1
00:00:04,070 --> 00:00:02,510
good morning everybody and welcome to

2
00:00:06,170 --> 00:00:04,080
the Johnson Space Center we're here

3
00:00:08,419 --> 00:00:06,180
today for our expedition 43 and the

4
00:00:11,240 --> 00:00:08,429
one-year crew mission overview and

5
00:00:12,740 --> 00:00:11,250
science briefing I'm Dan Huot so we're

6
00:00:14,839 --> 00:00:12,750
just about two months away now from the

7
00:00:17,150 --> 00:00:14,849
launch of nasa astronaut scott kelly and

8
00:00:19,820 --> 00:00:17,160
russian cosmonauts mikhail kornienko and

9
00:00:21,260 --> 00:00:19,830
gennady padalka kelly and kornienko will

10
00:00:23,240 --> 00:00:21,270
be spending a full year onboard the

11
00:00:25,099 --> 00:00:23,250
station very important milestone and a

12
00:00:27,769 --> 00:00:25,109
new step as we begin our next journeys

13
00:00:30,109 --> 00:00:27,779

getting ready to make giant leaps beyond

14
00:00:31,460 --> 00:00:30,119
and eventually on to Mars so we're going

15
00:00:34,100 --> 00:00:31,470
to talk a little bit about what's ahead

16
00:00:36,590 --> 00:00:34,110
for the crew for the next year joining

17
00:00:38,209 --> 00:00:36,600
me here today I have international space

18
00:00:40,729 --> 00:00:38,219
station program manager Mike suffered

19
00:00:43,369 --> 00:00:40,739
Deenie i also have emily nelson nasa

20
00:00:44,810 --> 00:00:43,379
flight director Julie Robinson the

21
00:00:47,150 --> 00:00:44,820
international space station chief

22
00:00:49,459 --> 00:00:47,160
scientist finally Steve Gilmore NASA

23
00:00:50,869 --> 00:00:49,469
flight surgeon so we're going to hear

24
00:00:52,340 --> 00:00:50,879
from each of them first and then we'll

25
00:00:53,810 --> 00:00:52,350
go ahead and open it up for everybody's

26
00:00:56,779 --> 00:00:53,820
questions so Mike why don't you go ahead

27
00:00:59,000 --> 00:00:56,789
and start us off well good morning it's

28
00:01:01,250 --> 00:00:59,010
been quite a while since we announced

29
00:01:03,260 --> 00:01:01,260
that we were going to have a one-year

30
00:01:05,149 --> 00:01:03,270
increment on board and so it's good to

31
00:01:09,920 --> 00:01:05,159
be in front of all of you discussing it

32
00:01:11,780 --> 00:01:09,930
today specifically several years two or

33
00:01:13,190 --> 00:01:11,790
three years ago we sat down with our

34
00:01:16,429 --> 00:01:13,200
Russian colleagues and the rest of the

35
00:01:19,310 --> 00:01:16,439
partners and decided it was time to

36
00:01:22,340 --> 00:01:19,320
start considering extending our

37
00:01:26,359 --> 00:01:22,350
durations onboard ISS in order to start

38
00:01:29,330 --> 00:01:26,369

to understand the effects of

39
00:01:32,899 --> 00:01:29,340
microgravity and other environments in

40
00:01:35,210 --> 00:01:32,909
space on the human system as we start to

41
00:01:39,319 --> 00:01:35,220
approach exploration beyond low Earth

42
00:01:42,679 --> 00:01:39,329
orbit and at that time we picked this

43
00:01:45,740 --> 00:01:42,689
period to begin our first one year

44
00:01:49,130 --> 00:01:45,750
increment and the team has been

45
00:01:51,139 --> 00:01:49,140
preparing for this ever since as luck

46
00:01:53,240 --> 00:01:51,149
would have it of course we also have

47
00:01:56,510 --> 00:01:53,250
another number of other things going on

48
00:01:58,370 --> 00:01:56,520
board stations so during these four

49
00:02:03,380 --> 00:01:58,380
increments that will make up the one

50
00:02:07,069 --> 00:02:03,390
year flight for both Scott and Misha

51
00:02:09,740 --> 00:02:07,079
we're also going to be reconfiguring the

52
00:02:12,630 --> 00:02:09,750
u.s. segment to have dockings again and

53
00:02:15,270 --> 00:02:12,640
in preparation for the arrival of

54
00:02:17,670 --> 00:02:15,280
the first commercial crew vehicle to the

55
00:02:20,400 --> 00:02:17,680
International Space Station so this

56
00:02:22,949 --> 00:02:20,410
period will be will be not only busy

57
00:02:25,290 --> 00:02:22,959
from a research standpoint as we do the

58
00:02:28,890 --> 00:02:25,300
research that we have been doing for

59
00:02:32,310 --> 00:02:28,900
some time on the human subjects for six

60
00:02:34,380 --> 00:02:32,320
months but we have the one-year subjects

61
00:02:37,020 --> 00:02:34,390
as well that adds to our list of

62
00:02:38,940 --> 00:02:37,030
research to do and of course the ever

63
00:02:41,460 --> 00:02:38,950

growing commercial use of the

64
00:02:43,500 --> 00:02:41,470
International Space Station is also

65
00:02:45,690 --> 00:02:43,510
picking up during this period of time

66
00:02:48,420 --> 00:02:45,700
and so in the middle of all this

67
00:02:51,090 --> 00:02:48,430
research we have major reconfiguration

68
00:02:55,979 --> 00:02:51,100
of the International Space Station as we

69
00:02:59,820 --> 00:02:55,989
begin to adapt the forward port on know

70
00:03:03,449 --> 00:02:59,830
to to have a new docking system the NASA

71
00:03:05,670 --> 00:03:03,459
docking system we call it and an adapter

72
00:03:08,070 --> 00:03:05,680
that we're going to have on on station

73
00:03:09,900 --> 00:03:08,080
the international docking adapter so

74
00:03:12,180 --> 00:03:09,910
we'll have one on the forward port and

75
00:03:16,500 --> 00:03:12,190
then we'll put one on the zenith port of

76
00:03:19,710 --> 00:03:16,510
no.2 and we will clear the nadir port of

77
00:03:22,020 --> 00:03:19,720
node one to have the backup birthing

78
00:03:24,509 --> 00:03:22,030
port so when we're done we have docking

79
00:03:26,550 --> 00:03:24,519
on the forward port will have docking on

80
00:03:29,550 --> 00:03:26,560
the zenith port and we'll have birthing

81
00:03:32,670 --> 00:03:29,560
on the note to nadir port and the node

82
00:03:35,880 --> 00:03:32,680
one nadir port of course today we have

83
00:03:38,130 --> 00:03:35,890
the pmm unknown one nadir and so we have

84
00:03:41,789 --> 00:03:38,140
a quite a fit quite a bit of work to do

85
00:03:44,699 --> 00:03:41,799
to move the pmm to run all the cables we

86
00:03:47,850 --> 00:03:44,709
need to run for the new docking systems

87
00:03:52,850 --> 00:03:47,860
to prep for the movable of p.m. a three

88
00:03:55,440 --> 00:03:52,860

from node three a port 22 no to Zenith

89
00:03:57,539 --> 00:03:55,450
and then of course the installation of

90
00:03:59,970 --> 00:03:57,549
the docking adapters which today are

91
00:04:03,180 --> 00:03:59,980
planned be brought up on SpaceX seven in

92
00:04:06,750 --> 00:04:03,190
space X 9 so all of this work is going

93
00:04:09,960 --> 00:04:06,760
on while the one your cruise on orbit so

94
00:04:12,030 --> 00:04:09,970
we we will keep them very busy which i

95
00:04:15,210 --> 00:04:12,040
think is a good thing as you're spending

96
00:04:17,279 --> 00:04:15,220
quite a bit of time on orbit but at the

97
00:04:19,380 --> 00:04:17,289
same time getting ourselves ready for

98
00:04:23,930 --> 00:04:19,390
the first commercial flights to the

99
00:04:26,410 --> 00:04:23,940
International Space Station so what the

100
00:04:28,870 --> 00:04:26,420
in addition that i should say in this

101
00:04:31,090 --> 00:04:28,880
that we've been working with the

102
00:04:34,510 --> 00:04:31,100
logistics partners to get the vehicle

103
00:04:37,810 --> 00:04:34,520
squared away to support ISS for the next

104
00:04:39,580 --> 00:04:37,820
year or so our orbital friends will

105
00:04:43,150 --> 00:04:39,590
start flying back to station hopefully

106
00:04:45,190 --> 00:04:43,160
in the October of 2015 timeframe the

107
00:04:47,350 --> 00:04:45,200
SpaceX corporation course had their

108
00:04:48,940 --> 00:04:47,360
first successful launch of the year to

109
00:04:51,790 --> 00:04:48,950
the International Space Station dragon

110
00:04:55,480 --> 00:04:51,800
is they're servicing it now and we have

111
00:04:57,370 --> 00:04:55,490
flights lined up for april and and the

112
00:04:59,490 --> 00:04:57,380
june/july time frame and then one at the

113
00:05:01,810 --> 00:04:59,500

end of fall and we're looking to pull up

114
00:05:03,940 --> 00:05:01,820
the flight and december up into the

115
00:05:06,910 --> 00:05:03,950
november time frame in order to keep the

116
00:05:09,130 --> 00:05:06,920
logistics train going so that looks very

117
00:05:12,490 --> 00:05:09,140
very good for the program in addition to

118
00:05:14,200 --> 00:05:12,500
that we also have an HTV flight in the

119
00:05:16,270 --> 00:05:14,210
summertime so from a logistics

120
00:05:19,540 --> 00:05:16,280
standpoint in order to pet support the

121
00:05:22,000 --> 00:05:19,550
research that we plan to to do both the

122
00:05:25,240 --> 00:05:22,010
nominal research we have and the

123
00:05:26,920 --> 00:05:25,250
one-year increment we it looks like the

124
00:05:29,950 --> 00:05:26,930
logistics will support all that so

125
00:05:33,600 --> 00:05:29,960
that's the plan going forward this

126
00:05:37,930 --> 00:05:33,610
morning Emily will walk through the ops

127
00:05:39,070 --> 00:05:37,940
portion of that and then Julie will give

128
00:05:42,010 --> 00:05:39,080
you quite a bit of rundown on the

129
00:05:46,380 --> 00:05:42,020
research aspect of as well so with that

130
00:05:48,520 --> 00:05:46,390
all handed over to Emily good morning

131
00:05:50,110 --> 00:05:48,530
first let me walk through for you the

132
00:05:51,880 --> 00:05:50,120
crews that will have making up the

133
00:05:54,580 --> 00:05:51,890
expedition's of this year long flight

134
00:05:55,990 --> 00:05:54,590
over the course of the year and Scott

135
00:05:57,700 --> 00:05:56,000
and Mikhail will be a part of four

136
00:05:59,620 --> 00:05:57,710
separate expeditions we can start

137
00:06:01,990 --> 00:05:59,630
bringing up those graphics will begin

138
00:06:03,850 --> 00:06:02,000

with terry virts samantha Christopher

139
00:06:06,610 --> 00:06:03,860
Eddie and anton shkaplerov that are

140
00:06:08,620 --> 00:06:06,620
already on orbit today Scott and Mikhail

141
00:06:11,980 --> 00:06:08,630
and gennady padalka will be joining them

142
00:06:14,980 --> 00:06:11,990
to make up the expedition 43 crew when

143
00:06:17,830 --> 00:06:14,990
Terry Samantha and Anton depart shortly

144
00:06:20,820 --> 00:06:17,840
thereafter will move into expedition 44

145
00:06:23,770 --> 00:06:20,830
with the mission of shell lindgren

146
00:06:25,930 --> 00:06:23,780
kimiya yui and oleg kononenko who will

147
00:06:29,440 --> 00:06:25,940
be joining them to make up expedition 44

148
00:06:33,010 --> 00:06:29,450
in order to provide a fresh so use for

149
00:06:36,700 --> 00:06:33,020
kelly Kornienko and padalka will be

150
00:06:39,850 --> 00:06:36,710
having a direct hand over for the trade

151
00:06:41,890 --> 00:06:39,860
from expedition 40 42 45 so

152
00:06:44,320 --> 00:06:41,900
volkov will bring up a Soyuz that will

153
00:06:45,820 --> 00:06:44,330
include ESA astronaut andre's morganson

154
00:06:50,020 --> 00:06:45,830
and spaceflight participants are

155
00:06:52,360 --> 00:06:50,030
participants Sarah Brightman then Sergei

156
00:06:54,850 --> 00:06:52,370
will stay onboard trading places with

157
00:06:56,559 --> 00:06:54,860
Gennady Gennady will take andreas and

158
00:06:59,610 --> 00:06:56,569
sarah brightman back home again and that

159
00:07:03,040 --> 00:06:59,620
will make up your expedition 45 crew

160
00:07:05,140 --> 00:07:03,050
then once shell and Kimia and Oleg

161
00:07:06,850 --> 00:07:05,150
depart will sort shortly after that have

162
00:07:11,260 --> 00:07:06,860
tim kopra tim peake and yuri malenchenko

163
00:07:13,330 --> 00:07:11,270

come up for expedition 46 and that will

164
00:07:15,749 --> 00:07:13,340
make up the four separate expeditions

165
00:07:19,510 --> 00:07:15,759
will have over the course of the year

166
00:07:21,519 --> 00:07:19,520
again as Mike pointed out over the the

167
00:07:22,990 --> 00:07:21,529
long duration of this mission we're

168
00:07:25,899 --> 00:07:23,000
going to do quite a bit of not only

169
00:07:28,119 --> 00:07:25,909
research but us systems reconfigurations

170
00:07:29,980 --> 00:07:28,129
to make room for docking adapters so

171
00:07:32,619 --> 00:07:29,990
that we can start bringing up us crude

172
00:07:34,390 --> 00:07:32,629
vehicles in order to get those

173
00:07:36,899 --> 00:07:34,400
international docking adapters installed

174
00:07:39,429 --> 00:07:36,909
we've got some graphics to show you the

175
00:07:43,269 --> 00:07:39,439
reconfigurations that mike outlined here

176
00:07:46,420 --> 00:07:43,279
you can see the permanent multi-purpose

177
00:07:50,079 --> 00:07:46,430
module and where it will be moving from

178
00:07:53,829 --> 00:07:50,089
the blue location where it is nadir of

179
00:07:55,990 --> 00:07:53,839
the node one module out to the forward

180
00:07:57,909 --> 00:07:56,000
port of the node three module freeing up

181
00:08:00,129 --> 00:07:57,919
that node one port for cargo vehicles

182
00:08:02,649 --> 00:08:00,139
will also continue to berth cargo

183
00:08:04,749 --> 00:08:02,659
vehicles at the node to nadir port so

184
00:08:06,519 --> 00:08:04,759
they'll be side by side there then we

185
00:08:08,890 --> 00:08:06,529
also need to move pressurized mating

186
00:08:11,320 --> 00:08:08,900
adapter number three again starting in

187
00:08:13,719 --> 00:08:11,330
its location at the pork side of node 3

188
00:08:16,360 --> 00:08:13,729

where shown in blue and the graphic

189
00:08:18,670 --> 00:08:16,370
moving it to the zenith portion of node

190
00:08:20,320 --> 00:08:18,680
2 so that our two docking adapters can

191
00:08:22,510 --> 00:08:20,330
be side by side they're on the zenith

192
00:08:24,309 --> 00:08:22,520
and forward portions of node 2 you can

193
00:08:26,499 --> 00:08:24,319
see the white tips of the pressurized

194
00:08:29,079 --> 00:08:26,509
mating adapters are the international

195
00:08:31,959 --> 00:08:29,089
docking adapters all of that work

196
00:08:34,240 --> 00:08:31,969
requires a great number of spacewalk

197
00:08:35,800 --> 00:08:34,250
activities and currently that spread

198
00:08:37,209 --> 00:08:35,810
across seven different space walks over

199
00:08:38,709 --> 00:08:37,219
the next year one of those is complete

200
00:08:41,259 --> 00:08:38,719
we've got three more coming up soon and

201
00:08:43,620 --> 00:08:41,269
a briefing about those next month we

202
00:08:46,449 --> 00:08:43,630
also have a significant structural

203
00:08:48,370 --> 00:08:46,459
science opportunity with the Bigelow

204
00:08:50,620 --> 00:08:48,380
expandable Activity module coming up on

205
00:08:52,300 --> 00:08:50,630
a SpaceX mission this summer that will

206
00:08:55,840 --> 00:08:52,310
be installed on the nose

207
00:08:59,440 --> 00:08:55,850
3 aft port we have a quick video showing

208
00:09:02,620 --> 00:08:59,450
the extraction from the SpaceX vehicle

209
00:09:04,750 --> 00:09:02,630
and then the u.s. robotic arm is going

210
00:09:07,330 --> 00:09:04,760
to swing that around to install it on

211
00:09:11,019 --> 00:09:07,340
the three it brings with it the gas

212
00:09:13,090 --> 00:09:11,029
canisters required for its expansion so

213
00:09:16,870 --> 00:09:13,100

once we get it installed robotically

214
00:09:19,960 --> 00:09:16,880
will then be able to ingress that module

215
00:09:26,130 --> 00:09:19,970
and deploy the gas from its canisters

216
00:09:32,620 --> 00:09:28,540
eventually there we go and then it'll be

217
00:09:34,600 --> 00:09:32,630
our first soft-sided expandable module

218
00:09:35,980 --> 00:09:34,610
it'll be on board for a total of two

219
00:09:38,530 --> 00:09:35,990
years periodically the crew will go

220
00:09:39,700 --> 00:09:38,540
inside to gather data on structural

221
00:09:41,590 --> 00:09:39,710
integrity leak rate temperature

222
00:09:43,510 --> 00:09:41,600
radiation environment and all of those

223
00:09:45,750 --> 00:09:43,520
kinds of information which will pass

224
00:09:49,120 --> 00:09:45,760
back to our big low partners as we

225
00:09:52,750 --> 00:09:49,130
progress in new structural technologies

226
00:09:54,040 --> 00:09:52,760
for future space flight and with that we

227
00:09:56,230 --> 00:09:54,050
will be doing quite a bit of science

228
00:09:59,160 --> 00:09:56,240
over the course of the year and Julie

229
00:10:02,980 --> 00:09:59,170
will walk through a lot of that force

230
00:10:04,570 --> 00:10:02,990
thanks Emily you know we have hundreds

231
00:10:05,890 --> 00:10:04,580
and hundreds of Investigations going on

232
00:10:09,160 --> 00:10:05,900
over the coming year really probably

233
00:10:10,900 --> 00:10:09,170
between 400 and 500 investigations will

234
00:10:12,820 --> 00:10:10,910
take place we don't even know how many

235
00:10:14,680 --> 00:10:12,830
investigations because we're doing such

236
00:10:16,480 --> 00:10:14,690
a rapid turnaround especially with

237
00:10:18,190 --> 00:10:16,490
commercial users getting to ISS that

238
00:10:20,170 --> 00:10:18,200

there are users who will come to ISS

239
00:10:21,820 --> 00:10:20,180
this year who have not yet finished

240
00:10:23,770 --> 00:10:21,830
designing their experiment so it's a

241
00:10:25,840 --> 00:10:23,780
really exciting dynamic time for the

242
00:10:28,329 --> 00:10:25,850
laboratory but if I were going to pick a

243
00:10:30,579 --> 00:10:28,339
single theme it's clearly health for

244
00:10:32,740 --> 00:10:30,589
exploration and health for life on Earth

245
00:10:34,990 --> 00:10:32,750
and so I want to talk to you I just

246
00:10:37,829 --> 00:10:35,000
picked six investigations that really

247
00:10:40,420 --> 00:10:37,839
help you understand that context of how

248
00:10:42,190 --> 00:10:40,430
the research that we're doing on ISS

249
00:10:44,199 --> 00:10:42,200
both helps us make sure that crews will

250
00:10:46,360 --> 00:10:44,209
be healthy and ready to go to Mars when

251
00:10:48,760 --> 00:10:46,370
we have the systems ready to support

252
00:10:49,930 --> 00:10:48,770
that as well as take that knowledge and

253
00:10:51,460 --> 00:10:49,940
bring it back here on earth to make

254
00:10:53,140 --> 00:10:51,470
people's lives better help them live

255
00:10:55,990 --> 00:10:53,150
longer and help them live with a higher

256
00:10:58,060 --> 00:10:56,000
quality of life so the first area is

257
00:11:00,070 --> 00:10:58,070
really working at the almost the

258
00:11:03,130 --> 00:11:00,080
cellular level at a basic building block

259
00:11:05,650 --> 00:11:03,140
level and using space to understand how

260
00:11:07,360 --> 00:11:05,660
cells respond to gravity and then

261
00:11:08,890 --> 00:11:07,370
hoping to then use that to interpret

262
00:11:10,960 --> 00:11:08,900
health on earth so if I could have my

263
00:11:13,330 --> 00:11:10,970

first graphic I want to explain a little

264
00:11:15,070 --> 00:11:13,340
bit of the basics of why we do this in

265
00:11:17,110 --> 00:11:15,080
space so if you look at those three

266
00:11:18,760 --> 00:11:17,120
little flasks they represent three of

267
00:11:20,380 --> 00:11:18,770
the things that don't happen in space

268
00:11:23,470 --> 00:11:20,390
that happen on earth that really matter

269
00:11:25,840 --> 00:11:23,480
for cells in the upper left one of the

270
00:11:27,760 --> 00:11:25,850
things you don't have is convection so

271
00:11:30,490 --> 00:11:27,770
you don't have mixing warm things don't

272
00:11:32,380 --> 00:11:30,500
rise cold things don't fall on the flask

273
00:11:34,300 --> 00:11:32,390
on the right what you see is we have a

274
00:11:36,520 --> 00:11:34,310
low shear environment there's not a lot

275
00:11:38,410 --> 00:11:36,530
of waves and mixing that like you have

276
00:11:40,360 --> 00:11:38,420
in a gravitational environment when

277
00:11:43,450 --> 00:11:40,370
you're growing cells and at the bottom

278
00:11:45,880 --> 00:11:43,460
you see the the third flask shows that

279
00:11:47,620 --> 00:11:45,890
we don't have sedimentation in space so

280
00:11:49,660 --> 00:11:47,630
heavy particles don't go to the bottom

281
00:11:51,340 --> 00:11:49,670
of a fluid like they do here on earth

282
00:11:53,290 --> 00:11:51,350
and those three things dramatically

283
00:11:55,930 --> 00:11:53,300
change the way that you culture cells

284
00:11:57,700 --> 00:11:55,940
and how those cells respond in fact it

285
00:11:59,740 --> 00:11:57,710
makes the cells act more like cells in

286
00:12:02,110 --> 00:11:59,750
the body and less like cells in a test

287
00:12:04,330 --> 00:12:02,120
tube and and then the graphic also

288
00:12:07,210 --> 00:12:04,340

represents three kind of big picture

289
00:12:08,830 --> 00:12:07,220
views of how cells change in space at

290
00:12:11,530 --> 00:12:08,840
the top you see that they change their

291
00:12:14,470 --> 00:12:11,540
shape they go to be a sphere if they can

292
00:12:16,240 --> 00:12:14,480
and at all and just like the water

293
00:12:19,000 --> 00:12:16,250
bubbles that you see astronauts drinking

294
00:12:21,100 --> 00:12:19,010
go to a perfect sphere in the lower left

295
00:12:22,720 --> 00:12:21,110
in the blue you see that they change the

296
00:12:24,220 --> 00:12:22,730
way they talk to each other so those

297
00:12:26,320 --> 00:12:24,230
particles where they signal to one

298
00:12:28,030 --> 00:12:26,330
another change and then on the right you

299
00:12:30,000 --> 00:12:28,040
see another major change which is all

300
00:12:32,650 --> 00:12:30,010
the genes that turn on and turn off

301
00:12:35,020 --> 00:12:32,660
change as those cells respond to this

302
00:12:37,810 --> 00:12:35,030
environment and this gives an incredible

303
00:12:42,070 --> 00:12:37,820
experimental platform for understanding

304
00:12:44,170 --> 00:12:42,080
how gravity plays a role in in cells so

305
00:12:47,050 --> 00:12:44,180
as an example then of some of the ways

306
00:12:49,150 --> 00:12:47,060
that we use this the National Institutes

307
00:12:50,500 --> 00:12:49,160
of Health partnered with cases the

308
00:12:52,270 --> 00:12:50,510
Center for the Advancement of science

309
00:12:54,580 --> 00:12:52,280
and space which manages our national

310
00:12:56,800 --> 00:12:54,590
laboratory have two investigations that

311
00:12:58,690 --> 00:12:56,810
will be flying this year completely

312
00:13:01,300 --> 00:12:58,700
focused on improving our understanding

313
00:13:03,400 --> 00:13:01,310

of osteoporosis and bone loss back here

314
00:13:06,850 --> 00:13:03,410
on earth one of those is called NIH

315
00:13:08,740 --> 00:13:06,860
osteo and it is looking at two kinds of

316
00:13:10,570 --> 00:13:08,750
cells there are cells that break up bone

317
00:13:12,910 --> 00:13:10,580
and cells that rebuild bone because your

318
00:13:15,220 --> 00:13:12,920
bone is always being recycled and an

319
00:13:17,050 --> 00:13:15,230
imbalance in those cells is what causes

320
00:13:19,600 --> 00:13:17,060
astronauts to lose bone in space it's

321
00:13:22,360 --> 00:13:19,610
also what causes women with osteoporosis

322
00:13:24,220 --> 00:13:22,370
and some men with osteoporosis to get

323
00:13:27,400 --> 00:13:24,230
out of balance and start losing bone and

324
00:13:30,130 --> 00:13:27,410
this nih-funded investigation will be

325
00:13:31,720 --> 00:13:30,140
helping to understand the actual genes

326
00:13:33,579 --> 00:13:31,730
that are turning on and turning off

327
00:13:35,440 --> 00:13:33,589
controlling the activity of these cells

328
00:13:37,690 --> 00:13:35,450
so it's very important to understanding

329
00:13:40,300 --> 00:13:37,700
how to manage osteoporosis on earth

330
00:13:43,030 --> 00:13:40,310
another nih-funded investigation with

331
00:13:44,920 --> 00:13:43,040
cases is called osteo 4 and this is

332
00:13:47,560 --> 00:13:44,930
looking at the cells in the bone that

333
00:13:49,690 --> 00:13:47,570
actually scents mechanical forces so

334
00:13:51,850 --> 00:13:49,700
your bones are sensing the forces on

335
00:13:53,350 --> 00:13:51,860
your body both from exercising from

336
00:13:55,150 --> 00:13:53,360
standing and fighting gravity all of

337
00:13:56,740 --> 00:13:55,160
those forces and this study will be

338
00:13:58,360 --> 00:13:56,750

looking at those cells that actually do

339
00:14:00,639 --> 00:13:58,370
the sensing right now scientists do not

340
00:14:02,500 --> 00:14:00,649
understand how those cells get their

341
00:14:04,840 --> 00:14:02,510
signal and communicate it to the other

342
00:14:07,389 --> 00:14:04,850
cells and so osteo for we'll be looking

343
00:14:10,030 --> 00:14:07,399
at that process and finally it's one

344
00:14:11,590 --> 00:14:10,040
more example there are a number of stem

345
00:14:14,620 --> 00:14:11,600
cell studies that will be flying in the

346
00:14:16,630 --> 00:14:14,630
coming year cases when did a stem cell

347
00:14:18,670 --> 00:14:16,640
call they had the largest response to

348
00:14:20,110 --> 00:14:18,680
any call for independently funded

349
00:14:22,720 --> 00:14:20,120
research on the space station that

350
00:14:25,210 --> 00:14:22,730
they've made to date with hundreds of

351
00:14:26,759 --> 00:14:25,220
applicants and some of their first

352
00:14:29,290 --> 00:14:26,769
studies from that call will be flying

353
00:14:31,389 --> 00:14:29,300
and there will be a number of different

354
00:14:33,460 --> 00:14:31,399
stem cell studies one of those just as

355
00:14:36,550 --> 00:14:33,470
an example is a Japanese study called

356
00:14:38,139 --> 00:14:36,560
stem cells that takes mouse stem cells

357
00:14:40,090 --> 00:14:38,149
it flies them in space for a period of

358
00:14:42,009 --> 00:14:40,100
time then they bring them back home they

359
00:14:44,050 --> 00:14:42,019
insert them into a mouse embryo an

360
00:14:46,449 --> 00:14:44,060
eight-cell mouse embryo back on earth

361
00:14:49,360 --> 00:14:46,459
and then look at how the development of

362
00:14:50,860 --> 00:14:49,370
that embryo occurs over time so this is

363
00:14:53,259 --> 00:14:50,870

really getting at understanding the

364
00:14:55,360 --> 00:14:53,269
basics of stem cells turn and

365
00:14:57,880 --> 00:14:55,370
developmental biology which is a really

366
00:15:00,189 --> 00:14:57,890
interesting area as medicine tries to

367
00:15:02,220 --> 00:15:00,199
move towards helping people to rebuild

368
00:15:04,780 --> 00:15:02,230
their own organs when they have injuries

369
00:15:06,880 --> 00:15:04,790
shifting then from that small cellular

370
00:15:09,160 --> 00:15:06,890
level up to the level of the whole human

371
00:15:10,720 --> 00:15:09,170
the one-year expedition as well as the

372
00:15:13,240 --> 00:15:10,730
six-month crew members in the coming

373
00:15:14,620 --> 00:15:13,250
year are also really important so this

374
00:15:17,019 --> 00:15:14,630
will be the first time that we've had

375
00:15:19,300 --> 00:15:17,029
astronauts on the space station for 12

376
00:15:22,000 --> 00:15:19,310
months it will also be the first time

377
00:15:25,269 --> 00:15:22,010
since the 1990s that we've had anyone in

378
00:15:27,519 --> 00:15:25,279
space for 12 months or more and you know

379
00:15:28,840 --> 00:15:27,529
since the late 1990s I think about all

380
00:15:30,790 --> 00:15:28,850
the changes in medicine that have

381
00:15:33,360 --> 00:15:30,800
happened they've been major changes in

382
00:15:35,340 --> 00:15:33,370
our understanding of human physiology

383
00:15:36,690 --> 00:15:35,350
also in him human physiology in space

384
00:15:38,070 --> 00:15:36,700
all the things that we've learned from

385
00:15:40,380 --> 00:15:38,080
the space station weren't known at that

386
00:15:42,180 --> 00:15:40,390
time and we've got a genetic

387
00:15:44,040 --> 00:15:42,190
understanding of disease that is

388
00:15:45,870 --> 00:15:44,050

completely new from when the last

389
00:15:48,810 --> 00:15:45,880
cosmonauts flew for long periods of time

390
00:15:51,120 --> 00:15:48,820
in the 1990's and that genetic

391
00:15:52,829 --> 00:15:51,130
connection understanding how genes and

392
00:15:54,240 --> 00:15:52,839
environment interact especially if that

393
00:15:56,700 --> 00:15:54,250
environment is something like being in

394
00:15:58,740 --> 00:15:56,710
space is something completely new in the

395
00:16:00,240 --> 00:15:58,750
one-year expedition and we have a unique

396
00:16:02,250 --> 00:16:00,250
opportunity that we're taking advantage

397
00:16:04,140 --> 00:16:02,260
of not only will we have a number of

398
00:16:06,930 --> 00:16:04,150
measures taken jointly on both scott

399
00:16:10,380 --> 00:16:06,940
kelly and victor Kornienko but Scott has

400
00:16:13,079 --> 00:16:10,390
a twin brother Mark Kelly and so mark

401
00:16:14,880 --> 00:16:13,089
will participate as a sort of a ground

402
00:16:17,120 --> 00:16:14,890
control to really help us understand

403
00:16:20,790 --> 00:16:17,130
this nature versus nurture question and

404
00:16:22,920 --> 00:16:20,800
a group of 10 really premier scientists

405
00:16:25,320 --> 00:16:22,930
at looking at the genetic basis of

406
00:16:26,430 --> 00:16:25,330
disease and the genetic basis of many of

407
00:16:28,860 --> 00:16:26,440
the different processes that affect

408
00:16:30,390 --> 00:16:28,870
astronauts have partnered in this twin

409
00:16:32,730 --> 00:16:30,400
study to really make it a

410
00:16:34,800 --> 00:16:32,740
state-of-the-art investigation of that

411
00:16:36,900 --> 00:16:34,810
interaction between genes and the space

412
00:16:40,140 --> 00:16:36,910
environment in affecting the health of

413
00:16:43,350 --> 00:16:40,150

astronauts for if I could have the next

414
00:16:44,910 --> 00:16:43,360
graphic for the past 15 years we have

415
00:16:46,680 --> 00:16:44,920
really learned a lot about long-duration

416
00:16:48,810 --> 00:16:46,690
spaceflight we've learned about the

417
00:16:51,360 --> 00:16:48,820
neurological system the heart bone

418
00:16:53,280 --> 00:16:51,370
muscle the immune system nutrition

419
00:16:55,970 --> 00:16:53,290
effects behavioral effects and radiation

420
00:16:58,290 --> 00:16:55,980
effects and all of those things kind of

421
00:17:00,060 --> 00:16:58,300
really affect the bodies of astronauts

422
00:17:01,800 --> 00:17:00,070
and they they push them towards

423
00:17:03,690 --> 00:17:01,810
something that looks not at all unlike

424
00:17:06,270 --> 00:17:03,700
aging on earth where their balance is

425
00:17:08,010 --> 00:17:06,280
disrupted their hearts are weaker their

426
00:17:09,630 --> 00:17:08,020
immune system isn't functioning as well

427
00:17:12,240 --> 00:17:09,640
their muscles are weaker and their bones

428
00:17:15,179 --> 00:17:12,250
are being lost and yet these are healthy

429
00:17:16,740 --> 00:17:15,189
people who otherwise would be probably

430
00:17:19,020 --> 00:17:16,750
some of the healthiest people back here

431
00:17:20,549 --> 00:17:19,030
on earth for their age and so we care

432
00:17:23,610 --> 00:17:20,559
about this both for future exploration

433
00:17:24,929 --> 00:17:23,620
but also because of these potential

434
00:17:27,480 --> 00:17:24,939
earth benefits from doing the research

435
00:17:29,669 --> 00:17:27,490
with the crew now we know a lot about

436
00:17:31,919 --> 00:17:29,679
six months but we know almost nothing

437
00:17:33,930 --> 00:17:31,929
about what happens between six and

438
00:17:36,750 --> 00:17:33,940

twelve months in space and if I could

439
00:17:39,150 --> 00:17:36,760
have the next graphic this is a highly

440
00:17:40,860 --> 00:17:39,160
simplified chart to kind of show you

441
00:17:43,230 --> 00:17:40,870
what we know about those effects on the

442
00:17:45,060 --> 00:17:43,240
body in from zero to six months and

443
00:17:46,440 --> 00:17:45,070
which is that vertical line in the

444
00:17:47,220 --> 00:17:46,450
middle and then from six to twelve

445
00:17:48,870 --> 00:17:47,230
months afterwards

446
00:17:50,850 --> 00:17:48,880
right now we know nothing about six to

447
00:17:52,530 --> 00:17:50,860
12 months so we see some things that

448
00:17:54,180 --> 00:17:52,540
have an early effect and then sort of

449
00:17:56,070 --> 00:17:54,190
stabilize we see some things with a

450
00:17:58,020 --> 00:17:56,080
constant rate either a high rate or a

451
00:17:59,669 --> 00:17:58,030
low rate and we understand how to manage

452
00:18:01,950 --> 00:17:59,679
those risks and we know which ones we

453
00:18:04,409 --> 00:18:01,960
need to work on before will be go for

454
00:18:06,480 --> 00:18:04,419
Mars but what we don't know is if there

455
00:18:09,090 --> 00:18:06,490
are some some processes that have a late

456
00:18:11,520 --> 00:18:09,100
effect the yellow line in that in that

457
00:18:14,070 --> 00:18:11,530
chart that late effect has things going

458
00:18:16,020 --> 00:18:14,080
up after six months but not looking like

459
00:18:17,669 --> 00:18:16,030
a problem before that and so this

460
00:18:19,260 --> 00:18:17,679
mission even though it's only two crew

461
00:18:21,780 --> 00:18:19,270
members it really gives us our first

462
00:18:23,430 --> 00:18:21,790
glimpse at what happens from six to

463
00:18:25,770 --> 00:18:23,440

twelve months and what risks are there

464
00:18:28,080 --> 00:18:25,780
that we don't know about today and then

465
00:18:30,600 --> 00:18:28,090
that will help us both to design future

466
00:18:33,690 --> 00:18:30,610
research too and also to identify those

467
00:18:35,250 --> 00:18:33,700
risks and then to define the future when

468
00:18:37,080 --> 00:18:35,260
your expeditions that we may need to do

469
00:18:39,470 --> 00:18:37,090
to make sure those risks have been taken

470
00:18:41,850 --> 00:18:39,480
care of and we're ready to go to Mars a

471
00:18:44,190 --> 00:18:41,860
couple examples of investigations that

472
00:18:46,590 --> 00:18:44,200
will be doing one investigation will be

473
00:18:48,510 --> 00:18:46,600
doing is called well two investigations

474
00:18:50,820 --> 00:18:48,520
really fluid shifts and ocular health

475
00:18:52,560 --> 00:18:50,830
and if I could have the video I have

476
00:18:55,289 --> 00:18:52,570
some graphics that kind of illustrate

477
00:18:57,570 --> 00:18:55,299
that problem so when astronauts go into

478
00:18:59,220 --> 00:18:57,580
space this is a person on earth where

479
00:19:01,860 --> 00:18:59,230
gravity is pulling the fluids in your

480
00:19:03,780 --> 00:19:01,870
body down towards your feet and you have

481
00:19:06,630 --> 00:19:03,790
that normal fluid movement at normal

482
00:19:08,460 --> 00:19:06,640
circulation but when astronauts go into

483
00:19:10,799 --> 00:19:08,470
space they don't have gravity pulling

484
00:19:12,330 --> 00:19:10,809
the fluids down anymore and so you start

485
00:19:14,159 --> 00:19:12,340
getting a shift of fluids to the head

486
00:19:16,289 --> 00:19:14,169
the crew members that we know well we

487
00:19:17,820 --> 00:19:16,299
see their faces looking puffy and we see

488
00:19:20,220 --> 00:19:17,830

their legs looking skinny and chicken

489
00:19:22,830 --> 00:19:20,230
legs we call it well once you get those

490
00:19:24,480 --> 00:19:22,840
fluids shifting into the head this is

491
00:19:25,890 --> 00:19:24,490
not without some impact and we've

492
00:19:28,590 --> 00:19:25,900
learned this over just the last couple

493
00:19:30,240 --> 00:19:28,600
of years that you also get an increase

494
00:19:32,400 --> 00:19:30,250
in the pressure in your brain called the

495
00:19:34,340 --> 00:19:32,410
intracranial pressure and that fluid

496
00:19:37,100 --> 00:19:34,350
pressure pushes on the back of the eye

497
00:19:39,570 --> 00:19:37,110
causes swelling of the optic nerve and

498
00:19:41,909 --> 00:19:39,580
compresses the eyeball well as you can

499
00:19:43,799 --> 00:19:41,919
imagine the eyeball is a really

500
00:19:45,390 --> 00:19:43,809
sophisticated imaging device and when

501
00:19:48,270 --> 00:19:45,400
you compress it you're going to start

502
00:19:52,049 --> 00:19:48,280
getting impacts on vision and so we see

503
00:19:54,000 --> 00:19:52,059
things like up to a 1.75 diopter shift

504
00:19:55,740 --> 00:19:54,010
in vision and that's simulated there

505
00:19:58,230 --> 00:19:55,750
it's basically high-powered reading

506
00:19:58,860 --> 00:19:58,240
glasses we also a few crew members have

507
00:20:00,750 --> 00:19:58,870
had things like

508
00:20:02,280 --> 00:20:00,760
cotton wool spots where certain parts of

509
00:20:04,440 --> 00:20:02,290
their retina have been damaged and they

510
00:20:06,540 --> 00:20:04,450
can't see as well there it but it

511
00:20:09,210 --> 00:20:06,550
doesn't happen to everybody and so the

512
00:20:11,100 --> 00:20:09,220
vision ocular health study is really

513
00:20:12,840 --> 00:20:11,110

taking measurements to understand why

514
00:20:14,250 --> 00:20:12,850
it's happening in crewmembers what the

515
00:20:16,460 --> 00:20:14,260
measurements are changing and you saw

516
00:20:19,410 --> 00:20:16,470
Karen Nyberg they're having a

517
00:20:21,600 --> 00:20:19,420
measurement taken on her I we also have

518
00:20:23,280 --> 00:20:21,610
a study to start understanding the real

519
00:20:25,350 --> 00:20:23,290
thing that's happening as the fluids

520
00:20:27,060 --> 00:20:25,360
move up and down in the body and this

521
00:20:29,640 --> 00:20:27,070
will be the most complicated experiment

522
00:20:31,169 --> 00:20:29,650
we've ever done on ISS and even more

523
00:20:33,450 --> 00:20:31,179
than that we'll be doing it with a

524
00:20:35,400 --> 00:20:33,460
combination of us and Russian equipment

525
00:20:37,410 --> 00:20:35,410
in the Russian segment with both Russian

526
00:20:39,270 --> 00:20:37,420
cosmonauts and astronauts participating

527
00:20:41,070 --> 00:20:39,280
as subjects and helping to set up and

528
00:20:43,710 --> 00:20:41,080
operate the experiment so it's gonna be

529
00:20:45,930 --> 00:20:43,720
a really exciting investigation we will

530
00:20:47,490 --> 00:20:45,940
use the Russian chivis which is a lower

531
00:20:49,560 --> 00:20:47,500
body negative pressure device to

532
00:20:51,150 --> 00:20:49,570
actually suck the fluids down into the

533
00:20:53,310 --> 00:20:51,160
crew members legs and then use our

534
00:20:55,560 --> 00:20:53,320
ultrasound and other equipment to make

535
00:20:57,060 --> 00:20:55,570
measurements on them and see what's

536
00:20:58,500 --> 00:20:57,070
happening with their blood vessels when

537
00:21:00,030 --> 00:20:58,510
what's happening with the fluid shifts

538
00:21:02,010 --> 00:21:00,040

so this is going to be a really novel

539
00:21:04,440 --> 00:21:02,020
investigation and give us some insights

540
00:21:07,730 --> 00:21:04,450
we've never had before into this overall

541
00:21:10,590 --> 00:21:07,740
fluid shift and and I impact problem

542
00:21:14,400 --> 00:21:10,600
another investigation that's part of the

543
00:21:16,320 --> 00:21:14,410
one your increment is called field test

544
00:21:18,450 --> 00:21:16,330
and this is not done on ISS but it's

545
00:21:20,549 --> 00:21:18,460
done on the ground in Kazakhstan after

546
00:21:22,410 --> 00:21:20,559
the crew members returned and it's

547
00:21:24,299 --> 00:21:22,420
looking at the practical tasks that

548
00:21:26,430 --> 00:21:24,309
astronauts would have to do after a

549
00:21:28,200 --> 00:21:26,440
transit to Mars things they would have

550
00:21:30,150 --> 00:21:28,210
to do right away when they land on Mars

551
00:21:32,100 --> 00:21:30,160
so you know right now when we land in

552
00:21:33,900 --> 00:21:32,110
Kazakhstan we've got a whole support

553
00:21:35,940 --> 00:21:33,910
network of people to help support the

554
00:21:37,290 --> 00:21:35,950
crew members but that first crew going

555
00:21:39,540 --> 00:21:37,300
to Mars is going to be all by themselves

556
00:21:41,580 --> 00:21:39,550
and so if I could have the next video

557
00:21:44,160 --> 00:21:41,590
I'll show you just some examples of the

558
00:21:46,980 --> 00:21:44,170
kinds of tasks one thing that crew

559
00:21:48,840 --> 00:21:46,990
members would have to do is get out of

560
00:21:50,100 --> 00:21:48,850
their seats or get get out of the

561
00:21:52,290 --> 00:21:50,110
protection that they've been in for

562
00:21:54,590 --> 00:21:52,300
pretty rough landing and they'll have to

563
00:21:57,360 --> 00:21:54,600

be able to jump out of a vehicle perhaps

564
00:21:59,760 --> 00:21:57,370
you know jumping down some stairs they

565
00:22:01,260 --> 00:21:59,770
might need to move some things around we

566
00:22:07,169 --> 00:22:01,270
call that rock translation with these

567
00:22:09,210 --> 00:22:07,179
different different barbells and so as

568
00:22:11,160 --> 00:22:09,220
you can imagine when crew members come

569
00:22:12,659 --> 00:22:11,170
back they have dizziness they have what

570
00:22:14,070 --> 00:22:12,669
we call orthostatic intolerance

571
00:22:15,269 --> 00:22:14,080
which means a tendency to want to faint

572
00:22:17,279 --> 00:22:15,279
because they're not used to having

573
00:22:19,950 --> 00:22:17,289
fluids back up back down in their feet

574
00:22:21,330 --> 00:22:19,960
and out of their head and here's some

575
00:22:22,889 --> 00:22:21,340
construction activities you might need

576
00:22:25,320 --> 00:22:22,899
to connect some valves together have

577
00:22:28,229 --> 00:22:25,330
everything ready to go to protect your

578
00:22:29,669 --> 00:22:28,239
life support system you're screwing

579
00:22:32,970 --> 00:22:29,679
things together bolting things together

580
00:22:35,039 --> 00:22:32,980
connecting tubes and using some tools

581
00:22:36,840 --> 00:22:35,049
and that crew members may have to do

582
00:22:39,119 --> 00:22:36,850
this when they're relatively dizzy

583
00:22:40,529 --> 00:22:39,129
possibly not feeling well their muscles

584
00:22:42,539 --> 00:22:40,539
may be weakened their bones maybe

585
00:22:45,029 --> 00:22:42,549
weekend they've just been on a transit

586
00:22:46,680 --> 00:22:45,039
in a very small compartment before they

587
00:22:48,840 --> 00:22:46,690
start doing these things they may need

588
00:22:52,109 --> 00:22:48,850

to open hatches and so you can see a

589
00:22:53,279 --> 00:22:52,119
torque generation activity and other

590
00:22:55,979 --> 00:22:53,289
things that the crew members will have

591
00:22:57,960 --> 00:22:55,989
to do while their whole sensory system

592
00:22:59,970 --> 00:22:57,970
adjusts to being in three-fifths gravity

593
00:23:01,919 --> 00:22:59,980
wearing heavy suits and really doing

594
00:23:03,359 --> 00:23:01,929
things quite differently and the final

595
00:23:05,879 --> 00:23:03,369
one I want to show you was a ladder

596
00:23:08,220 --> 00:23:05,889
climb test where the crews might need to

597
00:23:11,549 --> 00:23:08,230
climb into a vehicle or out of a vehicle

598
00:23:13,200 --> 00:23:11,559
or into a habitat so this is helping us

599
00:23:14,609 --> 00:23:13,210
and it's done completely jointly with

600
00:23:16,200 --> 00:23:14,619
our Russian colleagues and these are

601
00:23:19,409 --> 00:23:16,210
only a few of the types of measures that

602
00:23:21,239 --> 00:23:19,419
are made it's this is helping us to

603
00:23:23,369 --> 00:23:21,249
really work internationally to

604
00:23:24,779 --> 00:23:23,379
understand how the crew members could

605
00:23:26,129 --> 00:23:24,789
carry out the tests that need to be done

606
00:23:30,419 --> 00:23:26,139
on Mars and it really helps us prepare

607
00:23:32,249 --> 00:23:30,429
for a joint investigation but also if

608
00:23:34,919 --> 00:23:32,259
you look at these tasks these kinds of

609
00:23:36,779 --> 00:23:34,929
tasks are things that patients on earth

610
00:23:40,229 --> 00:23:36,789
who have say had a stroke or recovering

611
00:23:42,090 --> 00:23:40,239
from some kind of injury also need to do

612
00:23:44,399 --> 00:23:42,100
we we see patients in occupational

613
00:23:45,989 --> 00:23:44,409

therapy so what we learned from this is

614
00:23:48,690 --> 00:23:45,999
in someone who hasn't had a brain injury

615
00:23:49,859 --> 00:23:48,700
how can we retrain people who've lost

616
00:23:51,570 --> 00:23:49,869
the ability to do some of these things

617
00:23:53,759 --> 00:23:51,580
to do them well and are there things we

618
00:23:55,440 --> 00:23:53,769
can do even in the transit as we go to

619
00:23:57,509 --> 00:23:55,450
Mars to help prevent some of these

620
00:23:59,159 --> 00:23:57,519
impacts so even though we're focused on

621
00:24:01,229 --> 00:23:59,169
exploration in defining some of these

622
00:24:04,049 --> 00:24:01,239
tasks they also really benefit us back

623
00:24:06,869 --> 00:24:04,059
here on earth so just to wrap up we'll

624
00:24:09,659 --> 00:24:06,879
have between 400-500 investigations on

625
00:24:12,389 --> 00:24:09,669
ISS in the coming year about 380

626
00:24:13,739 --> 00:24:12,399
six-month period and many joint

627
00:24:15,090 --> 00:24:13,749
investigations with our Russian

628
00:24:18,060 --> 00:24:15,100
colleagues a level of collaboration

629
00:24:20,099 --> 00:24:18,070
across the whole ISS partnership of all

630
00:24:22,919 --> 00:24:20,109
16 nations that is higher than we've

631
00:24:24,839 --> 00:24:22,929
ever seen before and we're of course

632
00:24:26,400 --> 00:24:24,849
also having the astrophysics the

633
00:24:28,170 --> 00:24:26,410
physical sciences all kinds of things

634
00:24:30,270 --> 00:24:28,180
that I didn't talk about today but i

635
00:24:33,180 --> 00:24:30,280
think this theme on human health both of

636
00:24:35,400 --> 00:24:33,190
crews and of health back here on earth

637
00:24:36,690 --> 00:24:35,410
is a really important one and now hand

638
00:24:38,130 --> 00:24:36,700

it off to Steve to tell you a little bit

639
00:24:40,890 --> 00:24:38,140
about the health of the actual crew

640
00:24:43,620 --> 00:24:40,900
thank you appreciate the opportunity to

641
00:24:45,390 --> 00:24:43,630
talk this morning and I would add to my

642
00:24:47,490 --> 00:24:45,400
colleagues comments about the importance

643
00:24:50,220 --> 00:24:47,500
of this mission it'll provide us

644
00:24:52,140 --> 00:24:50,230
critical experience for planned future

645
00:24:54,750 --> 00:24:52,150
operations so that hopefully one day we

646
00:24:56,280 --> 00:24:54,760
can ask a crew member to stay for two

647
00:24:58,850 --> 00:24:56,290
years in space for three years in space

648
00:25:03,510 --> 00:24:58,860
depending on what the missions call for

649
00:25:05,490 --> 00:25:03,520
from the medical perspective the crew we

650
00:25:08,370 --> 00:25:05,500
start being involved with the crew about

651
00:25:10,890 --> 00:25:08,380
two years prior to their launch and I

652
00:25:12,720 --> 00:25:10,900
had some activities with Scott earlier

653
00:25:14,580 --> 00:25:12,730
this morning and I think nobody's

654
00:25:16,860 --> 00:25:14,590
happier than the crew to find out that

655
00:25:20,460 --> 00:25:16,870
they only have he only has like five

656
00:25:24,540 --> 00:25:20,470
activities left before he launches when

657
00:25:27,060 --> 00:25:24,550
you look at the total program of that

658
00:25:29,400 --> 00:25:27,070
two-year time period there's about 40

659
00:25:33,750 --> 00:25:29,410
hours of the equivalent of 40 hours of

660
00:25:36,240 --> 00:25:33,760
testing that we do and any body system

661
00:25:38,330 --> 00:25:36,250
you could think of we we have testing

662
00:25:41,580 --> 00:25:38,340
that we are interested in doing for that

663
00:25:46,020 --> 00:25:41,590

and so we have a few more activities

664
00:25:47,780 --> 00:25:46,030
before before launch and then as the

665
00:25:50,790 --> 00:25:47,790
science program will we'll be

666
00:25:54,180 --> 00:25:50,800
maintaining a comprehensive set of

667
00:25:56,700 --> 00:25:54,190
investigations during the flight to have

668
00:26:00,420 --> 00:25:56,710
a sense for how Scott's doing how his

669
00:26:06,200 --> 00:26:00,430
body systems are changing and eventually

670
00:26:08,670 --> 00:26:06,210
his preparedness for return to Earth and

671
00:26:10,890 --> 00:26:08,680
the additional comment I would make is

672
00:26:13,020 --> 00:26:10,900
as was talked about within the science

673
00:26:15,890 --> 00:26:13,030
program we have a unique opportunity on

674
00:26:20,040 --> 00:26:15,900
this mission because Scott has a twin to

675
00:26:21,960 --> 00:26:20,050
look very closely at the changes that

676
00:26:24,600 --> 00:26:21,970
the space environment provide while

677
00:26:28,730 --> 00:26:24,610
studying his brother who's staying on

678
00:26:31,410 --> 00:26:28,740
the ground while Scott's in space and I

679
00:26:33,360 --> 00:26:31,420
I don't have any other comments at this

680
00:26:35,230 --> 00:26:33,370
point the crew are doing well and

681
00:26:38,290 --> 00:26:35,240
looking forward to the mission and

682
00:26:41,620 --> 00:26:38,300
we're excited to be participating in

683
00:26:42,880 --> 00:26:41,630
this all right thanks Steve and thanks

684
00:26:45,190 --> 00:26:42,890
for everybody for your opening

685
00:26:46,660 --> 00:26:45,200
statements now time for questions we're

686
00:26:48,610 --> 00:26:46,670
going to start off on anybody here in

687
00:26:49,990 --> 00:26:48,620
the room that has a question and we'll

688
00:26:51,340 --> 00:26:50,000

go to our phone bridge and then we'll

689
00:26:53,560 --> 00:26:51,350
take some of our questions out of that

690
00:26:55,000 --> 00:26:53,570
we're getting in from social media so

691
00:26:56,290 --> 00:26:55,010
just like i read i'm going to go left to

692
00:26:57,580 --> 00:26:56,300
right so if you would raise your hand

693
00:27:05,500 --> 00:26:57,590
and again please state your name

694
00:27:07,240 --> 00:27:05,510
affiliation Eric ok Eric burger with the

695
00:27:09,640 --> 00:27:07,250
Houston Chronicle question for Mike and

696
00:27:12,549 --> 00:27:09,650
then the question probably for Ben for

697
00:27:15,250 --> 00:27:12,559
Julie some are suitable to your mission

698
00:27:17,680 --> 00:27:15,260
obviously so they didn't space of it on

699
00:27:19,510 --> 00:27:17,690
the ground do you have any plans or

700
00:27:21,280 --> 00:27:19,520
would it be possible to an 18 year or

701
00:27:23,860 --> 00:27:21,290
two year mission on the ISS we thought

702
00:27:26,220 --> 00:27:23,870
about that or talk about that we have

703
00:27:29,490 --> 00:27:26,230
not talked about it we certainly could

704
00:27:31,330 --> 00:27:29,500
this is sort of a stepwise approach

705
00:27:33,160 --> 00:27:31,340
there's a number of things you use

706
00:27:37,330 --> 00:27:33,170
station for and this is one of them

707
00:27:39,040 --> 00:27:37,340
courses to study the human adaptation to

708
00:27:42,700 --> 00:27:39,050
a microgravity environment in the entire

709
00:27:45,910 --> 00:27:42,710
environment that that space is relative

710
00:27:47,830 --> 00:27:45,920
to living here on earth so I think the

711
00:27:49,660 --> 00:27:47,840
first step of doing one year missions to

712
00:27:52,090 --> 00:27:49,670
kind of see where that knee and the

713
00:27:54,220 --> 00:27:52,100

curve is like Julie talked about is very

714
00:27:55,750 --> 00:27:54,230
important and I think that's the way

715
00:27:57,520 --> 00:27:55,760
we'll handle it will look to see what

716
00:27:59,770 --> 00:27:57,530
happens in a year if we get indications

717
00:28:01,750 --> 00:27:59,780
that things are changing or were

718
00:28:03,970 --> 00:28:01,760
unstable and and we need to spend more

719
00:28:05,620 --> 00:28:03,980
time on orbit than I suspect that we'll

720
00:28:07,840 --> 00:28:05,630
have a conversation about extending that

721
00:28:09,520 --> 00:28:07,850
a little bit a little bit so from a

722
00:28:12,220 --> 00:28:09,530
station standpoint there's really no

723
00:28:14,650 --> 00:28:12,230
limitation we can we can have a limited

724
00:28:16,150 --> 00:28:14,660
set of the crews stay for extended

725
00:28:18,600 --> 00:28:16,160
period of time we could have the entire

726
00:28:20,830 --> 00:28:18,610
crew stay for an extended period of time

727
00:28:22,720 --> 00:28:20,840
if we thought that was appropriate and

728
00:28:26,740 --> 00:28:22,730
this again the system doesn't really

729
00:28:28,780 --> 00:28:26,750
prevent that there's limitations on the

730
00:28:32,260 --> 00:28:28,790
transportation spacecraft for the crew

731
00:28:34,330 --> 00:28:32,270
that we'd have to replace every so often

732
00:28:35,560 --> 00:28:34,340
and we've done that in the past so

733
00:28:37,570 --> 00:28:35,570
that's not a big deal and it's just

734
00:28:40,510 --> 00:28:37,580
about having the logistics on orbit for

735
00:28:43,299 --> 00:28:40,520
the crew to perform so there really is

736
00:28:45,159 --> 00:28:43,309
no limitation on the station to to keep

737
00:28:47,160 --> 00:28:45,169
us from extending the crews time even

738
00:28:48,540 --> 00:28:47,170

longer on orbit but we have not really

739
00:28:52,110 --> 00:28:48,550
discuss that with the partnership at

740
00:28:54,390 --> 00:28:52,120
this point kind of dated Roscosmos

741
00:28:58,770 --> 00:28:54,400
collect in the 1990s on their one-year

742
00:29:01,020 --> 00:28:58,780
missions or their 438 day missions was

743
00:29:03,260 --> 00:29:01,030
it useful have you guys and they shared

744
00:29:07,080 --> 00:29:03,270
it with you as part of the partnership

745
00:29:10,410 --> 00:29:07,090
and in terms of sort of i mean we with

746
00:29:11,940 --> 00:29:10,420
the tools and sensors and computers will

747
00:29:13,950 --> 00:29:11,950
be able to get like ten times as much

748
00:29:15,780 --> 00:29:13,960
data are just sort of how much more

749
00:29:17,790 --> 00:29:15,790
useful is it going to be to sort of be

750
00:29:21,030 --> 00:29:17,800
doing this now versus what was collected

751
00:29:23,100 --> 00:29:21,040
maybe 15 or 20 years ago yeah so rest

752
00:29:24,480 --> 00:29:23,110
cosmos has shared both some of the

753
00:29:26,640 --> 00:29:24,490
unpublished data with us they've also

754
00:29:28,920 --> 00:29:26,650
published several volumes of data from

755
00:29:30,030 --> 00:29:28,930
mirror that explained in the data that

756
00:29:32,760 --> 00:29:30,040
they've observed in terms of

757
00:29:36,270 --> 00:29:32,770
deconditioning and so forth at the time

758
00:29:38,220 --> 00:29:36,280
the standard would be making fairly

759
00:29:39,450 --> 00:29:38,230
observational measurements about you

760
00:29:41,190 --> 00:29:39,460
know how well the crew was able to

761
00:29:44,220 --> 00:29:41,200
exercise how strong they were when they

762
00:29:46,320 --> 00:29:44,230
returned to earth so they're very basic

763
00:29:47,910 --> 00:29:46,330

kinds of measures that are in in that

764
00:29:50,460 --> 00:29:47,920
data so they're useful but they're very

765
00:29:51,930 --> 00:29:50,470
basic and there's only a handful of data

766
00:29:55,290 --> 00:29:51,940
points or handful of crew members with

767
00:29:58,530 --> 00:29:55,300
that data so what what we're seeing now

768
00:30:00,470 --> 00:29:58,540
is we're working with them to look at

769
00:30:02,790 --> 00:30:00,480
everything we know from six months and

770
00:30:05,250 --> 00:30:02,800
where we should go from there so for

771
00:30:07,230 --> 00:30:05,260
example neither NASA nor Rose cosmos

772
00:30:09,360 --> 00:30:07,240
knew back in those days that there would

773
00:30:10,830 --> 00:30:09,370
be I impacts the the stuff I talked

774
00:30:12,900 --> 00:30:10,840
about with vision has been discovered

775
00:30:14,250 --> 00:30:12,910
just in the last three years only when

776
00:30:17,220 --> 00:30:14,260
you had a large number of crew members

777
00:30:20,880 --> 00:30:17,230
doing long-duration missions another

778
00:30:22,620 --> 00:30:20,890
example is I think from mere data

779
00:30:25,260 --> 00:30:22,630
because of the exercise hardware they

780
00:30:26,760 --> 00:30:25,270
had we mostly thought and they're under

781
00:30:28,710 --> 00:30:26,770
Russian colleagues mostly thought that

782
00:30:30,000 --> 00:30:28,720
running on a treadmill was the most

783
00:30:31,760 --> 00:30:30,010
important thing to do and it is

784
00:30:33,600 --> 00:30:31,770
certainly important for cardiovascular

785
00:30:36,540 --> 00:30:33,610
for maintaining your cardiovascular

786
00:30:39,030 --> 00:30:36,550
fitness but what we found on ISS is that

787
00:30:41,070 --> 00:30:39,040
intensive resistive exercise is what

788
00:30:43,050 --> 00:30:41,080

really helps to protect bone so all of

789
00:30:45,390 --> 00:30:43,060
that knowledge is going into these joint

790
00:30:46,770 --> 00:30:45,400
investigations I think they're about 15

791
00:30:48,210 --> 00:30:46,780
different investigations that we're

792
00:30:51,300 --> 00:30:48,220
collaborating with our Russian

793
00:30:53,010 --> 00:30:51,310
colleagues on exchanging data and even

794
00:30:54,780 --> 00:30:53,020
comparing investigations that we've been

795
00:30:56,220 --> 00:30:54,790
doing on six months with investigations

796
00:30:58,260 --> 00:30:56,230
they've been doing on six-month crew

797
00:30:59,100 --> 00:30:58,270
putting that all together with 12 months

798
00:31:01,020 --> 00:30:59,110
of data and then

799
00:31:02,669 --> 00:31:01,030
able to compare six month versus 12

800
00:31:04,470 --> 00:31:02,679
months and so that makes even though we

801
00:31:06,000 --> 00:31:04,480
only have two crew members it makes it

802
00:31:07,470 --> 00:31:06,010
much more powerful when they do the same

803
00:31:09,690 --> 00:31:07,480
investigations that we have really

804
00:31:14,549 --> 00:31:09,700
strong data on for many crew members in

805
00:31:18,000 --> 00:31:14,559
six months see this dense forest even

806
00:31:19,830 --> 00:31:18,010
can you give us a sense of what Scott

807
00:31:21,210 --> 00:31:19,840
Kelly will experience on a weekly based

808
00:31:23,190 --> 00:31:21,220
on what sort of data would you be

809
00:31:24,840 --> 00:31:23,200
clicking every day what stuff is every

810
00:31:27,360 --> 00:31:24,850
week or every month or how does that

811
00:31:29,070 --> 00:31:27,370
just a sense of what he's going to have

812
00:31:34,320 --> 00:31:29,080
to do collected data that you guys

813
00:31:37,950 --> 00:31:34,330

looking for it's it's a good question on

814
00:31:40,380 --> 00:31:37,960
a weekly basis we Scott will have a

815
00:31:43,350 --> 00:31:40,390
science program that's being implemented

816
00:31:47,490 --> 00:31:43,360
and so those those activities typically

817
00:31:50,880 --> 00:31:47,500
have to occur at identified times during

818
00:31:52,799 --> 00:31:50,890
the flight the other things that he'll

819
00:31:54,659 --> 00:31:52,809
do for us is we have a weekly medical

820
00:31:56,549 --> 00:31:54,669
conference with them and just to kind of

821
00:31:59,490 --> 00:31:56,559
get a sense for how he's doing in that

822
00:32:02,810 --> 00:31:59,500
regard and many of our activities from

823
00:32:05,820 --> 00:32:02,820
from the medical system side are are

824
00:32:07,590 --> 00:32:05,830
geared towards a monthly monthly type

825
00:32:11,360 --> 00:32:07,600
evaluation for example we would check

826
00:32:14,010 --> 00:32:11,370
his exercise capacity that type of thing

827
00:32:15,510 --> 00:32:14,020
the other thing that the crew are doing

828
00:32:18,680 --> 00:32:15,520
on a daily but they're there they're

829
00:32:21,270 --> 00:32:18,690
doing things on a daily basis to help

830
00:32:23,130 --> 00:32:21,280
maintain their health status and

831
00:32:24,870 --> 00:32:23,140
primarily that's the exercise system

832
00:32:27,150 --> 00:32:24,880
they have approximately two to

833
00:32:31,220 --> 00:32:27,160
two-and-a-half hours a day to do

834
00:32:35,100 --> 00:32:31,230
exercise and so we use we use a suite of

835
00:32:36,690 --> 00:32:35,110
activities to monitor the crew we do a

836
00:32:38,580 --> 00:32:36,700
little bit of telemedicine to kind of

837
00:32:42,060 --> 00:32:38,590
keep their status and then there's a lot

838
00:32:45,090 --> 00:32:42,070

of one of the things to as a follow-on

839
00:32:47,130 --> 00:32:45,100
to the previous question is we now have

840
00:32:50,000 --> 00:32:47,140
on board in contrast to mirror we have a

841
00:32:53,870 --> 00:32:50,010
lot more sophisticated imaging

842
00:32:56,880 --> 00:32:53,880
capability so we have ultrasounds

843
00:32:59,070 --> 00:32:56,890
complicated gear to you know get very

844
00:33:01,980 --> 00:32:59,080
detailed images of the back of the eyes

845
00:33:03,750 --> 00:33:01,990
for examples and so those things will be

846
00:33:04,190 --> 00:33:03,760
done on a regular basis so that we can

847
00:33:06,560 --> 00:33:04,200
monitor

848
00:33:09,320 --> 00:33:06,570
are the chain any changes throughout the

849
00:33:11,210 --> 00:33:09,330
play is there any changes to his

850
00:33:12,169 --> 00:33:11,220
predicted exercise regimen over a year

851
00:33:16,210 --> 00:33:12,179
is it pretty much the same thing

852
00:33:19,070 --> 00:33:16,220
throughout depending on how it goes um

853
00:33:21,320 --> 00:33:19,080
the short answer is we're planning to do

854
00:33:23,690 --> 00:33:21,330
something akin to what they would do

855
00:33:27,320 --> 00:33:23,700
during a six-month mission so we the

856
00:33:29,269 --> 00:33:27,330
what the acers or the trainers recommend

857
00:33:31,940 --> 00:33:29,279
for the crew is they'll generally put

858
00:33:34,129 --> 00:33:31,950
them through a few plateaus basically so

859
00:33:36,019 --> 00:33:34,139
you pick them up and let them relax a

860
00:33:37,519 --> 00:33:36,029
little bit and pick them back up and let

861
00:33:40,820 --> 00:33:37,529
them relax a bit and you're trying to

862
00:33:42,440 --> 00:33:40,830
get them to their fitness level ideally

863
00:33:46,610 --> 00:33:42,450

try to get them to their fitness level

864
00:33:48,129 --> 00:33:46,620
at the time that they launched so hi

865
00:33:51,830 --> 00:33:48,139
Robert problem with collectspace.com

866
00:33:55,100 --> 00:33:51,840
with a question and follow-up for Mike

867
00:33:57,049 --> 00:33:55,110
the from a program perspective in terms

868
00:33:58,639 --> 00:33:57,059
of supporting a six-member crew on

869
00:34:01,580 --> 00:33:58,649
station are there any significant

870
00:34:03,549 --> 00:34:01,590
differences to keeping two people the

871
00:34:07,279 --> 00:34:03,559
same few people on board for a full year

872
00:34:09,889 --> 00:34:07,289
versus swapping about six months is

873
00:34:14,899 --> 00:34:09,899
there any specific challenges for a 40

874
00:34:17,569 --> 00:34:14,909
one-year mission really there's not the

875
00:34:20,210 --> 00:34:17,579
biggest challenge when you rotate crews

876
00:34:22,399 --> 00:34:20,220
differently is to sort out how you're

877
00:34:24,559 --> 00:34:22,409
going to do that and you can kind of see

878
00:34:27,260 --> 00:34:24,569
that on what we call the a line where we

879
00:34:30,470 --> 00:34:27,270
fly to Russians and one US crew member

880
00:34:32,359 --> 00:34:30,480
on the Soyuz of light and you can see

881
00:34:35,300 --> 00:34:32,369
about halfway through the one-year

882
00:34:38,180 --> 00:34:35,310
mission they're going to rotate the

883
00:34:40,639 --> 00:34:38,190
Soyuz and rotate commanders so all that

884
00:34:42,579 --> 00:34:40,649
had to be worked out and now we end up

885
00:34:44,540 --> 00:34:42,589
with a taxi flight and there's the

886
00:34:45,859 --> 00:34:44,550
decisions on who's going to fly on that

887
00:34:49,129 --> 00:34:45,869
flight and how you're going to deal with

888
00:34:51,859 --> 00:34:49,139

the taxi crew members but the operation

889
00:34:54,500 --> 00:34:51,869
of the station the logistics the science

890
00:34:56,180 --> 00:34:54,510
all that is the you know it's the same

891
00:35:00,640 --> 00:34:56,190
thing we kind of do on a regular basis

892
00:35:04,200 --> 00:35:00,650
and Julie mentioned this is a peak for

893
00:35:06,450 --> 00:35:04,210
for joint operations between

894
00:35:09,120 --> 00:35:06,460
the United States we're going on the

895
00:35:10,710 --> 00:35:09,130
15th anniversary of human continuous

896
00:35:12,510 --> 00:35:10,720
occupancy of the station there's been

897
00:35:15,120 --> 00:35:12,520
cosmonauts and astronauts onboard all

898
00:35:18,750 --> 00:35:15,130
that time why was it why is it take

899
00:35:22,200 --> 00:35:18,760
until now to this mission to encourage

900
00:35:25,230 --> 00:35:22,210
increased joint cooperation on science

901
00:35:27,810 --> 00:35:25,240
activities on the station well as the

902
00:35:29,760 --> 00:35:27,820
excellent question so from a research

903
00:35:32,700 --> 00:35:29,770
perspective we have been collaborating

904
00:35:35,070 --> 00:35:32,710
with the partners for many many years

905
00:35:39,000 --> 00:35:35,080
even well before the International Space

906
00:35:42,150 --> 00:35:39,010
Station program and as such if you look

907
00:35:45,079 --> 00:35:42,160
across the rest of the partners other

908
00:35:48,510 --> 00:35:45,089
than Russians you'll see a fairly large

909
00:35:50,550 --> 00:35:48,520
collaboration in research a Russian

910
00:35:53,040 --> 00:35:50,560
colleagues came in later and so it's

911
00:35:54,900 --> 00:35:53,050
taken us some time to get familiar with

912
00:35:56,490 --> 00:35:54,910
each other what we do what kind of work

913
00:35:58,349 --> 00:35:56,500

how we handle research how we choose

914
00:35:59,579 --> 00:35:58,359
research how we do our research on orbit

915
00:36:03,060 --> 00:35:59,589
how do you share the research when

916
00:36:05,040 --> 00:36:03,070
you're done and so it's taken up to

917
00:36:09,109 --> 00:36:05,050
about this period we it's it's been a

918
00:36:11,160 --> 00:36:09,119
it's been a slow methodical process of

919
00:36:14,880 --> 00:36:11,170
trying to get comfortable enough with

920
00:36:17,099 --> 00:36:14,890
what how each side does certain types of

921
00:36:19,829 --> 00:36:17,109
research and how you might collaborate

922
00:36:21,450 --> 00:36:19,839
till we've come to this point and

923
00:36:23,670 --> 00:36:21,460
honestly kind of use it as a forcing

924
00:36:26,339 --> 00:36:23,680
function to say okay this this is we

925
00:36:28,620 --> 00:36:26,349
can't really have everybody using the

926
00:36:31,620 --> 00:36:28,630
crews separately particularly when we

927
00:36:37,410 --> 00:36:31,630
have two crew members one's Russian and

928
00:36:39,780 --> 00:36:37,420
ones us crew member and the way we do

929
00:36:42,030 --> 00:36:39,790
research today or often up into this

930
00:36:43,859 --> 00:36:42,040
point is a lot of the russian research

931
00:36:45,870 --> 00:36:43,869
was done on russian crew members a lot

932
00:36:48,089 --> 00:36:45,880
of the US researchers done the US crew

933
00:36:50,640 --> 00:36:48,099
members but now we only have two crew

934
00:36:52,500 --> 00:36:50,650
members and we wanted to make sure that

935
00:36:54,750 --> 00:36:52,510
they were treated as identically as

936
00:36:56,339 --> 00:36:54,760
possible so we can all use two data

937
00:36:58,500 --> 00:36:56,349
points instead of each of us use a

938
00:37:00,660 --> 00:36:58,510

single data point and so that kind of

939
00:37:03,170 --> 00:37:00,670
forced the whole system to collaborate

940
00:37:06,150 --> 00:37:03,180
on this research and it really has set

941
00:37:08,700 --> 00:37:06,160
the process is in place for us to do

942
00:37:10,800 --> 00:37:08,710
future collaborations so it's been

943
00:37:12,800 --> 00:37:10,810
beneficial for us of course is you can

944
00:37:15,790 --> 00:37:12,810
imagine it takes time this has been a

945
00:37:18,430 --> 00:37:15,800
you know two year process of

946
00:37:20,950 --> 00:37:18,440
how when we collaborate it was a it was

947
00:37:22,780 --> 00:37:20,960
a criteria to agreeing to do this that

948
00:37:25,120 --> 00:37:22,790
since the two crew members were from

949
00:37:28,240 --> 00:37:25,130
different countries we had to share the

950
00:37:30,250 --> 00:37:28,250
data and we had to collaborate and so it

951
00:37:32,370 --> 00:37:30,260
became our forcing function so after the

952
00:37:35,170 --> 00:37:32,380
last over the last couple years we have

953
00:37:36,550 --> 00:37:35,180
collaborated on this and started to work

954
00:37:39,840 --> 00:37:36,560
towards other areas where we can

955
00:37:43,180 --> 00:37:39,850
collaborate and also fix the the

956
00:37:44,740 --> 00:37:43,190
processes the wrong word you know the

957
00:37:46,960 --> 00:37:44,750
best way to collaborate is that the

958
00:37:48,430 --> 00:37:46,970
early stages of selecting the researcher

959
00:37:50,770 --> 00:37:48,440
going to go do that's where you really

960
00:37:52,900 --> 00:37:50,780
figure out where the pis are and how

961
00:37:55,060 --> 00:37:52,910
they're going to work together and so

962
00:37:57,550 --> 00:37:55,070
this is the probably the most difficult

963
00:38:00,310 --> 00:37:57,560

step of collaborating on or truly

964
00:38:01,570 --> 00:38:00,320
collaborating on orbitz the way we do

965
00:38:03,460 --> 00:38:01,580
today with some of the other partners

966
00:38:06,400 --> 00:38:03,470
and so that's being looked at today

967
00:38:08,050 --> 00:38:06,410
because of what we've been through with

968
00:38:09,760 --> 00:38:08,060
this winning increment so I tell you it

969
00:38:10,840 --> 00:38:09,770
takes time to really get to know each

970
00:38:13,090 --> 00:38:10,850
other enough to figure out how to

971
00:38:15,850 --> 00:38:13,100
collaborate and then it takes sort of a

972
00:38:17,650 --> 00:38:15,860
forcing function and so we're just we're

973
00:38:19,210 --> 00:38:17,660
in a different place with the Russian

974
00:38:22,090 --> 00:38:19,220
our Russian partners than we are with

975
00:38:27,160 --> 00:38:22,100
the with our European partners but now

976
00:38:31,300 --> 00:38:27,170
we're starting to get there thank you

977
00:38:34,840 --> 00:38:31,310
Mark Karev for addition we have a couple

978
00:38:36,880 --> 00:38:34,850
of questions Mike suffered a knee as I

979
00:38:39,490 --> 00:38:36,890
listened to the agenda of activities it

980
00:38:42,820 --> 00:38:39,500
seems very vicious for the next year as

981
00:38:45,620 --> 00:38:42,830
you said so how crucial is it that the

982
00:38:53,790 --> 00:38:51,690
providers provide on time it's all my

983
00:38:55,650 --> 00:38:53,800
specific for the logistics providers yes

984
00:38:57,210 --> 00:38:55,660
opposed to the committee really I mean a

985
00:38:59,910 --> 00:38:57,220
lot of people are involved on the ground

986
00:39:01,859 --> 00:38:59,920
in space you've got to move stuff back

987
00:39:05,280 --> 00:39:01,869
and forth I'm just trying to get a sense

988
00:39:07,770 --> 00:39:05,290

of how crucial you perceive it to be

989
00:39:09,510 --> 00:39:07,780
that that they can show up and bring

990
00:39:13,950 --> 00:39:09,520
stuff back and all that other stuff that

991
00:39:16,950 --> 00:39:13,960
makes it work well it's the logistics

992
00:39:18,089 --> 00:39:16,960
guys are the key to us being able to do

993
00:39:22,680 --> 00:39:18,099
what we do on orbit I mean it's

994
00:39:26,160 --> 00:39:22,690
fundamentally that's the case so you can

995
00:39:28,109 --> 00:39:26,170
talk about wind providers might show up

996
00:39:30,750 --> 00:39:28,119
and if they slip a little bit you can

997
00:39:33,960 --> 00:39:30,760
talk about which providers as we know

998
00:39:36,030 --> 00:39:33,970
SpaceX brings back recoverable down mass

999
00:39:38,240 --> 00:39:36,040
a significant amount of recoverable

1000
00:39:40,230 --> 00:39:38,250
condition down mass which is significant

1001
00:39:42,720 --> 00:39:40,240
so you could talk about whether that's

1002
00:39:44,820 --> 00:39:42,730
there or slipping or not but it's it's

1003
00:39:48,240 --> 00:39:44,830
just crucial we can't we can't operate

1004
00:39:51,390 --> 00:39:48,250
without the logistics Partners so with

1005
00:39:57,060 --> 00:39:51,400
the orbital stand down for a bit we had

1006
00:40:00,630 --> 00:39:57,070
we basically lost 2.4 2.3 metric tons of

1007
00:40:03,210 --> 00:40:00,640
cargo that we had planned for so now

1008
00:40:05,550 --> 00:40:03,220
we're adjusting for that which is we can

1009
00:40:07,200 --> 00:40:05,560
do that's not a huge issue because of

1010
00:40:10,890 --> 00:40:07,210
how we protect ourselves on orbit with

1011
00:40:12,810 --> 00:40:10,900
the the gap that we protect for and then

1012
00:40:15,120 --> 00:40:12,820
as I I mentioned when we talked about

1013
00:40:18,420 --> 00:40:15,130

the SpaceX 5 we've made some adjustments

1014
00:40:20,579 --> 00:40:18,430
in that manifest and we protecting

1015
00:40:22,740 --> 00:40:20,589
really closer to four months gap on

1016
00:40:24,710 --> 00:40:22,750
orbit instead of six so we've made some

1017
00:40:27,300 --> 00:40:24,720
adjustments so it's not as big a deal

1018
00:40:28,890 --> 00:40:27,310
from a research impact although it has

1019
00:40:31,140 --> 00:40:28,900
and then we're trying to pull these

1020
00:40:33,089 --> 00:40:31,150
other flights up we're doing all that

1021
00:40:34,710 --> 00:40:33,099
because we need to do it that way in

1022
00:40:37,260 --> 00:40:34,720
order to continue to have a robust

1023
00:40:39,300 --> 00:40:37,270
research plan and to get all of the

1024
00:40:40,589 --> 00:40:39,310
other things we need to get done of

1025
00:40:42,720 --> 00:40:40,599
course there's quite a bit of about mass

1026
00:40:45,060 --> 00:40:42,730
for the reconfiguration that we have to

1027
00:40:47,010 --> 00:40:45,070
go do that has to show up and it's not

1028
00:40:48,960 --> 00:40:47,020
all in orbit today some of it has to

1029
00:40:50,700 --> 00:40:48,970
come up here and in the next few months

1030
00:40:52,589 --> 00:40:50,710
to get the reconfiguration certainly the

1031
00:40:56,190 --> 00:40:52,599
the docking adapter itself has to come

1032
00:40:58,020 --> 00:40:56,200
up on SpaceX seven so you know that's

1033
00:40:58,589 --> 00:40:58,030
critical I mean we can't we can't live

1034
00:41:00,569 --> 00:40:58,599
without it

1035
00:41:06,930 --> 00:41:00,579
so we're working very closely with

1036
00:41:09,779 --> 00:41:06,940
SpaceX to fly as close to the times that

1037
00:41:11,519 --> 00:41:09,789
we have on our manifest today of course

1038
00:41:13,109 --> 00:41:11,529

they agree to the manifest but things

1039
00:41:15,630 --> 00:41:13,119
happen and you know there's a lot of

1040
00:41:17,309 --> 00:41:15,640
other vehicles flying and so they're

1041
00:41:18,960 --> 00:41:17,319
very attended to that and working very

1042
00:41:20,299 --> 00:41:18,970
closely with us to try to keep their

1043
00:41:22,410 --> 00:41:20,309
schedule they're looking at these

1044
00:41:23,819 --> 00:41:22,420
flights later in the year to see how

1045
00:41:26,819 --> 00:41:23,829
much we might be able to pull them up

1046
00:41:28,589 --> 00:41:26,829
and then our job is to maintain the

1047
00:41:30,329 --> 00:41:28,599
flexibility so that when they move a

1048
00:41:32,670 --> 00:41:30,339
little bit it's not it's not a huge

1049
00:41:35,099 --> 00:41:32,680
impact us but they do need to show up

1050
00:41:38,670 --> 00:41:35,109
for sure and if they move to the right a

1051
00:41:41,670 --> 00:41:38,680
little bit then we'll be okay if I could

1052
00:41:45,259 --> 00:41:41,680
follow could you just touch on the

1053
00:41:49,710 --> 00:41:45,269
cooling and that's going at this point

1054
00:41:51,450 --> 00:41:49,720
um yeah since I spent most of my life

1055
00:41:54,569 --> 00:41:51,460
yesterday on that I probably could

1056
00:41:56,849 --> 00:41:54,579
touching a little bit the core similarly

1057
00:41:58,200 --> 00:41:56,859
does this 24 hours a day I just visit

1058
00:42:03,150 --> 00:41:58,210
every so often when things get

1059
00:42:06,539 --> 00:42:03,160
interesting the so we've course it was

1060
00:42:09,719 --> 00:42:06,549
not an ammonia leak we have recovered

1061
00:42:13,410 --> 00:42:09,729
cooling inside and and reconfigured the

1062
00:42:15,509 --> 00:42:13,420
systems largely they're all back up and

1063
00:42:18,450 --> 00:42:15,519

running but there's a significant

1064
00:42:20,549 --> 00:42:18,460
challenge when you bring up the ammonia

1065
00:42:22,559 --> 00:42:20,559
system outside because you can freeze

1066
00:42:24,269 --> 00:42:22,569
the heat exchangers there's water on one

1067
00:42:29,450 --> 00:42:24,279
side heat exchanger ammonia on the other

1068
00:42:32,579 --> 00:42:29,460
so just the phase of the ammonia alone

1069
00:42:34,200 --> 00:42:32,589
can put you in a case where you end up

1070
00:42:36,900 --> 00:42:34,210
with bubbles and then you end up

1071
00:42:40,680 --> 00:42:36,910
freezing water in the and the heat

1072
00:42:42,930 --> 00:42:40,690
exchangers and so it's it's been an

1073
00:42:44,700 --> 00:42:42,940
interesting experience for us since

1074
00:42:46,799 --> 00:42:44,710
we've flown space stations we kind of

1075
00:42:49,440 --> 00:42:46,809
learned how difficult this can be and

1076
00:42:51,299 --> 00:42:49,450
how you protect for it so it takes time

1077
00:42:53,339 --> 00:42:51,309
to get the conditions right on both

1078
00:42:55,259 --> 00:42:53,349
sides of the heat exchanger each of the

1079
00:42:57,450 --> 00:42:55,269
heat exchangers more than one to make

1080
00:42:58,829 --> 00:42:57,460
sure that as we introduce ammonia if the

1081
00:43:00,420 --> 00:42:58,839
ammonia is at the right temperature such

1082
00:43:02,549 --> 00:43:00,430
it won't freeze water on the other side

1083
00:43:04,559 --> 00:43:02,559
and you have to do that not only for the

1084
00:43:06,529 --> 00:43:04,569
41 heat exchanger you've got to do it

1085
00:43:09,779 --> 00:43:06,539
for all the heat exchangers in that loop

1086
00:43:12,030 --> 00:43:09,789
so we're not really pushed for time we

1087
00:43:15,750 --> 00:43:12,040
got plenty of cooling on the a side

1088
00:43:17,820 --> 00:43:15,760

and the systems are doing fine so so

1089
00:43:20,850 --> 00:43:17,830
we've asked the team to be very

1090
00:43:23,100 --> 00:43:20,860
methodical and and and bring the loops

1091
00:43:25,770 --> 00:43:23,110
on when you're ready of course to add a

1092
00:43:28,050 --> 00:43:25,780
little interest to our lives late

1093
00:43:30,600 --> 00:43:28,060
yesterday we had an MDM go down that

1094
00:43:35,550 --> 00:43:30,610
gives us insight into the loop beat some

1095
00:43:37,260 --> 00:43:35,560
of the systems we recovered that MDM and

1096
00:43:40,890 --> 00:43:37,270
it turned out it had an error counter on

1097
00:43:42,570 --> 00:43:40,900
it that was counting up and we found I

1098
00:43:44,550 --> 00:43:42,580
guess we got it recovered it was going

1099
00:43:46,200 --> 00:43:44,560
fine and we noticed this morning the air

1100
00:43:48,150 --> 00:43:46,210
counter now has started counting up

1101
00:43:51,510 --> 00:43:48,160
again which means eventually it's going

1102
00:43:53,190 --> 00:43:51,520
to run into this ADA issue so that just

1103
00:43:55,320 --> 00:43:53,200
to add interest the team is now

1104
00:43:57,000 --> 00:43:55,330
calculating when the error counter will

1105
00:43:58,830 --> 00:43:57,010
time out and then we're trying to plan

1106
00:44:00,300 --> 00:43:58,840
our ops around when the eight and the

1107
00:44:02,730 --> 00:44:00,310
counter will time out so that we can

1108
00:44:05,400 --> 00:44:02,740
recover the MDM so that was just it

1109
00:44:07,860 --> 00:44:05,410
that's just add interest so it'll take

1110
00:44:10,350 --> 00:44:07,870
us a little bit of time and we're doing

1111
00:44:13,620 --> 00:44:10,360
that on purpose if the a side went down

1112
00:44:15,600 --> 00:44:13,630
we'd suddenly do it a lot quicker and

1113
00:44:19,470 --> 00:44:15,610

we've actually been working on this this

1114
00:44:22,710 --> 00:44:19,480
specific case for the last year to kind

1115
00:44:24,780 --> 00:44:22,720
of we kind of got sensitized to it last

1116
00:44:27,720 --> 00:44:24,790
time we went through a pump change out

1117
00:44:28,890 --> 00:44:27,730
so the team has done quite a bit of work

1118
00:44:30,660 --> 00:44:28,900
I would tell you we're just being

1119
00:44:32,430 --> 00:44:30,670
conservative to make sure that

1120
00:44:35,610 --> 00:44:32,440
everything is going to be fine and we

1121
00:44:37,470 --> 00:44:35,620
find the right conditions to to

1122
00:44:39,300 --> 00:44:37,480
introduce the ammonia and keep us from

1123
00:44:41,580 --> 00:44:39,310
freezing the heat exchangers so that's

1124
00:44:43,350 --> 00:44:41,590
where we are again at the a side went

1125
00:44:44,610 --> 00:44:43,360
down we could probably get the B side

1126
00:44:46,620 --> 00:44:44,620
back a little quicker than we're doing

1127
00:44:49,650 --> 00:44:46,630
now but we just want to be very very

1128
00:44:51,300 --> 00:44:49,660
careful since we have the time and sorry

1129
00:44:52,710 --> 00:44:51,310
Marco let's keep it to wanting to follow

1130
00:44:55,200 --> 00:44:52,720
up right now if we have time at the end

1131
00:44:57,990 --> 00:44:55,210
will come back for final questions Jim

1132
00:45:00,270 --> 00:44:58,000
thank you have them for Julia Jim Oberg

1133
00:45:02,670 --> 00:45:00,280
with spectrum magazine

1134
00:45:05,070 --> 00:45:02,680
you gave a good explanation of why 22

1135
00:45:08,700 --> 00:45:05,080
sample sets are good but Tanner better

1136
00:45:11,490 --> 00:45:08,710
and the answer would be a questionably

1137
00:45:15,780 --> 00:45:11,500
you've discussed future reflex eb of the

1138
00:45:18,720 --> 00:45:15,790

12 month but without the commitment is

1139
00:45:21,630 --> 00:45:18,730
there any preliminary planning an apron

1140
00:45:25,980 --> 00:45:21,640
ability hopes for when you would send

1141
00:45:28,290 --> 00:45:25,990
your second problem expedition ethically

1142
00:45:30,360 --> 00:45:28,300
we know that two isn't enough but what

1143
00:45:32,250 --> 00:45:30,370
we don't know right now is what that six

1144
00:45:34,320 --> 00:45:32,260
to twelve month period looks like so

1145
00:45:35,790 --> 00:45:34,330
we're really I you know we're talking

1146
00:45:37,830 --> 00:45:35,800
about it scientifically but we're not

1147
00:45:39,690 --> 00:45:37,840
really having deep discussions about it

1148
00:45:41,160 --> 00:45:39,700
until we have the first information from

1149
00:45:43,140 --> 00:45:41,170
the first two if we see something

1150
00:45:45,570 --> 00:45:43,150
dramatic that's going to change how

1151
00:45:47,340 --> 00:45:45,580
everybody looks at having additional one

1152
00:45:49,020 --> 00:45:47,350
year missions if we don't see anything

1153
00:45:50,880 --> 00:45:49,030
dramatic then that might be less

1154
00:45:52,050 --> 00:45:50,890
important and until we know that with

1155
00:45:53,790 --> 00:45:52,060
these first two subjects it doesn't

1156
00:45:58,200 --> 00:45:53,800
really make sense to draw a line in the

1157
00:46:01,800 --> 00:45:58,210
sand because you're looking for unknown

1158
00:46:05,400 --> 00:46:01,810
unknowns which is true information what

1159
00:46:07,590 --> 00:46:05,410
are you up to confrontation and

1160
00:46:09,240 --> 00:46:07,600
measurement they making that you really

1161
00:46:11,580 --> 00:46:09,250
don't know what you're going to see what

1162
00:46:15,500 --> 00:46:11,590
kind of things are you looking at that

1163
00:46:17,940 --> 00:46:15,510

so far given no indications but in your

1164
00:46:21,360 --> 00:46:17,950
intuition here James intuition please

1165
00:46:23,970 --> 00:46:21,370
expect or worry but what are some things

1166
00:46:25,200 --> 00:46:23,980
that might happen that can get

1167
00:46:27,600 --> 00:46:25,210
speculation I'm not asking her

1168
00:46:28,800 --> 00:46:27,610
predictions so we have a pretty clean

1169
00:46:32,580 --> 00:46:28,810
list of all the different physiological

1170
00:46:34,770 --> 00:46:32,590
systems that could be impacted and in we

1171
00:46:35,940 --> 00:46:34,780
have the study the same types of studies

1172
00:46:37,170 --> 00:46:35,950
that we've done with the six-month

1173
00:46:39,030 --> 00:46:37,180
cruise we're doing with the one-year

1174
00:46:40,770 --> 00:46:39,040
cruise to make sure we've checked kind

1175
00:46:43,830 --> 00:46:40,780
of all those major systems then we have

1176
00:46:46,200 --> 00:46:43,840
the support of the medical monitoring to

1177
00:46:47,640 --> 00:46:46,210
go behind it so that if there that also

1178
00:46:49,800 --> 00:46:47,650
would detect something that maybe we

1179
00:46:52,290 --> 00:46:49,810
didn't have an experiment focused on and

1180
00:46:54,030 --> 00:46:52,300
so between those two things some

1181
00:46:55,740 --> 00:46:54,040
measurements you know we don't know what

1182
00:46:57,660 --> 00:46:55,750
the eye looks like between 6 and 12

1183
00:46:59,850 --> 00:46:57,670
months at all so that that is a

1184
00:47:01,410 --> 00:46:59,860
completely novel measurement we don't

1185
00:47:03,540 --> 00:47:01,420
know we've never put the ultrasound

1186
00:47:06,180 --> 00:47:03,550
together with the chiba in this kind of

1187
00:47:07,680 --> 00:47:06,190
way so we have no idea what what those

1188
00:47:09,720 --> 00:47:07,690

fluid shifts look like these are really

1189
00:47:11,490 --> 00:47:09,730
novel observations and

1190
00:47:13,920 --> 00:47:11,500
then probably the most important novel

1191
00:47:17,010 --> 00:47:13,930
observation is we've never done genomic

1192
00:47:18,750 --> 00:47:17,020
studies in humans on ISS so we've never

1193
00:47:21,150 --> 00:47:18,760
done something like the twin study where

1194
00:47:24,090 --> 00:47:21,160
we looked at you know where we sequence

1195
00:47:25,980 --> 00:47:24,100
the genes of both Scott and Mark and

1196
00:47:28,020 --> 00:47:25,990
then we look at the gene expression we

1197
00:47:29,609 --> 00:47:28,030
look at different markers so that it on

1198
00:47:30,930 --> 00:47:29,619
ISS it just looks like blood sampling

1199
00:47:32,790 --> 00:47:30,940
but what you do when you get those

1200
00:47:39,720 --> 00:47:32,800
samples home is brand-new we've never

1201
00:47:41,480 --> 00:47:39,730
had data like that before Jim again just

1202
00:47:44,040 --> 00:47:41,490
one question for now and one follow-up

1203
00:47:46,080 --> 00:47:44,050
hi I'm Stacey glaze man with Houston

1204
00:47:49,890 --> 00:47:46,090
Community Newspapers a question for dr.

1205
00:47:52,980 --> 00:47:49,900
Gilmore um when obviously the twin

1206
00:47:55,109 --> 00:47:52,990
brothers are study with Mark Kelly being

1207
00:47:57,450 --> 00:47:55,119
that control is he training alongside

1208
00:47:59,280 --> 00:47:57,460
his brother with the same type of

1209
00:48:04,080 --> 00:47:59,290
physical training to their in the same

1210
00:48:06,030 --> 00:48:04,090
condition the condition I don't believe

1211
00:48:09,870 --> 00:48:06,040
that they're following the same exercise

1212
00:48:11,190 --> 00:48:09,880
programs no but maybe Julie can speak a

1213
00:48:13,560 --> 00:48:11,200

little bit more they are going through

1214
00:48:17,150 --> 00:48:13,570
very similar data collection programs

1215
00:48:19,080 --> 00:48:17,160
for the payloads that are involved yeah

1216
00:48:20,849 --> 00:48:19,090
participating in the same exercise

1217
00:48:23,130 --> 00:48:20,859
regime doesn't really make sense because

1218
00:48:24,720 --> 00:48:23,140
they're you know a major part of the

1219
00:48:26,580 --> 00:48:24,730
exercise you're doing every day is just

1220
00:48:29,250 --> 00:48:26,590
fighting gravity to stand up and to sit

1221
00:48:31,109 --> 00:48:29,260
so that wasn't you know scientists don't

1222
00:48:33,630 --> 00:48:31,119
think that that's unnecessary kind of a

1223
00:48:35,880 --> 00:48:33,640
control of course mark is a fit person

1224
00:48:37,380 --> 00:48:35,890
and he intends to stay fit so he's going

1225
00:48:39,510 --> 00:48:37,390
to continue the things that he does and

1226
00:48:40,710 --> 00:48:39,520
Scott's going to do the prescriptions

1227
00:48:43,150 --> 00:48:40,720
that he has as well as his ground

1228
00:48:48,850 --> 00:48:43,160
research now

1229
00:48:51,430 --> 00:48:48,860
any more questions here in the room yo

1230
00:48:53,110 --> 00:48:51,440
Chris based education I know a lot of

1231
00:48:54,970 --> 00:48:53,120
preparations are made for the astronauts

1232
00:48:58,150 --> 00:48:54,980
when they're going up while they're

1233
00:48:59,440 --> 00:48:58,160
there are there any new preparations

1234
00:49:04,390 --> 00:48:59,450
that are being made for this one year

1235
00:49:06,790 --> 00:49:04,400
vision upon his return probably the

1236
00:49:07,870 --> 00:49:06,800
biggest difference on return are going

1237
00:49:09,580 --> 00:49:07,880
to be some of these things like field

1238
00:49:12,340 --> 00:49:09,590

tests that I talked about that will be

1239
00:49:13,810 --> 00:49:12,350
more extensive kinds of ground

1240
00:49:15,490 --> 00:49:13,820
measurements of how they perform in

1241
00:49:17,770 --> 00:49:15,500
those tasks so we've been doing

1242
00:49:19,930 --> 00:49:17,780
something we call mini field tests for

1243
00:49:21,670 --> 00:49:19,940
the last few six-month crew members to

1244
00:49:23,860 --> 00:49:21,680
start getting used to doing those kinds

1245
00:49:26,020 --> 00:49:23,870
of complex operations in the 10th in in

1246
00:49:27,940 --> 00:49:26,030
the medical tent in Kazakhstan that was

1247
00:49:29,350 --> 00:49:27,950
a pretty new innovation and we got

1248
00:49:31,330 --> 00:49:29,360
started on that a little early to make

1249
00:49:32,830 --> 00:49:31,340
sure we could do it but the one-year

1250
00:49:34,270 --> 00:49:32,840
field test measurements are going to be

1251
00:49:36,640 --> 00:49:34,280
more extensive than anything we've done

1252
00:49:38,230 --> 00:49:36,650
with the six-month crew members the

1253
00:49:39,820 --> 00:49:38,240
other thing that we will be doing

1254
00:49:41,980 --> 00:49:39,830
because they're participating in these

1255
00:49:43,990 --> 00:49:41,990
joint studies we have to do some pretty

1256
00:49:45,850 --> 00:49:44,000
tricky things to make sure that all the

1257
00:49:47,440 --> 00:49:45,860
ground measurements even if they're when

1258
00:49:49,510 --> 00:49:47,450
they're no longer together are also

1259
00:49:51,280 --> 00:49:49,520
taken in parallel so there's some things

1260
00:49:53,160 --> 00:49:51,290
like that on the ground that will have

1261
00:49:56,560 --> 00:49:53,170
to keep a good eye on so that the data

1262
00:50:01,120 --> 00:49:56,570
post-flight is is equivalent for the two

1263
00:50:04,450 --> 00:50:01,130

crew okay any more in here inside the

1264
00:50:06,700 --> 00:50:04,460
room no okay we'll go ahead and go to

1265
00:50:08,560 --> 00:50:06,710
our phone bridge then please wait until

1266
00:50:13,930 --> 00:50:08,570
I call your name I'll start off with

1267
00:50:16,570 --> 00:50:13,940
Marion crane from space com hi thanks so

1268
00:50:19,210 --> 00:50:16,580
much for taking my question I'm running

1269
00:50:22,870 --> 00:50:19,220
this questions for uh for dr. Robinson

1270
00:50:24,640 --> 00:50:22,880
um so is there any kind of science that

1271
00:50:27,070 --> 00:50:24,650
doesn't involve human health or human

1272
00:50:29,740 --> 00:50:27,080
physiology research that you're able to

1273
00:50:31,090 --> 00:50:29,750
do during one-year mission the maybe you

1274
00:50:34,900 --> 00:50:31,100
wouldn't be able to do during a

1275
00:50:37,510 --> 00:50:34,910
six-month thank you yeah so other than

1276
00:50:40,540 --> 00:50:37,520
the then the studies using the crew as

1277
00:50:42,070 --> 00:50:40,550
subjects in one year everything else we

1278
00:50:45,160 --> 00:50:42,080
could have done with six-month crew or

1279
00:50:48,310 --> 00:50:45,170
one year crew so the only subtle

1280
00:50:50,950 --> 00:50:48,320
difference is that we have Scott and and

1281
00:50:52,660 --> 00:50:50,960
Victor up for a whole year so we don't

1282
00:50:53,890 --> 00:50:52,670
have to train them twice once they know

1283
00:50:55,780 --> 00:50:53,900
how to do something they can continue

1284
00:50:56,800 --> 00:50:55,790
doing it so actually I personally

1285
00:50:58,300 --> 00:50:56,810
predict especially

1286
00:51:00,220 --> 00:50:58,310
knowing folks like Scott really well

1287
00:51:02,320 --> 00:51:00,230
that they're going to be more efficient

1288
00:51:03,940 --> 00:51:02,330

at doing tasks as they get on through

1289
00:51:06,640 --> 00:51:03,950
you know we have some investigations

1290
00:51:08,500 --> 00:51:06,650
that require operations for the full

1291
00:51:09,790 --> 00:51:08,510
year and i have a feeling by the time

1292
00:51:11,290 --> 00:51:09,800
they're doing it a month eight or nine

1293
00:51:13,060 --> 00:51:11,300
they're going to be probably better than

1294
00:51:14,380 --> 00:51:13,070
any six-month crew member ever it was at

1295
00:51:17,440 --> 00:51:14,390
doing that task just because they'll

1296
00:51:19,480 --> 00:51:17,450
have have repetition but but overall

1297
00:51:20,620 --> 00:51:19,490
it's just the the duration of the one

1298
00:51:22,240 --> 00:51:20,630
your crew really makes them value-based

1299
00:51:25,660 --> 00:51:22,250
subjects that's the primary scientific

1300
00:51:27,160 --> 00:51:25,670
difference okay thank you Marion let's

1301
00:51:30,670 --> 00:51:27,170
go next to Marcia done with The

1302
00:51:33,100 --> 00:51:30,680
Associated Press yes hi I'm wondering

1303
00:51:35,440 --> 00:51:33,110
what personality traits excuse me what

1304
00:51:37,240 --> 00:51:35,450
personality traits to spud Kelly bring

1305
00:51:39,490 --> 00:51:37,250
to the one-year mission that makes him

1306
00:51:42,970 --> 00:51:39,500
particularly well-suited for being on

1307
00:51:45,850 --> 00:51:42,980
orbit an entire year and as you consider

1308
00:51:48,070 --> 00:51:45,860
more when your cruise what's your take

1309
00:51:58,210 --> 00:51:48,080
on what the ideal person might be for

1310
00:52:00,300 --> 00:51:58,220
such a long flight don't take a swipe at

1311
00:52:02,500 --> 00:52:00,310
that I guess wonder one of the things

1312
00:52:06,190 --> 00:52:02,510
you know there's a lot of factors that

1313
00:52:08,380 --> 00:52:06,200

go into into the crew selection and I

1314
00:52:11,620 --> 00:52:08,390
think I think some of the things that

1315
00:52:15,310 --> 00:52:11,630
are that Scott exemplifies is he's

1316
00:52:16,990 --> 00:52:15,320
fairly adaptable and that's something

1317
00:52:19,360 --> 00:52:17,000
that's important you got to be able to

1318
00:52:22,260 --> 00:52:19,370
roll with whatever comes your way during

1319
00:52:25,750 --> 00:52:22,270
a during a longer mission like this and

1320
00:52:27,220 --> 00:52:25,760
the other thing I had the opportunity to

1321
00:52:29,200 --> 00:52:27,230
work with him during his previous

1322
00:52:31,960 --> 00:52:29,210
six-month mission and I think all of us

1323
00:52:34,060 --> 00:52:31,970
no Scott pretty well but one of the good

1324
00:52:36,370 --> 00:52:34,070
things that he does is he's fairly

1325
00:52:39,940 --> 00:52:36,380
direct he's not bashful about telling

1326
00:52:41,470 --> 00:52:39,950
you what they're talking about what what

1327
00:52:42,970 --> 00:52:41,480
needs to be done to improve things and

1328
00:52:46,420 --> 00:52:42,980
things like that and that's also a

1329
00:52:47,770 --> 00:52:46,430
really valuable trait yeah our previous

1330
00:52:50,080 --> 00:52:47,780
behavioral health studies have shown

1331
00:52:51,940 --> 00:52:50,090
that you know you can have challenges in

1332
00:52:55,690 --> 00:52:51,950
communication between the crew and the

1333
00:52:58,630 --> 00:52:55,700
ground as the crew becomes stressed out

1334
00:53:00,580 --> 00:52:58,640
and so one of the things with Scott is

1335
00:53:03,010 --> 00:53:00,590
of course that he is very open he's very

1336
00:53:04,600 --> 00:53:03,020
ready to say what he what he thinks and

1337
00:53:06,760 --> 00:53:04,610
so forth and so he's probably less

1338
00:53:08,140 --> 00:53:06,770

likely to have that tendency not to

1339
00:53:10,330 --> 00:53:08,150
communicate with the ground if he gets

1340
00:53:11,920 --> 00:53:10,340
frustrated but what's in

1341
00:53:13,570 --> 00:53:11,930
teresting is he'll also be participating

1342
00:53:15,910 --> 00:53:13,580
he and victor will both be participating

1343
00:53:17,500 --> 00:53:15,920
again in a repeat of that study that had

1344
00:53:19,060 --> 00:53:17,510
those results for six month crew members

1345
00:53:21,370 --> 00:53:19,070
so we'll get the opportunity to

1346
00:53:23,410 --> 00:53:21,380
understand from several different

1347
00:53:25,810 --> 00:53:23,420
studies from a study looking at their

1348
00:53:27,340 --> 00:53:25,820
reporting of how they're feeling and in

1349
00:53:28,930 --> 00:53:27,350
whether they're having senses of

1350
00:53:31,510 --> 00:53:28,940
isolation and confinement there'll be

1351
00:53:33,700 --> 00:53:31,520
some studies on their performance over

1352
00:53:35,050 --> 00:53:33,710
time and then there'll be these studies

1353
00:53:36,190 --> 00:53:35,060
on the way that they interact with the

1354
00:53:38,980 --> 00:53:36,200
ground and all of those different

1355
00:53:40,450 --> 00:53:38,990
studies will come together to help us

1356
00:53:43,780 --> 00:53:40,460
get a better sense of that after his

1357
00:53:50,490 --> 00:53:43,790
flights over as well okay next up we

1358
00:53:50,500 --> 00:53:59,259
Amy are you there

1359
00:54:04,509 --> 00:54:02,249
Amy you're very low can you speak up

1360
00:54:07,269 --> 00:54:04,519
actually my questions and answers thank

1361
00:54:10,979 --> 00:54:07,279
you okay we'll go ahead and move on then

1362
00:54:13,209 --> 00:54:10,989
next we have Carrie Sheridan with AFP

1363
00:54:14,889 --> 00:54:13,219

thank you my questions already been

1364
00:54:17,049 --> 00:54:14,899
answered too thanks all right we're not

1365
00:54:18,789 --> 00:54:17,059
going to mount them so finally on our

1366
00:54:23,949 --> 00:54:18,799
phone bridge we have Irene Klotz with

1367
00:54:26,409 --> 00:54:23,959
Reuters didn't say that exactly what is

1368
00:54:28,809 --> 00:54:26,419
that Louis that is it's going to be

1369
00:54:32,199 --> 00:54:28,819
ready to support Commercial Crew

1370
00:54:35,319 --> 00:54:32,209
vehicles for brilliant pets loads and

1371
00:54:40,799 --> 00:54:35,329
after winter wouldn't happen now

1372
00:54:48,039 --> 00:54:44,380
yes I think I did so so Irene our plan

1373
00:54:49,689 --> 00:54:48,049
is to be able to allow a vehicle to dock

1374
00:54:54,009 --> 00:54:49,699
to the international space station by

1375
00:54:57,939 --> 00:54:54,019
the end of calendar year 2015 I'm sorry

1376
00:55:01,179 --> 00:54:57,949
yet 2015 the thought process is that the

1377
00:55:04,569 --> 00:55:01,189
the commercial providers will probably

1378
00:55:07,419 --> 00:55:04,579
bring at least a test vehicle to ISS and

1379
00:55:09,759 --> 00:55:07,429
the 2017 timeframe and we wanted some

1380
00:55:11,559 --> 00:55:09,769
time to make sure that we had the system

1381
00:55:14,499 --> 00:55:11,569
checked out ready to go so art we're

1382
00:55:17,620 --> 00:55:14,509
shooting for the end of 2015 at least to

1383
00:55:19,929 --> 00:55:17,630
have one port active and the comm system

1384
00:55:23,169 --> 00:55:19,939
ready to support all that so that's what

1385
00:55:25,120 --> 00:55:23,179
we're shooting for today the manifest

1386
00:55:28,239 --> 00:55:25,130
calls for the commercial vehicles to

1387
00:55:30,759 --> 00:55:28,249
start bringing increment cruise to the

1388
00:55:33,339 --> 00:55:30,769

International Space Station in 2018 and

1389
00:55:35,199 --> 00:55:33,349
at that point the the vehicle will bring

1390
00:55:36,549 --> 00:55:35,209
a fork crew member up when it comes so

1391
00:55:38,019 --> 00:55:36,559
that's the point which will step up to

1392
00:55:41,889 --> 00:55:38,029
one additional crew member on the

1393
00:55:43,929 --> 00:55:41,899
International Space Station okay that

1394
00:55:45,759 --> 00:55:43,939
will do it for our phone bridge next we

1395
00:55:47,289 --> 00:55:45,769
have meg Sumner one of our public

1396
00:55:49,179 --> 00:55:47,299
affairs officers been collecting some

1397
00:55:51,099 --> 00:55:49,189
questions out from social media meg once

1398
00:55:53,079 --> 00:55:51,109
you go ahead and give us one yeah we

1399
00:55:55,929 --> 00:55:53,089
have one from twitter from laura keaney

1400
00:55:57,699 --> 00:55:55,939
my question for NASA is why two male

1401
00:55:59,769 --> 00:55:57,709
crew members for the ISS one-year

1402
00:56:04,029 --> 00:55:59,779
mission physiological effects of space

1403
00:56:06,699 --> 00:56:04,039
are different on men and women so let me

1404
00:56:08,649 --> 00:56:06,709
take that just scientifically so there

1405
00:56:10,599 --> 00:56:08,659
was no bias in the selection of the crew

1406
00:56:12,460 --> 00:56:10,609
members it was equally possible for a

1407
00:56:13,900 --> 00:56:12,470
woman to have been selected when we

1408
00:56:15,790 --> 00:56:13,910
the one your crew selection it just so

1409
00:56:17,830 --> 00:56:15,800
happened that this was the crew member

1410
00:56:19,660 --> 00:56:17,840
that was selected what's really

1411
00:56:21,849 --> 00:56:19,670
interesting is when we look at the

1412
00:56:24,430 --> 00:56:21,859
radiation models for the lifetime

1413
00:56:26,410 --> 00:56:24,440

effects in the cancer risks on crew

1414
00:56:28,780 --> 00:56:26,420
members women are much more susceptible

1415
00:56:30,280 --> 00:56:28,790
they have much higher risk of impacts

1416
00:56:33,190 --> 00:56:30,290
from living in the radiation environment

1417
00:56:35,320 --> 00:56:33,200
and so that does affect the ability of

1418
00:56:36,640 --> 00:56:35,330
women to do longer duration missions it

1419
00:56:38,500 --> 00:56:36,650
also affects the ability of women

1420
00:56:41,140 --> 00:56:38,510
sometimes to do repeat missions over

1421
00:56:43,900 --> 00:56:41,150
time so one of the things that I think

1422
00:56:45,970 --> 00:56:43,910
is really important for gender equity

1423
00:56:47,650 --> 00:56:45,980
and space exploration is actually to get

1424
00:56:49,300 --> 00:56:47,660
good countermeasures for some of these

1425
00:56:51,310 --> 00:56:49,310
radiation effects and that's something

1426
00:56:52,599 --> 00:56:51,320
that we're not primarily doing on ISS

1427
00:56:54,010 --> 00:56:52,609
we're primarily doing that in

1428
00:56:57,520 --> 00:56:54,020
ground-based research but it's a very

1429
00:56:59,920 --> 00:56:57,530
important area of work I'm also from

1430
00:57:01,810 --> 00:56:59,930
surrogates Garretson on Twitter what

1431
00:57:03,640 --> 00:57:01,820
resources are available for medical or

1432
00:57:08,560 --> 00:57:03,650
emotional needs on board during the year

1433
00:57:10,330 --> 00:57:08,570
long journey well the crew has access to

1434
00:57:13,120 --> 00:57:10,340
a number of things and probably the most

1435
00:57:15,300 --> 00:57:13,130
important ones are they have effectively

1436
00:57:17,680 --> 00:57:15,310
the ability to use a telephone and call

1437
00:57:22,750 --> 00:57:17,690
friends family whoever they'd like to

1438
00:57:26,440 --> 00:57:22,760

call email is also available and then

1439
00:57:28,560 --> 00:57:26,450
there's a certain number of crew special

1440
00:57:32,829 --> 00:57:28,570
activities where they can have a

1441
00:57:35,109 --> 00:57:32,839
interaction with various guess that they

1442
00:57:39,460 --> 00:57:35,119
select on the ground and then we also do

1443
00:57:40,990 --> 00:57:39,470
a couple more things one of them is they

1444
00:57:45,970 --> 00:57:41,000
have a family conference on a weekly

1445
00:57:48,670 --> 00:57:45,980
basis and and then we also from the sort

1446
00:57:50,530 --> 00:57:48,680
of the measure the medical side we sort

1447
00:57:52,060 --> 00:57:50,540
of have the medical team that has some

1448
00:57:53,770 --> 00:57:52,070
conferences with the crew just to kind

1449
00:57:58,180 --> 00:57:53,780
of see how things are going so there's a

1450
00:57:59,859 --> 00:57:58,190
lot of an own systems onboard group

1451
00:58:03,310 --> 00:57:59,869
worked very hard to give crew members

1452
00:58:04,780 --> 00:58:03,320
almost as much access to communicate on

1453
00:58:07,060 --> 00:58:04,790
or as they do on the ground so they have

1454
00:58:09,820 --> 00:58:07,070
internet access as well Steve mentioned

1455
00:58:12,550 --> 00:58:09,830
we have the IP phone that's available to

1456
00:58:15,370 --> 00:58:12,560
them whenever we have K you access which

1457
00:58:19,390 --> 00:58:15,380
is a lion's share of the orbits we have

1458
00:58:21,730 --> 00:58:19,400
K you access we give the crews access to

1459
00:58:24,339 --> 00:58:21,740
two movies in fact sometimes we've got

1460
00:58:25,960 --> 00:58:24,349
them movies that are released to

1461
00:58:26,480 --> 00:58:25,970
theaters before they release the

1462
00:58:29,180 --> 00:58:26,490
theaters

1463
00:58:31,430 --> 00:58:29,190

I think in one case we did that we are

1464
00:58:33,380 --> 00:58:31,440
in fact your special request we are

1465
00:58:35,330 --> 00:58:33,390
looking to get a bigger screen on orbitz

1466
00:58:37,520 --> 00:58:35,340
of the crews can have a better view of a

1467
00:58:38,960 --> 00:58:37,530
movie during during a movie night

1468
00:58:42,530 --> 00:58:38,970
whenever it is so we've taken a lot of

1469
00:58:44,540 --> 00:58:42,540
steps to make sure the crews have access

1470
00:58:47,120 --> 00:58:44,550
to communicate but also kind of the

1471
00:58:48,620 --> 00:58:47,130
normalcy of home so you know we get them

1472
00:58:50,030 --> 00:58:48,630
football games they won't football games

1473
00:58:52,160 --> 00:58:50,040
to all these kinds of things are steps

1474
00:58:56,570 --> 00:58:52,170
we take to try to make them feel like

1475
00:58:58,220 --> 00:58:56,580
they're still you know attached to to

1476
00:58:59,480 --> 00:58:58,230
life here on earth so that they can feel

1477
00:59:02,660 --> 00:58:59,490
as normal as they can give an

1478
00:59:04,310 --> 00:59:02,670
environment parent okay thanks Meg we're

1479
00:59:08,630 --> 00:59:04,320
just about out of time are there any

1480
00:59:09,980 --> 00:59:08,640
really quick follow-ups no okay then

1481
00:59:12,080 --> 00:59:09,990
that will go ahead and bring us to a

1482
00:59:14,180 --> 00:59:12,090
close again this is our briefing looking

1483
00:59:16,520 --> 00:59:14,190
at the launch of expedition 43 and the

1484
00:59:19,550 --> 00:59:16,530
one-year crew as always you can follow

1485
00:59:21,950 --> 00:59:19,560
along for the science on Twitter at ISS

1486
00:59:24,560 --> 00:59:21,960
underscore research you can follow Scott

1487
00:59:26,810 --> 00:59:24,570
Kelly on his journey at station see dr

1488
00:59:29,480 --> 00:59:26,820

kelly and as always you can follow the

1489
00:59:31,340 --> 00:59:29,490
hashtag hashtag is s 1 year you get all

1490
00:59:33,740 --> 00:59:31,350
the latest on our website at nasa.gov