18:50,150 --> 00:18:48,320
is a really important aspect of these

549
00:18:51,830 --> 00:18:50,160
missions was it also reassuring to see

550
00:18:53,909 --> 00:18:51,840
him smiling and goofing off and having a

551
00:18:56,630 --> 00:18:53,919
good time up there yeah i think that's p

552
00:19:01,510 --> 00:18:56,640
people people like that i mean nasa can

553
00:19:03,590 --> 00:19:01,520
be a very obviously a very technical

554
00:19:05,669 --> 00:19:03,600
very sterile the space station could be

555
00:19:07,510 --> 00:19:05,679
very sterile environment and very

556
00:19:11,190 --> 00:19:07,520
technical and some people just aren't

557
00:19:13,430 --> 00:19:11,200
technical you know some people you know

558
00:19:15,750 --> 00:19:13,440
connect to things in a different way

559
00:19:17,510 --> 00:19:15,760
so sure i mean seeing somebody who's

560
00:19:20,470 --> 00:19:17,520
living in space for a year having a good

561
00:19:24,230 --> 00:19:20,480
time and and enjoying it is a way he can

562
00:19:25,270 --> 00:19:24,240
connect with uh certain people in the

563
00:19:27,510 --> 00:19:25,280

back there

564
00:19:29,029 --> 00:19:27,520
jake reiner with kprc channel 2 in

565
00:19:30,789 --> 00:19:29,039
houston

566
00:19:32,950 --> 00:19:30,799
what i know you guys can't talk about

567
00:19:35,270 --> 00:19:32,960
the the twin study in terms of the data

568
00:19:37,190 --> 00:19:35,280
that you guys collected but what are

569
00:19:40,070 --> 00:19:37,200
some things that you guys were looking

570
00:19:41,750 --> 00:19:40,080
for before doing the twin study what are

571
00:19:45,190 --> 00:19:41,760
what are some things you you wanted to

572
00:19:46,710 --> 00:19:45,200
find out and would help you in the

573
00:19:48,390 --> 00:19:46,720
research mission

574
00:19:49,669 --> 00:19:48,400
well the purpose of the twin study was

575
00:19:52,390 --> 00:19:49,679
was

576
00:19:53,190 --> 00:19:52,400
really to understand what can be learned

577
00:19:55,830 --> 00:19:53,200
from

578
00:19:57,830 --> 00:19:55,840
doing a new class of investigations a

579
00:20:01,029 --> 00:19:57,840
new class of work at the literally at

580
00:20:02,950 --> 00:20:01,039
the genetic level that nasa is is not

581
00:20:04,870 --> 00:20:02,960
doing a lot of at least in terms of of

582
00:20:06,549 --> 00:20:04,880
the astronauts at least not in in a

583
00:20:08,470 --> 00:20:06,559
widespread sense

584
00:20:10,789 --> 00:20:08,480
and so we're really trying to understand

585
00:20:12,390 --> 00:20:10,799
what the advantages are of doing this

586
00:20:14,549 --> 00:20:12,400
kind of work and what better way to do

587
00:20:16,710 --> 00:20:14,559
it than to compare two individuals who

588
00:20:19,270 --> 00:20:16,720

at least at birth were fairly identical

589
00:20:20,870 --> 00:20:19,280
genetically so by looking at mark's

590
00:20:22,149 --> 00:20:20,880
results collected over the course of the

591
00:20:23,990 --> 00:20:22,159
year we can see what the normal

592
00:20:25,510 --> 00:20:24,000
variations might be and then by looking

593
00:20:26,470 --> 00:20:25,520
at scott's collected over the course of

594
00:20:28,470 --> 00:20:26,480
the year

595
00:20:31,110 --> 00:20:28,480
we can see where his

596
00:20:33,430 --> 00:20:31,120
his variations are greater than marks

597
00:20:35,270 --> 00:20:33,440
have been and those will tell us what

598
00:20:36,870 --> 00:20:35,280
areas to investigate in the future not

599
00:20:39,029 --> 00:20:36,880
on twins because there's no more twins

600
00:20:41,430 --> 00:20:39,039
in the pipeline but but on astronauts in

601
00:20:43,990 --> 00:20:41,440
general uh using this new set of what i

602
00:20:45,830 --> 00:20:44,000
call 21st century medical techniques and

603
00:20:47,669 --> 00:20:45,840
technologies to supplement the ongoing

604
00:20:50,149 --> 00:20:47,679
research we're already doing in fact of

605
00:20:52,549 --> 00:20:50,159
the 10 investigations five were already

606
00:20:55,110 --> 00:20:52,559
planned for for scott for his one-year

607
00:20:57,590 --> 00:20:55,120
mission they were simply reapplied

608
00:20:59,669 --> 00:20:57,600
to the the twins study as well but five

609
00:21:01,750 --> 00:20:59,679
are brand new investigations from brand

610
00:21:03,510 --> 00:21:01,760
new investigators who had never thought

611
00:21:05,350 --> 00:21:03,520
they they had anything in common with

612
00:21:07,350 --> 00:21:05,360
space flight and space flight research

613
00:21:09,909 --> 00:21:07,360

which essentially opens up an entire new

614
00:21:12,070 --> 00:21:09,919
community of research and researchers to

615
00:21:13,830 --> 00:21:12,080
help us solve the problems we have we

616
00:21:15,270 --> 00:21:13,840
have to address so we can send

617
00:21:17,510 --> 00:21:15,280
astronauts safely to mars so that's a

618
00:21:20,630 --> 00:21:17,520
very exciting benefit right there is

619
00:21:22,390 --> 00:21:20,640
just just access to a new set of of eyes

620
00:21:24,390 --> 00:21:22,400
a new set of brains that can think about

621
00:21:25,830 --> 00:21:24,400
this kind of stuff and also they've

622
00:21:27,669 --> 00:21:25,840
enjoyed immensely being part of the

623
00:21:30,630 --> 00:21:27,679
space show because it's it's a lot of

624
00:21:31,990 --> 00:21:30,640
fun they enjoy seeing uh

625
00:21:33,270 --> 00:21:32,000
coming and interacting with mark when

626
00:21:34,630 --> 00:21:33,280
they do their their data collections

627
00:21:36,310 --> 00:21:34,640
during the course of the year they enjoy

628
00:21:38,149 --> 00:21:36,320
seeing scott in flight and knowing that

629
00:21:39,270 --> 00:21:38,159
they have a a role to play in that so

630
00:21:40,630 --> 00:21:39,280
there's there's a lot of these

631
00:21:42,310 --> 00:21:40,640
interconnections that mark was just

632
00:21:44,390 --> 00:21:42,320
talking about about making sure that

633
00:21:45,990 --> 00:21:44,400
everybody feels part of the program

634
00:21:48,230 --> 00:21:46,000
as well as some very

635
00:21:49,669 --> 00:21:48,240
very tangible benefits i think in the

636
00:21:52,390 --> 00:21:49,679
outcome of these studies

637
00:21:55,270 --> 00:21:52,400
but it can't be understated i think what

638
00:21:56,950 --> 00:21:55,280

mark and scott gave to science by coming

639
00:21:58,149 --> 00:21:56,960
to nasa and saying we'd like to why

640
00:21:59,990 --> 00:21:58,159
don't you take advantage of the fact

641
00:22:01,830 --> 00:22:00,000
that we're twins because the reason that

642
00:22:03,750 --> 00:22:01,840
we hadn't really gone down this genetic

643
00:22:06,549 --> 00:22:03,760
route is because of all the medical

644
00:22:08,549 --> 00:22:06,559
privacy concerns and you know issues

645
00:22:10,310 --> 00:22:08,559
with genetic information non-disclosure

646
00:22:12,070 --> 00:22:10,320
act and other things that made it really

647
00:22:13,510 --> 00:22:12,080
challenging for nasa to come to them to

648
00:22:15,510 --> 00:22:13,520
ask for something like that so because

649
00:22:18,149 --> 00:22:15,520
they came to us we were able to work out

650
00:22:19,830 --> 00:22:18,159
a policy and approach and really open up

651
00:22:21,270 --> 00:22:19,840
this area which you'll hear this

652
00:22:22,710 --> 00:22:21,280
mentioned by your doctor too it's called

653
00:22:24,230 --> 00:22:22,720
personalized medicine you know looking

654
00:22:26,149 --> 00:22:24,240
at your genes and understanding how

655
00:22:27,909 --> 00:22:26,159
they're going to react to whatever

656
00:22:29,430 --> 00:22:27,919
experience or whatever medical problem

657
00:22:31,430 --> 00:22:29,440
you have so this is really an important

658
00:22:34,149 --> 00:22:31,440
advance for nasa that they made possible

659
00:22:36,710 --> 00:22:34,159
by coming to us with that offer

660
00:22:39,270 --> 00:22:36,720
thanks mark

661
00:22:40,630 --> 00:22:39,280
eric eric berger with arts technica a

662
00:22:42,470 --> 00:22:40,640
question maybe for john if you can't

663
00:22:44,950 --> 00:22:42,480

talk quantitatively maybe you can talk

664
00:22:46,630 --> 00:22:44,960
qualitatively about how scott did in his

665
00:22:48,870 --> 00:22:46,640
initial performance tests in the medical

666
00:22:50,870 --> 00:22:48,880
tent in kazakhstan

667
00:22:52,149 --> 00:22:50,880
either sort of generally or compared to

668
00:22:53,990 --> 00:22:52,159
the last six month

669
00:22:55,510 --> 00:22:54,000
mission he did well what i've been told

670
00:22:57,990 --> 00:22:55,520
is that he completed all the testing

671
00:22:59,270 --> 00:22:58,000
which is in itself a real accomplishment

672
00:23:00,950 --> 00:22:59,280
because

673
00:23:03,669 --> 00:23:00,960
it's it's a lot of work to do

674
00:23:05,590 --> 00:23:03,679
immediately after a very strenuous and i

675
00:23:07,430 --> 00:23:05,600
think harrowing episode you know when

676
00:23:09,830 --> 00:23:07,440
you land in the soyuz

677
00:23:11,430 --> 00:23:09,840
so he is he has

678
00:23:12,789 --> 00:23:11,440
continued to

679
00:23:14,230 --> 00:23:12,799
to perform

680
00:23:16,149 --> 00:23:14,240
at that

681
00:23:18,470 --> 00:23:16,159
very significant levels he's he's been

682
00:23:20,230 --> 00:23:18,480
there for all the studies he's been a

683
00:23:22,630 --> 00:23:20,240
full participant and

684
00:23:24,149 --> 00:23:22,640
and uh and seems to be doing it uh by

685
00:23:25,990 --> 00:23:24,159
taking it in stride he said when i see

686
00:23:27,909 --> 00:23:26,000
him on tv he seems to be looking like he

687
00:23:29,430 --> 00:23:27,919
is he's just fine doing it all and

688
00:23:30,390 --> 00:23:29,440

doesn't seem to slow him down did you

689
00:23:31,750 --> 00:23:30,400
get a sense that he could have put a

690
00:23:33,270 --> 00:23:31,760
space suit on and walked out onto the

691
00:23:34,870 --> 00:23:33,280
surface of mars

692
00:23:37,430 --> 00:23:34,880
i get a sense that he could have that's

693
00:23:39,110 --> 00:23:37,440
my strictly qualitative non-professional

694
00:23:41,110 --> 00:23:39,120
assessment having never interacted with

695
00:23:42,950 --> 00:23:41,120
the space suits myself but but he sure

696
00:23:46,390 --> 00:23:42,960
if if he couldn't i can't imagine

697
00:23:49,830 --> 00:23:48,070
robert perelman with collectsbase.com

698
00:23:51,110 --> 00:23:49,840
and space.com

699
00:23:54,230 --> 00:23:51,120
off the earlier question that there are

700
00:23:56,549 --> 00:23:54,240
no more twins in the pipeline nasa is in

701
00:23:58,149 --> 00:23:56,559
a recruitment right now of astronauts is

702
00:24:00,549 --> 00:23:58,159
there a scientific

703
00:24:03,190 --> 00:24:00,559
basis or desire to

704
00:24:04,870 --> 00:24:03,200
see more twins as a control sample and

705
00:24:07,669 --> 00:24:04,880
space sample

706
00:24:09,110 --> 00:24:07,679
recruit for the program as a specific

707
00:24:10,310 --> 00:24:09,120
goal

708
00:24:13,430 --> 00:24:10,320
i don't think

709
00:24:15,510 --> 00:24:13,440
of the selection committee to look for

710
00:24:17,029 --> 00:24:15,520
twins but i think if twins do show up

711
00:24:18,630 --> 00:24:17,039
we'll certainly

712
00:24:20,549 --> 00:24:18,640
will certainly be interested in their

713
00:24:22,470 --> 00:24:20,559

their success as astronauts and be

714
00:24:23,750 --> 00:24:22,480
thinking of ways subtly to suggest to

715
00:24:31,269 --> 00:24:23,760
them perhaps they might like to be

716
00:24:36,149 --> 00:24:34,310
in studies we talked bigger picture

717
00:24:37,990 --> 00:24:36,159
down the road

718
00:24:40,070 --> 00:24:38,000
human space flight long duration

719
00:24:42,630 --> 00:24:40,080
duration space flight top three things

720
00:24:44,950 --> 00:24:42,640
you're concerned about how this

721
00:24:46,630 --> 00:24:44,960
specifically will address those top

722
00:24:48,390 --> 00:24:46,640
three things

723
00:24:50,070 --> 00:24:48,400
well from the perspective of the human

724
00:24:51,669 --> 00:24:50,080
research program that the top things

725
00:24:53,590 --> 00:24:51,679
we're worried about are

726
00:24:55,510 --> 00:24:53,600
are the psychological psychosocial

727
00:24:58,149 --> 00:24:55,520
aspects of space flight being confined

728
00:25:00,710 --> 00:24:58,159
in a small vehicle if you're on your way

729
00:25:03,669 --> 00:25:00,720
to mars you're remote from earth by

730
00:25:05,510 --> 00:25:03,679
minutes to tens of minutes by radio

731
00:25:07,990 --> 00:25:05,520
same faces all the time small

732
00:25:10,070 --> 00:25:08,000
environment things like that so there's

733
00:25:11,590 --> 00:25:10,080
in the different circadian rhythm

734
00:25:13,750 --> 00:25:11,600
impacts or

735
00:25:16,230 --> 00:25:13,760
sleep wake cycles

736
00:25:18,630 --> 00:25:16,240
we have concerns about continuous or

737
00:25:20,950 --> 00:25:18,640
autonomous medical care how do you take

738
00:25:21,990 --> 00:25:20,960

care of of astronauts

739
00:25:23,990 --> 00:25:22,000
who are

740
00:25:25,830 --> 00:25:24,000
off of the earth and

741
00:25:27,510 --> 00:25:25,840
too far away even for a radio or a

742
00:25:28,789 --> 00:25:27,520
telephone house call

743
00:25:30,870 --> 00:25:28,799
clearly they have to have all of the

744
00:25:33,110 --> 00:25:30,880
skills and all the all the wherewithal

745
00:25:35,029 --> 00:25:33,120
on board and nowhere to find it if they

746
00:25:36,549 --> 00:25:35,039
need it we're concerned about space

747
00:25:38,390 --> 00:25:36,559
radiation and a lot of that space

748
00:25:39,269 --> 00:25:38,400
radiation work is being done on the

749
00:25:41,590 --> 00:25:39,279
earth

750
00:25:43,750 --> 00:25:41,600
because the the space station itself is

751
00:25:45,830 --> 00:25:43,760
orbiting within uh below earth's

752
00:25:47,430 --> 00:25:45,840
magnetic field and is not exposed to the

753
00:25:49,909 --> 00:25:47,440
deep space radiation that astronauts

754
00:25:51,750 --> 00:25:49,919
will experience on trips to mars just

755
00:25:53,350 --> 00:25:51,760
hours after leaving earth and then

756
00:25:55,110 --> 00:25:53,360
continuously for the remainder of the

757
00:25:56,470 --> 00:25:55,120
say two and a half year

758
00:25:58,630 --> 00:25:56,480
round trip

759
00:26:00,549 --> 00:25:58,640
we're we're concerned about those

760
00:26:01,669 --> 00:26:00,559
factors

761
00:26:03,190 --> 00:26:01,679
but we're also concerned about

762
00:26:04,630 --> 00:26:03,200
everything else that's required how do

763
00:26:05,830 --> 00:26:04,640

you provide the right kind of food and i

764
00:26:08,710 --> 00:26:05,840
don't just mean

765
00:26:10,310 --> 00:26:08,720
mres or frozen dinners but the food that

766
00:26:11,510 --> 00:26:10,320
maintains its freshness and its

767
00:26:14,870 --> 00:26:11,520
nutrition

768
00:26:17,190 --> 00:26:14,880
for long periods of time stored in

769
00:26:18,630 --> 00:26:17,200
less than perfect conditions and remains

770
00:26:20,549 --> 00:26:18,640
appealing and palatable so the

771
00:26:22,549 --> 00:26:20,559
astronauts don't lose interest in eating

772
00:26:23,750 --> 00:26:22,559
i personally cannot imagine losing

773
00:26:24,549 --> 00:26:23,760
interest in eating but i think some

774
00:26:26,230 --> 00:26:24,559
people

775
00:26:28,630 --> 00:26:26,240
have experienced that

776
00:26:31,350 --> 00:26:28,640
we're we're interested in things like

777
00:26:32,789 --> 00:26:31,360
mark described scott's uh report of

778
00:26:34,789 --> 00:26:32,799
visual changes that occur in space

779
00:26:35,830 --> 00:26:34,799
flight this is a fairly recent

780
00:26:38,390 --> 00:26:35,840
finding

781
00:26:40,789 --> 00:26:38,400
amongst space station crew members

782
00:26:42,789 --> 00:26:40,799
and uh in retrospect we sort of knew it

783
00:26:44,630 --> 00:26:42,799
was coming but we didn't realize the

784
00:26:46,630 --> 00:26:44,640
significance of it and we haven't as far

785
00:26:47,750 --> 00:26:46,640
as i know seen the seen it plateau

786
00:26:49,110 --> 00:26:47,760
really

787
00:26:50,310 --> 00:26:49,120
so maybe the one-year mission will tell

788
00:26:52,789 --> 00:26:50,320

us a little bit about whether the visual

789
00:26:55,029 --> 00:26:52,799
acuity changes are the same after one

790
00:26:57,430 --> 00:26:55,039
year as they were after six months

791
00:26:58,789 --> 00:26:57,440
but essentially every every kind of body

792
00:27:00,470 --> 00:26:58,799
system that you can imagine is

793
00:27:01,909 --> 00:27:00,480
influenced by the factors of space

794
00:27:03,350 --> 00:27:01,919
flight including especially

795
00:27:05,269 --> 00:27:03,360
weightlessness

796
00:27:07,750 --> 00:27:05,279
we're worried about things like bone

797
00:27:10,149 --> 00:27:07,760
integrity bone loss not just bone not

798
00:27:12,390 --> 00:27:10,159
just calcium loss but where the calcium

799
00:27:14,230 --> 00:27:12,400
came from and from and how the bone

800
00:27:16,390 --> 00:27:14,240
that's left behind is able to withstand

801
00:27:18,389 --> 00:27:16,400
the stresses that will be imposed on it

802
00:27:20,070 --> 00:27:18,399
not just on a mission to mars but in the

803
00:27:22,310 --> 00:27:20,080
remainder of the astronauts life back on

804
00:27:24,070 --> 00:27:22,320
the earth muscle function cardiovascular

805
00:27:26,230 --> 00:27:24,080
function you name it we're interested in

806
00:27:28,070 --> 00:27:26,240
all of it and missions like this help us

807
00:27:30,149 --> 00:27:28,080
to answer the questions that we have in

808
00:27:33,110 --> 00:27:30,159
front of us so at the end of the space

809
00:27:35,029 --> 00:27:33,120
station era or thereafter we can give a

810
00:27:37,110 --> 00:27:35,039
go to the program manager of the mars

811
00:27:38,789 --> 00:27:37,120
program and says and say that yes we we

812
00:27:40,230 --> 00:27:38,799
think we understand what

813
00:27:42,630 --> 00:27:40,240

needs to be done to keep astronauts

814
00:27:45,110 --> 00:27:42,640
healthy happy and performing at a high

815
00:27:47,110 --> 00:27:45,120
level not just alive but performing at a

816
00:27:48,630 --> 00:27:47,120
high level for the duration of the mars

817
00:27:50,389 --> 00:27:48,640
missions

818
00:27:52,149 --> 00:27:50,399
okay we're gonna go to our phone bridge

819
00:27:54,149 --> 00:27:52,159
now to take a few questions and just a

820
00:27:56,789 --> 00:27:54,159
reminder if you have a question you need

821
00:27:58,870 --> 00:27:56,799
to press star one to get into the queue

822
00:28:02,149 --> 00:27:58,880
let's go ahead and start off with marcia

823
00:28:05,350 --> 00:28:02,159
dunn and the associated press

824
00:28:08,149 --> 00:28:05,360
hi um my questions for you mark i'm just

825
00:28:10,230 --> 00:28:08,159
wondering what your impressions

826
00:28:13,190 --> 00:28:10,240
were when you were finally reunited with

827
00:28:14,149 --> 00:28:13,200
your brother even now any surprises

828
00:28:17,029 --> 00:28:14,159
about

829
00:28:18,950 --> 00:28:17,039
physically mentally behaviorally um any

830
00:28:21,190 --> 00:28:18,960
worry seeing him jump through his pull

831
00:28:22,710 --> 00:28:21,200
and whatever else he might be up to

832
00:28:24,950 --> 00:28:22,720
adjust to his what

833
00:28:26,470 --> 00:28:24,960
jumped in his pool oh he jumped in his

834
00:28:27,590 --> 00:28:26,480
pool yeah i wasn't there for that i was

835
00:28:29,110 --> 00:28:27,600
it was a

836
00:28:31,269 --> 00:28:29,120
very late night i think that was about

837
00:28:33,750 --> 00:28:31,279
four in the morning um you know any

838
00:28:35,350 --> 00:28:33,760

concerns no i mean he's

839
00:28:37,750 --> 00:28:35,360
you know he's a professional he's done

840
00:28:40,470 --> 00:28:37,760
this before he's even done as you know a

841
00:28:42,230 --> 00:28:40,480
long duration mission for six months um

842
00:28:45,269 --> 00:28:42,240
i think he will tell you that this is

843
00:28:46,310 --> 00:28:45,279
different you know he feels different

844
00:28:48,950 --> 00:28:46,320
and

845
00:28:50,789 --> 00:28:48,960
uh you know one year is a really uh long

846
00:28:52,870 --> 00:28:50,799
period of time but you know i haven't

847
00:28:54,630 --> 00:28:52,880
noticed anything you know specifically

848
00:28:55,350 --> 00:28:54,640
that makes me think that it's going to

849
00:28:57,830 --> 00:28:55,360
be

850
00:29:00,070 --> 00:28:57,840
you know a long time for him to you know

851
00:29:01,430 --> 00:29:00,080
get back to normal physically or recover

852
00:29:02,549 --> 00:29:01,440
from this

853
00:29:04,310 --> 00:29:02,559
so he's

854
00:29:06,149 --> 00:29:04,320
i think a lot of people saw him get out

855
00:29:08,230 --> 00:29:06,159
of the soyuz and how good he looked and

856
00:29:11,190 --> 00:29:08,240
i imagine if if

857
00:29:13,350 --> 00:29:11,200
rose cosmos if the medical folks around

858
00:29:14,470 --> 00:29:13,360
him and the nasa folks that were there

859
00:29:15,830 --> 00:29:14,480
would have allowed him he would have

860
00:29:17,029 --> 00:29:15,840
loved to have been able to walk from the

861
00:29:18,789 --> 00:29:17,039
soyuz

862
00:29:21,110 --> 00:29:18,799
but that's not permitted

863
00:29:23,190 --> 00:29:21,120

but i think he'd be uh you know a good

864
00:29:25,110 --> 00:29:23,200
example of somebody who could probably

865
00:29:27,269 --> 00:29:25,120
you know make that trip to mars you know

866
00:29:28,950 --> 00:29:27,279
for six months and then you know in a

867
00:29:31,590 --> 00:29:28,960
short period of time do some reasonable

868
00:29:37,190 --> 00:29:34,310
all right next we will go to irene klotz

869
00:29:38,470 --> 00:29:37,200
with reuters

870
00:29:41,190 --> 00:29:38,480
thanks man

871
00:29:43,750 --> 00:29:41,200
i have two questions uh the first for dr

872
00:29:47,669 --> 00:29:43,760
charles um just from a radiation

873
00:29:51,430 --> 00:29:47,679
exposure perspective is scott kelly now

874
00:29:54,310 --> 00:29:51,440
at or beyond his uh lifetime um

875
00:29:55,990 --> 00:29:54,320
exposure you know from a nasa government

876
00:29:58,070 --> 00:29:56,000
employee perspective

877
00:30:00,070 --> 00:29:58,080
and for mark aside from that really fun

878
00:30:02,630 --> 00:30:00,080
sounding mri can you talk a little bit

879
00:30:04,549 --> 00:30:02,640
about some of the other um

880
00:30:06,389 --> 00:30:04,559
protocols and things that you've done

881
00:30:07,990 --> 00:30:06,399
this past year

882
00:30:10,310 --> 00:30:08,000
you've matched

883
00:30:12,470 --> 00:30:10,320
your brother's exercise regime for

884
00:30:14,630 --> 00:30:12,480
example and also if you have

885
00:30:16,870 --> 00:30:14,640
participated in the cognitive tests and

886
00:30:19,269 --> 00:30:16,880
things like that thank you

887
00:30:21,590 --> 00:30:19,279
in terms of the radiation i don't know

888
00:30:22,710 --> 00:30:21,600

those numbers and sadly if i knew him i

889
00:30:24,470 --> 00:30:22,720
couldn't tell you because that's

890
00:30:26,149 --> 00:30:24,480
protected by medical privacy but i guess

891
00:30:28,630 --> 00:30:26,159
we could infer

892
00:30:29,830 --> 00:30:28,640
that he had enough radiation tolerance

893
00:30:31,110 --> 00:30:29,840
left at the beginning of the one-year

894
00:30:32,549 --> 00:30:31,120
mission and he certainly picked up

895
00:30:34,789 --> 00:30:32,559
radiation during the one-year mission

896
00:30:37,350 --> 00:30:34,799
but i cannot tell you how close he came

897
00:30:39,029 --> 00:30:37,360
to his lifetime limit

898
00:30:40,470 --> 00:30:39,039
uh knowing how close other people have

899
00:30:42,470 --> 00:30:40,480
come to the limit i would imagine that

900
00:30:45,430 --> 00:30:42,480
he's probably getting pretty close you

901
00:30:47,510 --> 00:30:45,440
know after spending uh over 500 days in

902
00:30:50,630 --> 00:30:47,520
space now i mean he's got to be up there

903
00:30:52,549 --> 00:30:50,640
by the upper limit would be my guess

904
00:30:53,990 --> 00:30:52,559
the other things that i've been doing

905
00:30:56,070 --> 00:30:54,000
you know personally

906
00:30:57,509 --> 00:30:56,080
you know during this year is you know i

907
00:31:00,230 --> 00:30:57,519
come here i do

908
00:31:03,350 --> 00:31:00,240
ultrasounds on certain body parts

909
00:31:07,269 --> 00:31:03,360
you know my eye my carotid artery

910
00:31:11,590 --> 00:31:08,710
part of my

911
00:31:13,029 --> 00:31:11,600
arterial system in my lower leg i'm not

912
00:31:14,070 --> 00:31:13,039
sure exactly what they're looking for

913
00:31:21,190 --> 00:31:14,080

there

914
00:31:23,990 --> 00:31:21,200
30 tubes of blood and i don't keep track

915
00:31:25,830 --> 00:31:24,000
of what each tube of blood is for or

916
00:31:30,230 --> 00:31:25,840
where it's going you know there are

917
00:31:33,029 --> 00:31:30,240
urine samples saliva samples

918
00:31:35,750 --> 00:31:33,039
and other things that you know go off to

919
00:31:37,830 --> 00:31:35,760
to researchers you know the mris i did

920
00:31:40,389 --> 00:31:37,840
an mri yesterday i have another one

921
00:31:43,110 --> 00:31:40,399
tomorrow uh there's a test where they

922
00:31:44,470 --> 00:31:43,120
reduce the pressure around your lower

923
00:31:47,350 --> 00:31:44,480
extremities

924
00:31:49,350 --> 00:31:47,360
to look at your the function of your

925
00:31:52,470 --> 00:31:49,360
circulatory system

926
00:31:55,350 --> 00:31:52,480
and i suppose you know i could have gone

927
00:31:56,389 --> 00:31:55,360
and figured out exactly what each of

928
00:32:00,549 --> 00:31:56,399
these

929
00:32:02,470 --> 00:32:00,559
tests you know which research it is for

930
00:32:05,350 --> 00:32:02,480
but in you know my opinion what i'm

931
00:32:07,029 --> 00:32:05,360
really interested in is the results and

932
00:32:09,830 --> 00:32:07,039
you know where that tube of blood goes

933
00:32:11,590 --> 00:32:09,840
to or what that mri is used for you know

934
00:32:13,509 --> 00:32:11,600
i think i'll let the researchers deal

935
00:32:14,549 --> 00:32:13,519
with that you asked about the cognitive

936
00:32:16,710 --> 00:32:14,559
testing

937
00:32:18,789 --> 00:32:16,720
and during my brother's mission he was

938
00:32:20,950 --> 00:32:18,799

doing these cognitive tests it's on a

939
00:32:22,149 --> 00:32:20,960
nasal laptop there's about 10 different

940
00:32:23,990 --> 00:32:22,159
tests

941
00:32:26,149 --> 00:32:24,000
and i was doing them around the same

942
00:32:28,630 --> 00:32:26,159
time that he was i think he probably did

943
00:32:31,430 --> 00:32:28,640
one last night and i did one last night

944
00:32:33,350 --> 00:32:31,440
as well and it takes about uh 30 minutes

945
00:32:35,669 --> 00:32:33,360
it's pretty interesting over a period of

946
00:32:37,110 --> 00:32:35,679
time i've noticed that just with time

947
00:32:38,149 --> 00:32:37,120
because you're doing the same test over

948
00:32:39,990 --> 00:32:38,159
and over again you are getting a little

949
00:32:41,029 --> 00:32:40,000
bit better at some of these things

950
00:32:43,830 --> 00:32:41,039
um

951
00:32:46,149 --> 00:32:43,840
but uh you know it's been a overall a

952
00:32:49,590 --> 00:32:46,159
really positive experience for me it's

953
00:32:51,269 --> 00:32:49,600
pr as an astronaut having flown four

954
00:32:53,750 --> 00:32:51,279
uh missions

955
00:32:56,549 --> 00:32:53,760
you know while i was at nasa i would

956
00:32:58,070 --> 00:32:56,559
have to say as far as human research

957
00:33:00,710 --> 00:32:58,080
goes on me

958
00:33:04,549 --> 00:33:00,720
this is probably by far the most

959
00:33:10,230 --> 00:33:06,789
all right next we'll go to brian resnick

960
00:33:15,110 --> 00:33:12,710
hey thanks for taking my question it's

961
00:33:17,590 --> 00:33:15,120
for probably either john or julie i'm

962
00:33:19,669 --> 00:33:17,600
wondering is there an upper limit with

963
00:33:21,830 --> 00:33:19,679

the amount of time a person can stay in

964
00:33:24,070 --> 00:33:21,840
space like did you potentially do a

965
00:33:26,230 --> 00:33:24,080
two-year mission a three-year mission

966
00:33:28,149 --> 00:33:26,240
and in those cases what do you suspect

967
00:33:29,909 --> 00:33:28,159
would be the limiting factor that would

968
00:33:31,990 --> 00:33:29,919
determine

969
00:33:34,310 --> 00:33:32,000
you can't stay in space after a certain

970
00:33:36,549 --> 00:33:34,320
amount of time

971
00:33:38,549 --> 00:33:36,559
well um you know the goal isn't just to

972
00:33:40,710 --> 00:33:38,559
set a record the goal here is to really

973
00:33:42,389 --> 00:33:40,720
be applied to the practical things that

974
00:33:43,830 --> 00:33:42,399
we need humans to be in space for that

975
00:33:46,230 --> 00:33:43,840
period of time and so that's the

976
00:33:48,310 --> 00:33:46,240
one-year mission helps us model

977
00:33:49,830 --> 00:33:48,320
basically a transit to mars and a return

978
00:33:51,990 --> 00:33:49,840
and so that's why we're focused on

979
00:33:53,830 --> 00:33:52,000
extending out beyond six months to make

980
00:33:55,990 --> 00:33:53,840
sure that we've got all of those risks

981
00:33:58,230 --> 00:33:56,000
understood and covered

982
00:34:00,710 --> 00:33:58,240
there's no inherent limit if we have the

983
00:34:01,830 --> 00:34:00,720
right countermeasures in place

984
00:34:03,830 --> 00:34:01,840
as long as the crew member is doing

985
00:34:05,590 --> 00:34:03,840
enough exercise we're getting a much

986
00:34:07,110 --> 00:34:05,600
better idea say of how to protect their

987
00:34:10,629 --> 00:34:07,120
bone how to protect their heart with

988
00:34:13,750 --> 00:34:10,639

exercise and diet and so forth but um

989
00:34:15,030 --> 00:34:13,760
it's it's hard to see what other than um

990
00:34:16,629 --> 00:34:15,040
you know then but you have other

991
00:34:18,230 --> 00:34:16,639
cumulative risks that come together like

992
00:34:20,470 --> 00:34:18,240
radiation and so forth so i don't think

993
00:34:21,589 --> 00:34:20,480
we would really push or extend we

994
00:34:22,950 --> 00:34:21,599
certainly wouldn't want crew members

995
00:34:25,349 --> 00:34:22,960
going beyond their occupational

996
00:34:27,030 --> 00:34:25,359
radiation safety limits and

997
00:34:30,869 --> 00:34:27,040
and there's really not a reason to just

998
00:34:34,149 --> 00:34:31,909
okay

999
00:34:40,470 --> 00:34:34,159
next we'll go to ann ball voice of

1000
00:34:47,349 --> 00:34:42,389
okay she might have dropped off let's go

1001
00:34:51,669 --> 00:34:50,149
yeah thank you um this is uh for mark

1002
00:34:53,190 --> 00:34:51,679
and the scientists uh could you talk a

1003
00:34:55,109 --> 00:34:53,200
little bit about what you expect uh the

1004
00:34:56,869 --> 00:34:55,119
twin study could teach us about cancer

1005
00:34:59,030 --> 00:34:56,879
because uh scott was up in the space

1006
00:35:00,710 --> 00:34:59,040
station uh outside to protect the

1007
00:35:02,390 --> 00:35:00,720
protection of earth's atmosphere and i

1008
00:35:03,670 --> 00:35:02,400
know that um there's a various amounts

1009
00:35:05,030 --> 00:35:03,680
of uh

1010
00:35:06,310 --> 00:35:05,040
medical

1011
00:35:07,589 --> 00:35:06,320
treatment you know you we expect to

1012
00:35:08,550 --> 00:35:07,599
learn a lot about the human body but

1013
00:35:10,310 --> 00:35:08,560

what do you think we can learn about

1014
00:35:12,150 --> 00:35:10,320
cancer from him uh being exposed to

1015
00:35:13,670 --> 00:35:12,160
radiation for so long and you're taking

1016
00:35:14,710 --> 00:35:13,680
a very close look closer look at that

1017
00:35:16,069 --> 00:35:14,720
than ever

1018
00:35:18,230 --> 00:35:16,079
and after astronauts have gotten back

1019
00:35:19,829 --> 00:35:18,240
from space

1020
00:35:21,829 --> 00:35:19,839
well i think john would be better as a

1021
00:35:23,670 --> 00:35:21,839
scientist in in answering this question

1022
00:35:24,870 --> 00:35:23,680
but certainly there's there is i mean i

1023
00:35:28,069 --> 00:35:24,880
think we all know there's a connection

1024
00:35:29,670 --> 00:35:28,079
between radiation and cancer uh but i'll

1025
00:35:30,790 --> 00:35:29,680
leave it up to him to explain that

1026
00:35:31,990 --> 00:35:30,800
further

1027
00:35:34,150 --> 00:35:32,000
i was kind of hoping you'd answer that

1028
00:35:37,190 --> 00:35:34,160
one

1029
00:35:39,190 --> 00:35:37,200
clearly the the cancer is induced by

1030
00:35:40,950 --> 00:35:39,200
changes at the mutations that occur at

1031
00:35:42,310 --> 00:35:40,960
the at the genetic level and i think

1032
00:35:43,109 --> 00:35:42,320
we're going to be learning things about

1033
00:35:47,270 --> 00:35:43,119
the

1034
00:35:48,710 --> 00:35:47,280
gentlemen's genes from this

1035
00:35:51,270 --> 00:35:48,720
investigation

1036
00:35:53,349 --> 00:35:51,280
and some of those things may well be the

1037
00:35:55,349 --> 00:35:53,359
rate of of mutations that occur in those

1038
00:35:56,870 --> 00:35:55,359

genes especially in in scott in the

1039
00:35:58,790 --> 00:35:56,880
flight environment with all of the the

1040
00:36:00,150 --> 00:35:58,800
various stressors that he was

1041
00:36:03,030 --> 00:36:00,160
confronting

1042
00:36:04,710 --> 00:36:03,040
i i would be uh foolish i think to try

1043
00:36:07,190 --> 00:36:04,720
and predict how that's gonna

1044
00:36:08,470 --> 00:36:07,200
change how we understand cancer

1045
00:36:10,310 --> 00:36:08,480
but i am confident in saying that it

1046
00:36:11,510 --> 00:36:10,320
will influence how we understand cancer

1047
00:36:13,829 --> 00:36:11,520
and i'm looking forward to seeing the

1048
00:36:15,430 --> 00:36:13,839
results myself after the investigators

1049
00:36:16,950 --> 00:36:15,440
have analyzed the data so they can they

1050
00:36:19,349 --> 00:36:16,960
can perhaps answer that question for

1051
00:36:21,510 --> 00:36:19,359
both of us

1052
00:36:26,069 --> 00:36:21,520
okay we got two more on the phone let's

1053
00:36:28,390 --> 00:36:26,079
go to michelle fitzsimmons tech radar

1054
00:36:30,470 --> 00:36:28,400
yes hi um my question is for uh john and

1055
00:36:32,630 --> 00:36:30,480
julie um you had mentioned i think julie

1056
00:36:34,950 --> 00:36:32,640
earlier um from the technology

1057
00:36:37,109 --> 00:36:34,960
experiments so are there any preliminary

1058
00:36:37,829 --> 00:36:37,119
findings on the technology front as far

1059
00:36:42,230 --> 00:36:37,839
as

1060
00:36:43,670 --> 00:36:42,240
needed in future long term space

1061
00:36:44,390 --> 00:36:43,680
missions

1062
00:36:45,990 --> 00:36:44,400
uh

1063
00:36:47,510 --> 00:36:46,000

there definitely are

1064
00:36:50,630 --> 00:36:47,520
just to pull a couple off the top of my

1065
00:36:52,550 --> 00:36:50,640
head of course we did 3d printing on iss

1066
00:36:54,870 --> 00:36:52,560
and looked at assembling some simple

1067
00:36:57,190 --> 00:36:54,880
tools and parts together

1068
00:36:59,990 --> 00:36:57,200
it was a successful demonstration of a

1069
00:37:01,910 --> 00:37:00,000
new approach but i would say that we um

1070
00:37:03,349 --> 00:37:01,920
and and we will be looking in in

1071
00:37:05,270 --> 00:37:03,359
actually dissecting and taking apart

1072
00:37:06,069 --> 00:37:05,280
some of those parts to see

1073
00:37:07,270 --> 00:37:06,079
whether

1074
00:37:08,550 --> 00:37:07,280
there are certain flaws in their

1075
00:37:10,550 --> 00:37:08,560
construction that might make them weaker

1076
00:37:12,710 --> 00:37:10,560
than we expected

1077
00:37:15,030 --> 00:37:12,720
but we also found that we're not fully

1078
00:37:16,630 --> 00:37:15,040
satisfied with the technologies as it

1079
00:37:17,910 --> 00:37:16,640
exists today we need to look at other

1080
00:37:19,190 --> 00:37:17,920
materials

1081
00:37:21,270 --> 00:37:19,200
maybe even improving some of those

1082
00:37:24,069 --> 00:37:21,280
processes so it's a stepwise

1083
00:37:25,510 --> 00:37:24,079
process of of improving technologies as

1084
00:37:27,990 --> 00:37:25,520
we go so that's just one example that

1085
00:37:31,270 --> 00:37:28,000
came to mind

1086
00:37:33,589 --> 00:37:31,280
okay let's do colleen mccarthy optometry

1087
00:37:36,550 --> 00:37:33,599
times

1088
00:37:37,670 --> 00:37:36,560

hi my new question is for julie and john

1089
00:37:40,150 --> 00:37:37,680
i was wondering if you might be able to

1090
00:37:41,990 --> 00:37:40,160
discuss how the use of the lower body

1091
00:37:43,829 --> 00:37:42,000
negative pressure suit differed on this

1092
00:37:46,150 --> 00:37:43,839
mission and whether or not you believe

1093
00:37:47,270 --> 00:37:46,160
that had any positive impact on scott's

1094
00:37:48,630 --> 00:37:47,280
vision

1095
00:37:51,109 --> 00:37:48,640
let me do that one

1096
00:37:52,790 --> 00:37:51,119
i'll do that one you get that

1097
00:37:54,390 --> 00:37:52,800
the lower body negative pressure suit is

1098
00:37:55,510 --> 00:37:54,400
a russian device it's used by the

1099
00:37:58,470 --> 00:37:55,520
russians

1100
00:37:59,910 --> 00:37:58,480
uh specifically in preparation for the

1101
00:38:03,750 --> 00:37:59,920
end of the mission they they go through

1102
00:38:05,990 --> 00:38:03,760
a protocol of of decompressions and uh

1103
00:38:07,190 --> 00:38:06,000
oral fluid loading fluid and salt tablet

1104
00:38:08,150 --> 00:38:07,200
ingestion

1105
00:38:10,870 --> 00:38:08,160
for

1106
00:38:12,790 --> 00:38:10,880
several tens of minutes at a time

1107
00:38:14,790 --> 00:38:12,800
several times a week for the last month

1108
00:38:16,630 --> 00:38:14,800
in flight the american astronauts are

1109
00:38:18,550 --> 00:38:16,640
not required to do that it's a decision

1110
00:38:20,230 --> 00:38:18,560
by the american space medicine community

1111
00:38:21,750 --> 00:38:20,240
that that the benefit is

1112
00:38:23,030 --> 00:38:21,760
is not uh

1113
00:38:24,550 --> 00:38:23,040

is not something that they're worried

1114
00:38:26,710 --> 00:38:24,560
about because astronauts are landing

1115
00:38:28,870 --> 00:38:26,720
recumbent in the soyuz and and there's a

1116
00:38:30,630 --> 00:38:28,880
lot of support immediately after landing

1117
00:38:32,550 --> 00:38:30,640
but it is a traditional part of the

1118
00:38:34,390 --> 00:38:32,560
russian program

1119
00:38:36,150 --> 00:38:34,400
the last time that

1120
00:38:37,990 --> 00:38:36,160
anybody has done

1121
00:38:40,470 --> 00:38:38,000
lbnp lower body negative pressure for

1122
00:38:42,470 --> 00:38:40,480
research purposes was just about 20

1123
00:38:44,310 --> 00:38:42,480
years ago on the the neural lab space

1124
00:38:46,150 --> 00:38:44,320
lab mission and then before that

1125
00:38:47,829 --> 00:38:46,160
there were several uh investigations

1126
00:38:49,910 --> 00:38:47,839
using lower body negative pressure as a

1127
00:38:51,430 --> 00:38:49,920
potential counter measure on several

1128
00:38:54,390 --> 00:38:51,440
shuttle missions

1129
00:38:56,230 --> 00:38:54,400
so the the difference is that this was

1130
00:38:58,150 --> 00:38:56,240
one of the first times in recent memory

1131
00:39:00,230 --> 00:38:58,160
that lbnp has been done for research

1132
00:39:02,550 --> 00:39:00,240
purposes we had to get clearance from

1133
00:39:05,030 --> 00:39:02,560
the russian medical community because

1134
00:39:07,829 --> 00:39:05,040
using this piece of of end-of-mission

1135
00:39:10,310 --> 00:39:07,839
medical hardware for research purposes

1136
00:39:12,069 --> 00:39:10,320
necessarily reduces its lifetime it's

1137
00:39:14,230 --> 00:39:12,079
its continued usefulness the number of

1138
00:39:17,190 --> 00:39:14,240

times you can decompress on it for

1139
00:39:18,550 --> 00:39:17,200
future end of mission preparations

1140
00:39:19,670 --> 00:39:18,560
but the the

1141
00:39:21,349 --> 00:39:19,680
they agreed with us that the

1142
00:39:23,510 --> 00:39:21,359
investigation was

1143
00:39:25,430 --> 00:39:23,520
interesting enough and uh potentially

1144
00:39:28,310 --> 00:39:25,440
significant enough that it was worth the

1145
00:39:30,310 --> 00:39:28,320
the expenditure of a limited number of

1146
00:39:33,190 --> 00:39:30,320
of runs in the the chibis device and

1147
00:39:35,510 --> 00:39:33,200
that's c-h-i-b-i-s it's russian for a

1148
00:39:38,230 --> 00:39:35,520
kind of a sparrow

1149
00:39:40,390 --> 00:39:38,240
but it's it was used specifically to

1150
00:39:43,030 --> 00:39:40,400
reverse the fluid shifting that occurs

1151
00:39:45,589 --> 00:39:43,040
in all astronauts and space flight the

1152
00:39:46,950 --> 00:39:45,599
the interest is to understand how that

1153
00:39:48,390 --> 00:39:46,960
fluid shifting and it goes from the

1154
00:39:50,790 --> 00:39:48,400
lower body into the upper part of the

1155
00:39:52,870 --> 00:39:50,800
body uh in weightlessness and sort of

1156
00:39:54,790 --> 00:39:52,880
sort of stays there until you come back

1157
00:39:56,790 --> 00:39:54,800
uh to the earth after spaceflight and

1158
00:39:58,710 --> 00:39:56,800
gravity relocates some of the fluids

1159
00:39:59,670 --> 00:39:58,720
back in the lower part of the body

1160
00:40:01,510 --> 00:39:59,680
it was

1161
00:40:02,950 --> 00:40:01,520
intended to understand how the fluid

1162
00:40:05,030 --> 00:40:02,960
shifting that occurs

1163
00:40:07,430 --> 00:40:05,040

may influence the changes that occur in

1164
00:40:09,829 --> 00:40:07,440
the ocular system especially in the the

1165
00:40:11,910 --> 00:40:09,839
shape of the the globe of the eye as

1166
00:40:13,430 --> 00:40:11,920
well as the pressure inside of the head

1167
00:40:14,790 --> 00:40:13,440
the intracranial pressure and the

1168
00:40:15,670 --> 00:40:14,800
distribution of fluids throughout the

1169
00:40:17,910 --> 00:40:15,680
body

1170
00:40:21,030 --> 00:40:17,920
the the hypothesis several hypotheses

1171
00:40:21,910 --> 00:40:21,040
but one of the hypothesis hypotheses was

1172
00:40:23,510 --> 00:40:21,920
that

1173
00:40:24,470 --> 00:40:23,520
shifting of fluid out of the upper part

1174
00:40:26,069 --> 00:40:24,480
of the body

1175
00:40:28,150 --> 00:40:26,079
might have an effect on the shape of the

1176
00:40:30,390 --> 00:40:28,160
eyeball if the if

1177
00:40:32,230 --> 00:40:30,400
scott or mikhail's eyes had

1178
00:40:34,630 --> 00:40:32,240
become a little bit flattened because of

1179
00:40:36,390 --> 00:40:34,640
their time and space flight and if fluid

1180
00:40:38,630 --> 00:40:36,400
shifting is involved in that then

1181
00:40:41,109 --> 00:40:38,640
perhaps transiently removing some of

1182
00:40:42,870 --> 00:40:41,119
that fluid would have caused some sort

1183
00:40:44,710 --> 00:40:42,880
of rebound in the shape of the eye and

1184
00:40:46,230 --> 00:40:44,720
as i said i have not yet seen the

1185
00:40:48,470 --> 00:40:46,240
results from this investigation so i'm

1186
00:40:51,030 --> 00:40:48,480
looking forward to seeing that as well

1187
00:40:52,390 --> 00:40:51,040
i do not think that the brief

1188
00:40:54,790 --> 00:40:52,400

interventions that they

1189
00:40:56,470 --> 00:40:54,800
both experienced over the course of 340

1190
00:40:59,349 --> 00:40:56,480
days and it was one hour

1191
00:41:01,910 --> 00:40:59,359
on two two continuous days three times

1192
00:41:03,270 --> 00:41:01,920
in flight so a total of six hours per

1193
00:41:04,710 --> 00:41:03,280
person i really don't think that's going

1194
00:41:07,750 --> 00:41:04,720
to reverse the fluid shift that has

1195
00:41:09,910 --> 00:41:07,760
occurred over 340 days in space flight

1196
00:41:12,790 --> 00:41:09,920
so i'm thinking more of thinking of it

1197
00:41:14,950 --> 00:41:12,800
more as an intervention uh an acute

1198
00:41:16,550 --> 00:41:14,960
brief transient intervention to answer a

1199
00:41:18,390 --> 00:41:16,560
specific question relating to

1200
00:41:20,550 --> 00:41:18,400
intracranial pressure and

1201
00:41:22,390 --> 00:41:20,560
shape of the eye but uh

1202
00:41:24,150 --> 00:41:22,400
the results that come back from that

1203
00:41:26,630 --> 00:41:24,160
should be very illuminating and and uh

1204
00:41:28,470 --> 00:41:26,640
enlightening in that regard

1205
00:41:30,230 --> 00:41:28,480
okay we'll bring it back here in the

1206
00:41:31,750 --> 00:41:30,240
room for follow-ups in just a moment i

1207
00:41:33,349 --> 00:41:31,760
wanted to take some social media

1208
00:41:34,950 --> 00:41:33,359
questions real quick i know we have a

1209
00:41:36,790 --> 00:41:34,960
couple

1210
00:41:39,030 --> 00:41:36,800
so this question is for john and julie

1211
00:41:41,190 --> 00:41:39,040
and it's coming to us from lis collins

1212
00:41:42,790 --> 00:41:41,200
on behalf of her fifth grade class she's

1213
00:41:44,470 --> 00:41:42,800

wondering what experiment do you think

1214
00:41:46,790 --> 00:41:44,480
was most beneficial for the year in

1215
00:41:49,430 --> 00:41:46,800
space

1216
00:41:51,190 --> 00:41:49,440
who most beneficial

1217
00:41:53,750 --> 00:41:51,200
i would uh

1218
00:41:54,710 --> 00:41:53,760
have to say that um

1219
00:41:57,349 --> 00:41:54,720
there were

1220
00:42:00,230 --> 00:41:57,359
a number of studies that were going on

1221
00:42:03,190 --> 00:42:00,240
uh looking at cell division and cell

1222
00:42:05,510 --> 00:42:03,200
types and i think if you look at the

1223
00:42:07,589 --> 00:42:05,520
core of medical care going on right now

1224
00:42:09,510 --> 00:42:07,599
and understanding how cells divide and

1225
00:42:10,950 --> 00:42:09,520
how cells become

1226
00:42:12,390 --> 00:42:10,960
differentiated which means become the

1227
00:42:13,829 --> 00:42:12,400
kind of cells in our bodies that do

1228
00:42:15,270 --> 00:42:13,839
different things we really don't

1229
00:42:17,270 --> 00:42:15,280
understand that very well and that's the

1230
00:42:19,589 --> 00:42:17,280
core of research on how we could prevent

1231
00:42:21,270 --> 00:42:19,599
aging how we can solve all kinds of

1232
00:42:23,030 --> 00:42:21,280
medical problems and the fact that you

1233
00:42:24,150 --> 00:42:23,040
see those different patterns in space i

1234
00:42:27,430 --> 00:42:24,160
actually think that's some of the most

1235
00:42:32,630 --> 00:42:29,030
so we have another one most likely for

1236
00:42:34,790 --> 00:42:32,640
john jason sexton is wondering did he

1237
00:42:37,750 --> 00:42:34,800
really grow two inches while in space

1238
00:42:42,069 --> 00:42:39,990

i don't know if anybody knows that i'm

1239
00:42:44,870 --> 00:42:42,079
not sure when that measurement was made

1240
00:42:47,109 --> 00:42:44,880
but as much as he did grow in height it

1241
00:42:49,190 --> 00:42:47,119
probably went away very quickly because

1242
00:42:51,510 --> 00:42:49,200
it's a it's a function of

1243
00:42:53,829 --> 00:42:51,520
of essentially fluid accumulation in the

1244
00:42:55,670 --> 00:42:53,839
discs in the between the bones in our in

1245
00:42:57,510 --> 00:42:55,680
our spinal column and our

1246
00:42:59,910 --> 00:42:57,520
in our back so

1247
00:43:01,670 --> 00:42:59,920
as as we all sit here on the ground or

1248
00:43:03,109 --> 00:43:01,680
stand here on the ground our backs are

1249
00:43:04,470 --> 00:43:03,119
being compressed you can often feel that

1250
00:43:07,510 --> 00:43:04,480
especially at the end of a long day you

1251
00:43:09,510 --> 00:43:07,520
know your back is is tight and sore and

1252
00:43:11,349 --> 00:43:09,520
a lot part of that is uh

1253
00:43:12,710 --> 00:43:11,359
signaling the fact that the the discs

1254
00:43:15,030 --> 00:43:12,720
that cushion

1255
00:43:16,950 --> 00:43:15,040
between each of the the vertebral bones

1256
00:43:18,790 --> 00:43:16,960
in your back get compressed by the

1257
00:43:19,510 --> 00:43:18,800
weight of the body above them

1258
00:43:21,349 --> 00:43:19,520
now

1259
00:43:22,790 --> 00:43:21,359
in the absence of gravity they have a

1260
00:43:24,950 --> 00:43:22,800
certain natural resilience and they

1261
00:43:28,150 --> 00:43:24,960
bounce back they spring up and they

1262
00:43:29,750 --> 00:43:28,160
absorb body fluids so they stay hydrated

1263
00:43:31,349 --> 00:43:29,760

uh so during the period of time that

1264
00:43:33,510 --> 00:43:31,359
astronauts are in space they do get a

1265
00:43:35,670 --> 00:43:33,520
little bit taller tall enough to make a

1266
00:43:38,470 --> 00:43:35,680
difference in space suit fit and also to

1267
00:43:39,910 --> 00:43:38,480
make a difference in the and the the

1268
00:43:41,510 --> 00:43:39,920
seats that the cosmonauts and the

1269
00:43:42,870 --> 00:43:41,520
astronauts sit in in the soyuz vehicle

1270
00:43:44,309 --> 00:43:42,880
they have to be

1271
00:43:46,150 --> 00:43:44,319
specially designed to accommodate a

1272
00:43:48,150 --> 00:43:46,160
slight increase in height

1273
00:43:49,589 --> 00:43:48,160
but unfortunately that height this

1274
00:43:51,510 --> 00:43:49,599
difference goes away as soon as they

1275
00:43:53,990 --> 00:43:51,520
come back to the ground and stand up for

1276
00:43:55,910 --> 00:43:54,000
the first time the gravity affects that

1277
00:43:58,309 --> 00:43:55,920
those uh intervertebral discs and

1278
00:44:00,630 --> 00:43:58,319
squishes the the fluid out of them and

1279
00:44:02,150 --> 00:44:00,640
before too long astronauts are the same

1280
00:44:06,309 --> 00:44:02,160
height they were before

1281
00:44:10,470 --> 00:44:08,230
let's do one more from social um this

1282
00:44:12,230 --> 00:44:10,480
one is most likely for julie um

1283
00:44:14,390 --> 00:44:12,240
commander aristotle on twitter is

1284
00:44:16,069 --> 00:44:14,400
wondering is there any possibilities

1285
00:44:17,430 --> 00:44:16,079
that other veggies will be grown on the

1286
00:44:19,750 --> 00:44:17,440
space station

1287
00:44:21,270 --> 00:44:19,760
uh yeah so veggies an interesting study

1288
00:44:23,109 --> 00:44:21,280

because what we're doing with that is

1289
00:44:25,270 --> 00:44:23,119
we're really testing our ability to take

1290
00:44:26,630 --> 00:44:25,280
a a small greenhouse with us to mars

1291
00:44:29,430 --> 00:44:26,640
it's very small

1292
00:44:31,910 --> 00:44:29,440
space and and low power low low energy

1293
00:44:33,190 --> 00:44:31,920
and so forth and on the way to mars

1294
00:44:34,630 --> 00:44:33,200
there are a couple reasons we'd like to

1295
00:44:37,030 --> 00:44:34,640
have a greenhouse one is for the

1296
00:44:39,430 --> 00:44:37,040
psychological benefits of having some

1297
00:44:42,150 --> 00:44:39,440
living organisms to go along with you

1298
00:44:44,069 --> 00:44:42,160
but another is to be able to grow fresh

1299
00:44:46,230 --> 00:44:44,079
food for some of the vitamins and

1300
00:44:48,950 --> 00:44:46,240
especially antioxidants that break down

1301
00:44:50,790 --> 00:44:48,960
in space so it'd be nice to have some

1302
00:44:52,630 --> 00:44:50,800
things like maybe spinach or some fresh

1303
00:44:55,750 --> 00:44:52,640
berries

1304
00:44:58,069 --> 00:44:55,760
sources of vitamin c and so we as you

1305
00:44:59,670 --> 00:44:58,079
know while while scott was up we grew

1306
00:45:01,829 --> 00:44:59,680
a red romaine lettuce which is a very

1307
00:45:03,829 --> 00:45:01,839
nutritional form of romaine lettuce and

1308
00:45:05,750 --> 00:45:03,839
we also had the zinnias

1309
00:45:07,589 --> 00:45:05,760
personally i'd like to see a fruit come

1310
00:45:10,230 --> 00:45:07,599
up in the future our russian colleagues

1311
00:45:12,630 --> 00:45:10,240
in their larger heavier greenhouse have

1312
00:45:15,109 --> 00:45:12,640
grown things like peas and other plants

1313
00:45:16,710 --> 00:45:15,119

so we have some work to go still

1314
00:45:18,390 --> 00:45:16,720
but it was a big advantage just to get

1315
00:45:20,309 --> 00:45:18,400
to the point where we were comfortable

1316
00:45:21,430 --> 00:45:20,319
that the food was safe to eat that had

1317
00:45:24,150 --> 00:45:21,440
been grown in space and that was an

1318
00:45:25,750 --> 00:45:24,160
important accomplishment this mission

1319
00:45:27,109 --> 00:45:25,760
okay we'll take a couple of follow-ups

1320
00:45:28,150 --> 00:45:27,119
here in the room all the way on the end

1321
00:45:30,069 --> 00:45:28,160
here

1322
00:45:32,550 --> 00:45:30,079
hi alexandra becker with texas medical

1323
00:45:34,470 --> 00:45:32,560
center news um could you speak a little

1324
00:45:36,630 --> 00:45:34,480
bit more about how data from the twin

1325
00:45:39,270 --> 00:45:36,640
study and maybe the research process

1326
00:45:42,230 --> 00:45:39,280
itself might benefit human health here

1327
00:45:46,150 --> 00:45:43,750
that's always a difficult kind of

1328
00:45:47,990 --> 00:45:46,160
question to answer because it requires a

1329
00:45:49,670 --> 00:45:48,000
sort of a direct mapping of the results

1330
00:45:51,190 --> 00:45:49,680
from space flight to

1331
00:45:52,870 --> 00:45:51,200
life here on earth

1332
00:45:54,309 --> 00:45:52,880
but i don't think it's an exaggeration

1333
00:45:56,390 --> 00:45:54,319
to say that everything we learn about

1334
00:45:57,589 --> 00:45:56,400
the human body whether it's in space or

1335
00:45:59,349 --> 00:45:57,599
on the ground

1336
00:46:01,030 --> 00:45:59,359
benefits all of us here on the earth

1337
00:46:03,430 --> 00:46:01,040
there's the

1338
00:46:06,150 --> 00:46:03,440

guys like like mark and scott

1339
00:46:08,630 --> 00:46:06,160
while very fit and unique they have the

1340
00:46:10,390 --> 00:46:08,640
same basic physiology the same basic

1341
00:46:11,670 --> 00:46:10,400
anatomy as the rest of us do

1342
00:46:13,670 --> 00:46:11,680
and by allowing us to make the

1343
00:46:15,750 --> 00:46:13,680
measurements on them in an

1344
00:46:17,750 --> 00:46:15,760
in-depth and detailed manner

1345
00:46:20,470 --> 00:46:17,760
uh repeatedly in

1346
00:46:22,470 --> 00:46:20,480
the most novel circumstance that i can

1347
00:46:24,870 --> 00:46:22,480
envision which is weightlessness

1348
00:46:26,309 --> 00:46:24,880
that tells us things about how the how

1349
00:46:28,550 --> 00:46:26,319
all of our bodies

1350
00:46:30,470 --> 00:46:28,560
respond to stresses

1351
00:46:31,349 --> 00:46:30,480
and eliminate some of the

1352
00:46:32,710 --> 00:46:31,359
some of the noise some of the

1353
00:46:34,470 --> 00:46:32,720
variability some of the uncertainty

1354
00:46:36,069 --> 00:46:34,480
because they are

1355
00:46:39,190 --> 00:46:36,079
in this case they're twins and so we

1356
00:46:40,470 --> 00:46:39,200
have some very clear comparisons between

1357
00:46:42,230 --> 00:46:40,480
one person in space and one on the

1358
00:46:43,990 --> 00:46:42,240
ground but also because they're very

1359
00:46:46,470 --> 00:46:44,000
healthy so that eliminates a lot of the

1360
00:46:47,910 --> 00:46:46,480
the complications of of not quite so

1361
00:46:50,069 --> 00:46:47,920
healthy bodies

1362
00:46:51,829 --> 00:46:50,079
but very brief it's too late to be brief

1363
00:46:53,990 --> 00:46:51,839

but very briefly

1364
00:46:56,069 --> 00:46:54,000
anything we learn about people any place

1365
00:46:57,990 --> 00:46:56,079
is going to benefit life on earth well

1366
00:46:59,990 --> 00:46:58,000
we've already had examples where the

1367
00:47:01,910 --> 00:47:00,000
research in space led to follow-on

1368
00:47:03,750 --> 00:47:01,920
research by say pharmaceutical companies

1369
00:47:05,670 --> 00:47:03,760
and others there's already a drug on the

1370
00:47:07,430 --> 00:47:05,680
market that was tested

1371
00:47:10,710 --> 00:47:07,440
on the space station basically to

1372
00:47:13,190 --> 00:47:10,720
evaluate its mechanism of function merck

1373
00:47:15,510 --> 00:47:13,200
eli lilly other companies are using iss

1374
00:47:17,349 --> 00:47:15,520
to take it that second step so the basic

1375
00:47:19,030 --> 00:47:17,359
information it takes another couple sets

1376
00:47:21,109 --> 00:47:19,040
of research to to get it to a health

1377
00:47:23,510 --> 00:47:21,119
benefit but you know if you look at all

1378
00:47:25,670 --> 00:47:23,520
the effects overall on on crew member

1379
00:47:27,910 --> 00:47:25,680
health the bone loss cardiac

1380
00:47:29,750 --> 00:47:27,920
deconditioning they all start looking a

1381
00:47:31,670 --> 00:47:29,760
lot like aging and that's those are the

1382
00:47:39,589 --> 00:47:31,680
medical things that we care about most

1383
00:47:43,990 --> 00:47:41,030
you mentioned that there's still some

1384
00:47:45,829 --> 00:47:44,000
medical specimens i guess especially

1385
00:47:47,750 --> 00:47:45,839
various types on the space station can

1386
00:47:50,230 --> 00:47:47,760
you describe

1387
00:47:55,430 --> 00:47:53,349
i guess it's blood but what it is and

1388
00:47:57,990 --> 00:47:55,440

is there a certain period

1389
00:48:00,230 --> 00:47:58,000
of the time that something is faced that

1390
00:48:01,030 --> 00:48:00,240
that those samples cover that's critical

1391
00:48:03,430 --> 00:48:01,040
to

1392
00:48:05,430 --> 00:48:03,440
the overall project

1393
00:48:07,030 --> 00:48:05,440
it's primarily the most recent blood

1394
00:48:09,430 --> 00:48:07,040
specimens that were collected on on

1395
00:48:10,390 --> 00:48:09,440
scott the earlier specimens came back on

1396
00:48:14,309 --> 00:48:10,400
earlier

1397
00:48:16,630 --> 00:48:14,319
down mass vehicles like spacex's before

1398
00:48:18,470 --> 00:48:16,640
but uh yeah we are we have a big freezer

1399
00:48:20,710 --> 00:48:18,480
on iss called melfi

1400
00:48:23,109 --> 00:48:20,720
the minus 80 degree laboratory freezers

1401
00:48:26,150 --> 00:48:23,119
for iss and then we have small freezers

1402
00:48:27,430 --> 00:48:26,160
on our spacex return vehicles that bring

1403
00:48:29,109 --> 00:48:27,440
those samples home we want to keep them

1404
00:48:30,950 --> 00:48:29,119
frozen the whole time we also have some

1405
00:48:33,670 --> 00:48:30,960
cold bags we can bring home on a spacex

1406
00:48:35,910 --> 00:48:33,680
to have extra capacity and we just ha we

1407
00:48:37,430 --> 00:48:35,920
try to get a block of samples together

1408
00:48:39,910 --> 00:48:37,440
from a single experiment and bring them

1409
00:48:41,030 --> 00:48:39,920
home all at once so the next spacex is

1410
00:48:43,750 --> 00:48:41,040
going to be a really important one for

1411
00:48:44,950 --> 00:48:43,760
having a lot of these samples

1412
00:48:46,549 --> 00:48:44,960
eric

1413
00:48:49,829 --> 00:48:46,559

berger again with uh

1414
00:48:51,910 --> 00:48:49,839
a question for for john um

1415
00:48:54,630 --> 00:48:51,920
so obviously the you know mark and scott

1416
00:48:56,470 --> 00:48:54,640
are you know talented intelligent

1417
00:48:57,829 --> 00:48:56,480
you know guys

1418
00:48:59,750 --> 00:48:57,839
i want to know about the psychology of

1419
00:49:01,030 --> 00:48:59,760
this so being up in space away from

1420
00:49:03,589 --> 00:49:01,040
loved ones for a year now you get to

1421
00:49:05,270 --> 00:49:03,599
calm at any time but you know it's hard

1422
00:49:06,549 --> 00:49:05,280
it's isolating

1423
00:49:07,910 --> 00:49:06,559
you know what percentage the general

1424
00:49:09,990 --> 00:49:07,920
population you think has the

1425
00:49:12,390 --> 00:49:10,000
psychological makeup to handle this kind

1426
00:49:15,030 --> 00:49:12,400
of a situation where you're you know

1427
00:49:18,790 --> 00:49:15,040
you're staying on task every day

1428
00:49:22,710 --> 00:49:21,190
i would be scared to guess how many what

1429
00:49:24,870 --> 00:49:22,720
fraction of the general population can

1430
00:49:27,430 --> 00:49:24,880
do that i suspect it's more than one in

1431
00:49:28,630 --> 00:49:27,440
a thousand because and i say one in a

1432
00:49:29,990 --> 00:49:28,640
thousand because that's the number of

1433
00:49:31,670 --> 00:49:30,000
people we're going to select in the next

1434
00:49:32,950 --> 00:49:31,680
next astronaut selection out of the ones

1435
00:49:35,270 --> 00:49:32,960
that applied

1436
00:49:36,390 --> 00:49:35,280
but it's it's we i think we can all

1437
00:49:38,230 --> 00:49:36,400
probably answer that question for

1438
00:49:41,190 --> 00:49:38,240

ourselves just imagine who

1439
00:49:43,670 --> 00:49:41,200
who amongst all of your acquaintances

1440
00:49:46,710 --> 00:49:43,680
could maintain that kind of uh focus on

1441
00:49:48,630 --> 00:49:46,720
task in a fairly confined environment

1442
00:49:50,230 --> 00:49:48,640
with the same faces to look at all the

1443
00:49:52,710 --> 00:49:50,240
time and under

1444
00:49:54,069 --> 00:49:52,720
no kidding life and death death stresses

1445
00:49:55,670 --> 00:49:54,079
the entire time

1446
00:49:57,190 --> 00:49:55,680
who among us could do that i'm not sure

1447
00:50:00,150 --> 00:49:57,200
i would be really one of the one of the

1448
00:50:01,349 --> 00:50:00,160
chosen ones in that regard

1449
00:50:03,030 --> 00:50:01,359
all right well that's going to be all

1450
00:50:04,710 --> 00:50:03,040
the time we have for this press

1451
00:50:06,309 --> 00:50:04,720
conference today you can of course

1452
00:50:07,670 --> 00:50:06,319
continue to follow the mission on

1453
00:50:09,430 --> 00:50:07,680
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1454
00:50:11,349 --> 00:50:09,440
one year i want to thank all of my

1455
00:50:12,950 --> 00:50:11,359
guests here today for their time and for

1456
00:50:14,870 --> 00:50:12,960
all of their work to make this mission

1457
00:50:17,270 --> 00:50:14,880
the success that it was dr julie

1458
00:50:18,470 --> 00:50:17,280
robinson dr john charles and mark kelly

1459
00:50:19,750 --> 00:50:18,480
of course

1460
00:50:21,270 --> 00:50:19,760
so we're going to break away for now

1461
00:50:23,670 --> 00:50:21,280
stick around though because coming up