
PAO

1
00:00:05,510 --> 00:00:03,110
thanks for joining us we're here in mr

2
00:00:06,950 --> 00:00:05,520
mission control and i'm joined by dr vic

3
00:00:08,390 --> 00:00:06,960
cooley who's the lead increment

4
00:00:10,070 --> 00:00:08,400
scientist thanks for joining us this

5
00:00:11,669 --> 00:00:10,080
morning

6
00:00:13,270 --> 00:00:11,679
so we're right in this great transition

7
00:00:14,870 --> 00:00:13,280
phase we've got a crew that's preparing

8
00:00:16,150 --> 00:00:14,880
to depart they've been wrapping up their

9
00:00:17,590 --> 00:00:16,160
long-duration mission which has been

10
00:00:19,670 --> 00:00:17,600
heavily focused on science and we're

11
00:00:21,189 --> 00:00:19,680
ready for a new crew

12
00:00:22,950 --> 00:00:21,199
we know that you you have a team you're

13
00:00:24,390 --> 00:00:22,960

part of a team that works on

14
00:00:25,990 --> 00:00:24,400
strategically planning all of this

15
00:00:28,150 --> 00:00:26,000
science can you tell us a little bit

16
00:00:29,589 --> 00:00:28,160
about what expedition 41 has done what

17
00:00:31,349 --> 00:00:29,599
type of highlights have been from their

18
00:00:32,389 --> 00:00:31,359
science well thank you nicole i'd be

19
00:00:34,549 --> 00:00:32,399
glad to

20
00:00:37,910 --> 00:00:34,559
yes so over the past uh eight weeks or

21
00:00:40,549 --> 00:00:37,920
so we've uh conducted increment 41.

22
00:00:43,350 --> 00:00:40,559
um it's been a an extreme challenge

23
00:00:45,430 --> 00:00:43,360
because of two evas that were not

24
00:00:47,430 --> 00:00:45,440
planned during this time period were

25
00:00:49,190 --> 00:00:47,440
added late uh

26
00:00:51,910 --> 00:00:49,200
just before the increment begin but

27
00:00:54,389 --> 00:00:51,920
despite that and each eva brings with it

28
00:00:55,510 --> 00:00:54,399
on the order of 100 to 150 hours of

29
00:00:58,069 --> 00:00:55,520
additional

30
00:00:59,590 --> 00:00:58,079
crew time activity to accommodate and

31
00:01:01,110 --> 00:00:59,600
prepare for and then clean up after

32
00:01:03,510 --> 00:01:01,120
those evas

33
00:01:05,830 --> 00:01:03,520
but despite all that we were able to get

34
00:01:08,469 --> 00:01:05,840
all of the critical science done

35
00:01:10,310 --> 00:01:08,479
and perhaps the key key accomplishment

36
00:01:12,950 --> 00:01:10,320
in the science activity uh certainly a

37
00:01:13,910 --> 00:01:12,960
new one for the space station

38
00:01:17,190 --> 00:01:13,920

is the

39
00:01:19,270 --> 00:01:17,200
enhanced rodent research facility now

40
00:01:20,630 --> 00:01:19,280
we've flown rodents on the on the

41
00:01:23,749 --> 00:01:20,640
shuttle system

42
00:01:25,109 --> 00:01:23,759
over 20 times over a 30-year period of

43
00:01:27,670 --> 00:01:25,119
the shuttle life

44
00:01:28,950 --> 00:01:27,680
but in this case this is a an expanded

45
00:01:31,429 --> 00:01:28,960
capability

46
00:01:33,350 --> 00:01:31,439
uh you know we use rodents to as as

47
00:01:35,749 --> 00:01:33,360
models for bone and muscle loss

48
00:01:38,230 --> 00:01:35,759
primarily and again that's what this

49
00:01:41,030 --> 00:01:38,240
effort was about in increment 41. there

50
00:01:43,910 --> 00:01:41,040
were two key objectives uh to

51
00:01:45,510 --> 00:01:43,920
uh prove that the new system consisting

52
00:01:47,910 --> 00:01:45,520
of three pieces of hardware the the

53
00:01:50,389 --> 00:01:47,920
transporter unit the habitat that the

54
00:01:52,550 --> 00:01:50,399
mice live in for the however many days

55
00:01:54,950 --> 00:01:52,560
they're in weightlessness and an access

56
00:01:57,590 --> 00:01:54,960
unit which is used to transfer mice

57
00:01:59,749 --> 00:01:57,600
between their habitat and a work volume

58
00:02:01,670 --> 00:01:59,759
so all three of those pieces of hardware

59
00:02:02,950 --> 00:02:01,680
worked as expected and the second

60
00:02:05,990 --> 00:02:02,960
objective

61
00:02:08,309 --> 00:02:06,000
was to return frozen tissue from the

62
00:02:11,270 --> 00:02:08,319
mice after either 20 days for some of

63
00:02:12,949 --> 00:02:11,280

the mice in 30 days for additional mice

64
00:02:15,430 --> 00:02:12,959
that tissue has been returned from the

65
00:02:18,070 --> 00:02:15,440
20-day mice on the spacex that landed in

66
00:02:19,589 --> 00:02:18,080
late october i should say splash down

67
00:02:21,670 --> 00:02:19,599
off the coast of california on the

68
00:02:22,869 --> 00:02:21,680
spacex 4 mission

69
00:02:24,949 --> 00:02:22,879
so um

70
00:02:27,750 --> 00:02:24,959
the two main objectives for that

71
00:02:29,430 --> 00:02:27,760
research were well accomplished and and

72
00:02:31,990 --> 00:02:29,440
now we're looking forward to more

73
00:02:34,070 --> 00:02:32,000
research in in that area

74
00:02:35,270 --> 00:02:34,080
and is there more um i guess you're

75
00:02:37,030 --> 00:02:35,280
alluding to there's more of that

76
00:02:40,390 --> 00:02:37,040
experiment and research planned for

77
00:02:43,350 --> 00:02:40,400
expedition 42 uh not for expedition 42

78
00:02:46,150 --> 00:02:43,360
but in expedition 43 will be

79
00:02:47,110 --> 00:02:46,160
a spacex 6 mission two spacex vehicles

80
00:02:50,470 --> 00:02:47,120
from now

81
00:02:52,710 --> 00:02:50,480
and it will extend the the challenge to

82
00:02:54,390 --> 00:02:52,720
the to the hardware system we've proven

83
00:02:56,630 --> 00:02:54,400
that the hardware system can support

84
00:02:58,390 --> 00:02:56,640
mice and keep them healthy for 30 days

85
00:03:01,430 --> 00:02:58,400
and now we're going to extend that to 60

86
00:03:04,550 --> 00:03:01,440
days of course it's designed to to

87
00:03:05,350 --> 00:03:04,560
support rodents that long um

88
00:03:07,589 --> 00:03:05,360

so

89
00:03:10,790 --> 00:03:07,599
there's a big future for rodent research

90
00:03:13,030 --> 00:03:10,800
you know in the in the 2011

91
00:03:14,949 --> 00:03:13,040
um

92
00:03:18,070 --> 00:03:14,959
decadal research by the national

93
00:03:20,229 --> 00:03:18,080
institute of health or um

94
00:03:21,589 --> 00:03:20,239
getting my acronyms confused it wasn't

95
00:03:23,350 --> 00:03:21,599
national institute of health but it was

96
00:03:25,509 --> 00:03:23,360
one of the

97
00:03:27,350 --> 00:03:25,519
recommending agencies that helps nasa do

98
00:03:29,270 --> 00:03:27,360
long-term planning

99
00:03:30,309 --> 00:03:29,280
and it's called a decadal survey that

100
00:03:32,470 --> 00:03:30,319
survey

101
00:03:34,149 --> 00:03:32,480
strongly recommended that

102
00:03:36,070 --> 00:03:34,159
station develop a rodent research

103
00:03:38,070 --> 00:03:36,080
capability so this is the first response

104
00:03:40,550 --> 00:03:38,080
to that and i expect we'll be doing

105
00:03:43,830 --> 00:03:40,560
rodent research probably in an ongoing

106
00:03:45,670 --> 00:03:43,840
basis for four years to come

107
00:03:47,270 --> 00:03:45,680
okay can you tell us some of the other

108
00:03:49,750 --> 00:03:47,280
research that is planned for expedition

109
00:03:53,990 --> 00:03:49,760
42 i'd be glad to um

110
00:03:55,990 --> 00:03:54,000
the last time i talked it was with

111
00:03:58,309 --> 00:03:56,000
brandy about two months ago we talked

112
00:04:00,869 --> 00:03:58,319
about the increment 41 science and and

113
00:04:03,110 --> 00:04:00,879

that time i talked about model organisms

114
00:04:05,030 --> 00:04:03,120
in all the biological

115
00:04:07,030 --> 00:04:05,040
experiments that we had over the past

116
00:04:10,789 --> 00:04:07,040
eight weeks i want to do something

117
00:04:13,830 --> 00:04:10,799
similar today on the spacex 5 mission in

118
00:04:15,509 --> 00:04:13,840
in december we have i want to talk about

119
00:04:17,749 --> 00:04:15,519
seven experiments that are really

120
00:04:20,150 --> 00:04:17,759
biological in nature

121
00:04:22,150 --> 00:04:20,160
and i want to do that by going through

122
00:04:23,670 --> 00:04:22,160
the three laboratory modules one at a

123
00:04:25,670 --> 00:04:23,680
time and talking about two or three

124
00:04:28,150 --> 00:04:25,680
investigations in each

125
00:04:29,189 --> 00:04:28,160
so but first let me point out that you

126
00:04:31,590 --> 00:04:29,199
know

127
00:04:34,870 --> 00:04:31,600
these model organism biological type

128
00:04:36,550 --> 00:04:34,880
investigations are in in no way the only

129
00:04:37,590 --> 00:04:36,560
type of science we have on the space

130
00:04:39,749 --> 00:04:37,600
station

131
00:04:41,590 --> 00:04:39,759
we have lots of physical science

132
00:04:43,590 --> 00:04:41,600
in materials research and so forth we

133
00:04:45,749 --> 00:04:43,600
have lots of research looking out at the

134
00:04:47,830 --> 00:04:45,759
rest of the solar system and the

135
00:04:49,350 --> 00:04:47,840
universe and we have lots of human

136
00:04:51,670 --> 00:04:49,360
adaptation

137
00:04:54,390 --> 00:04:51,680
research going on to

138
00:04:56,950 --> 00:04:54,400

allow us to explore the solar system

139
00:04:59,909 --> 00:04:56,960
but today and because of the spacex five

140
00:05:02,230 --> 00:04:59,919
mission which is particularly uh

141
00:05:03,909 --> 00:05:02,240
well suited for biological type

142
00:05:07,430 --> 00:05:03,919
experiments which characteristically

143
00:05:09,270 --> 00:05:07,440
have to go up for uh the phenomenal

144
00:05:11,590 --> 00:05:09,280
mission is 30 days and then come home

145
00:05:13,749 --> 00:05:11,600
after that period of time that that

146
00:05:15,830 --> 00:05:13,759
profile is is well suited to these

147
00:05:17,670 --> 00:05:15,840
biological missions so that's why i

148
00:05:19,189 --> 00:05:17,680
talked about them for spacex 4 and

149
00:05:20,950 --> 00:05:19,199
that's why i'm talking about them again

150
00:05:23,110 --> 00:05:20,960
for spacex 5.

151
00:05:25,909 --> 00:05:23,120
so starting in the columbus module we

152
00:05:28,870 --> 00:05:25,919
have two cellular level experiments and

153
00:05:31,189 --> 00:05:28,880
one plant experiment

154
00:05:33,749 --> 00:05:31,199
yes so the

155
00:05:35,430 --> 00:05:33,759
columbus module

156
00:05:39,590 --> 00:05:35,440
shown on the left there

157
00:05:42,230 --> 00:05:39,600
is uh the known as the well it's the esa

158
00:05:44,390 --> 00:05:42,240
european space agency uh laboratory

159
00:05:45,909 --> 00:05:44,400
known as columbus

160
00:05:48,390 --> 00:05:45,919
the first experiment i want to talk

161
00:05:52,390 --> 00:05:48,400
about is called triple lux

162
00:05:55,110 --> 00:05:52,400
this uses blue muscle

163
00:05:56,629 --> 00:05:55,120

hemocytes now hemocytes are

164
00:05:58,790 --> 00:05:56,639
are

165
00:06:02,469 --> 00:05:58,800
phagocytes in this case they actually

166
00:06:05,430 --> 00:06:02,479
detect and ingest foreign bodies so this

167
00:06:10,629 --> 00:06:07,990
immune response in the plasma of the

168
00:06:13,350 --> 00:06:10,639
blood so to speak it's not a cell

169
00:06:16,629 --> 00:06:13,360
mediated immune response it's outside

170
00:06:18,870 --> 00:06:16,639
the the other cells and and these

171
00:06:21,270 --> 00:06:18,880
hemocytes are

172
00:06:22,070 --> 00:06:21,280
dedicated their sole purpose in life is

173
00:06:25,510 --> 00:06:22,080
to

174
00:06:28,390 --> 00:06:25,520
uh detect and ingest and eliminate

175
00:06:30,870 --> 00:06:28,400
invading threats to the to the organism

176
00:06:31,590 --> 00:06:30,880
so in this case the the hemocytes will

177
00:06:35,029 --> 00:06:31,600
be

178
00:06:38,070 --> 00:06:35,039
incubated some at 0g and some at 1g and

179
00:06:41,029 --> 00:06:38,080
we use the 1g as a control to

180
00:06:42,710 --> 00:06:41,039
make sure that we're not misinterpreting

181
00:06:44,070 --> 00:06:42,720
misinterpreting the effects of

182
00:06:46,070 --> 00:06:44,080
weightlessness with the effects of

183
00:06:48,950 --> 00:06:46,080
radiation because that's the other

184
00:06:50,950 --> 00:06:48,960
strong difference between

185
00:06:52,950 --> 00:06:50,960
on earth and in space is the radiation

186
00:06:54,150 --> 00:06:52,960
environment is quite a bit different so

187
00:06:55,909 --> 00:06:54,160
many

188
00:06:57,350 --> 00:06:55,919

life science samples are affected by

189
00:06:59,510 --> 00:06:57,360
radiation so

190
00:07:01,029 --> 00:06:59,520
several of our experiments have a 0g and

191
00:07:03,110 --> 00:07:01,039
a 1g

192
00:07:03,990 --> 00:07:03,120
version of them in this experiment has

193
00:07:06,469 --> 00:07:04,000
that

194
00:07:09,350 --> 00:07:06,479
we will look with a through a microscope

195
00:07:11,589 --> 00:07:09,360
with video at these hema sites as they

196
00:07:13,029 --> 00:07:11,599
ingest foreign material both in one g

197
00:07:15,430 --> 00:07:13,039
and zero g

198
00:07:18,550 --> 00:07:15,440
so that's the triple lux experiment the

199
00:07:19,430 --> 00:07:18,560
second experiment in the columbus module

200
00:07:23,029 --> 00:07:19,440
is

201
00:07:27,430 --> 00:07:23,039
t cell activation in aging

202
00:07:33,029 --> 00:07:28,469
human

203
00:07:35,510 --> 00:07:33,039
known as t cells t for the thymus the

204
00:07:37,189 --> 00:07:35,520
human thymus is below the sternum and

205
00:07:39,430 --> 00:07:37,199
this is where those cells are produced

206
00:07:42,469 --> 00:07:39,440
these cells have special receptors on

207
00:07:44,869 --> 00:07:42,479
their surface that respond to

208
00:07:47,589 --> 00:07:44,879
threats and they trigger immune

209
00:07:51,990 --> 00:07:47,599
reactions in in other cells

210
00:07:53,430 --> 00:07:52,000
so it's uh these these um t cells will

211
00:07:58,230 --> 00:07:53,440
be incubated

212
00:08:02,550 --> 00:07:58,240
uh in the cubic incubator in um in the

213
00:08:05,430 --> 00:08:02,560

esa module and after 75 hours uh they

214
00:08:06,950 --> 00:08:05,440
will be fixed and returned to earth

215
00:08:09,670 --> 00:08:06,960
um

216
00:08:11,430 --> 00:08:09,680
and we will do some genetic analysis on

217
00:08:12,550 --> 00:08:11,440
them there there

218
00:08:14,230 --> 00:08:12,560
um

219
00:08:16,550 --> 00:08:14,240
so that's a little bit different from

220
00:08:18,469 --> 00:08:16,560
the first experiment the triple lux

221
00:08:19,510 --> 00:08:18,479
where we were talking about dedicated

222
00:08:21,990 --> 00:08:19,520
cells

223
00:08:23,909 --> 00:08:22,000
like antibodies and antigens that that

224
00:08:27,189 --> 00:08:23,919
go after and eliminate

225
00:08:29,990 --> 00:08:27,199
threats in this case it's a cell that it

226
00:08:32,070 --> 00:08:30,000
merely detects and then triggers other

227
00:08:33,750 --> 00:08:32,080
cellular responses to respond to the

228
00:08:35,750 --> 00:08:33,760
immune system so there's a fundamental

229
00:08:37,589 --> 00:08:35,760
difference there

230
00:08:40,230 --> 00:08:37,599
in the first case it was it was

231
00:08:43,190 --> 00:08:40,240
invertebrate cells of the blue muscle

232
00:08:45,990 --> 00:08:43,200
the aquatic blue muscle not muscle cells

233
00:08:47,990 --> 00:08:46,000
but m-u-s-s-e-l in this case and then in

234
00:08:49,910 --> 00:08:48,000
the second case it's it's actually human

235
00:08:51,430 --> 00:08:49,920
white blood cells

236
00:08:53,910 --> 00:08:51,440
so the third experiment i want to talk

237
00:08:55,350 --> 00:08:53,920
about is a plant experiment and you did

238
00:08:56,949 --> 00:08:55,360

speak about the seedling growth

239
00:08:58,949 --> 00:08:56,959
experiment that's going on this week

240
00:09:00,710 --> 00:08:58,959
another plant experiment

241
00:09:01,590 --> 00:09:00,720
in the esa module

242
00:09:06,470 --> 00:09:01,600
is

243
00:09:08,870 --> 00:09:06,480
and

244
00:09:11,110 --> 00:09:08,880
this experiment looks at

245
00:09:13,190 --> 00:09:11,120
plant cells in particular we're growing

246
00:09:15,990 --> 00:09:13,200
arabidopsis seeds which happen to be the

247
00:09:17,829 --> 00:09:16,000
same seeds in the current experiment but

248
00:09:18,790 --> 00:09:17,839
this approach is is fundamentally

249
00:09:23,110 --> 00:09:18,800
different

250
00:09:25,910 --> 00:09:23,120
in that the plant cell walls

251
00:09:27,190 --> 00:09:25,920
have structural elements known as

252
00:09:28,550 --> 00:09:27,200
micro

253
00:09:30,310 --> 00:09:28,560
filaments in

254
00:09:32,710 --> 00:09:30,320
tubin or

255
00:09:35,190 --> 00:09:32,720
actin which are plant cell walls

256
00:09:36,949 --> 00:09:35,200
basically all plant cells aid in the

257
00:09:38,310 --> 00:09:36,959
structure of holding the plant up

258
00:09:40,470 --> 00:09:38,320
against gravity

259
00:09:43,829 --> 00:09:40,480
unlike human cells or excuse me unlike

260
00:09:47,430 --> 00:09:43,839
animal cells so in plant cells where we

261
00:09:49,590 --> 00:09:47,440
are again using molecular uh

262
00:09:51,030 --> 00:09:49,600
biomolecular

263
00:09:53,910 --> 00:09:51,040

genetics

264
00:09:55,829 --> 00:09:53,920
at at the very smallest level that we're

265
00:09:57,269 --> 00:09:55,839
at today in our forefront of science and

266
00:09:59,269 --> 00:09:57,279
studying how

267
00:10:01,190 --> 00:09:59,279
uh mechanisms signal each other

268
00:10:03,350 --> 00:10:01,200
throughout the organism so we're looking

269
00:10:05,350 --> 00:10:03,360
at signaling pathways

270
00:10:08,310 --> 00:10:05,360
for how the plants

271
00:10:10,150 --> 00:10:08,320
change and respond differently in 0g

272
00:10:12,069 --> 00:10:10,160
versus 1g because now they don't have to

273
00:10:14,389 --> 00:10:12,079
hold up their structure they don't need

274
00:10:17,269 --> 00:10:14,399
as much of these actin filaments in the

275
00:10:19,910 --> 00:10:17,279
cell walls and they grow differently

276
00:10:22,150 --> 00:10:19,920
so the we're looking at that that

277
00:10:24,150 --> 00:10:22,160
experiment actually returns

278
00:10:26,470 --> 00:10:24,160
uh plant tissue

279
00:10:28,069 --> 00:10:26,480
fixed with para para formaldehyde which

280
00:10:31,110 --> 00:10:28,079
allows the cell structure to remain

281
00:10:35,269 --> 00:10:31,120
intact but we also fix other samples

282
00:10:37,110 --> 00:10:35,279
with a fixative called rna later and

283
00:10:38,790 --> 00:10:37,120
those are frozen

284
00:10:41,430 --> 00:10:38,800
unlike the para formaldehyde samples

285
00:10:44,550 --> 00:10:41,440
which can only be refrigerated so the

286
00:10:47,670 --> 00:10:44,560
freezing won't burst the cell walls

287
00:10:49,750 --> 00:10:47,680
for the genetic rna later fixative those

288
00:10:52,790 --> 00:10:49,760

cells are frozen and then we can do

289
00:10:55,269 --> 00:10:52,800
molecular analysis on the frozen samples

290
00:10:57,269 --> 00:10:55,279
but a third

291
00:10:59,190 --> 00:10:57,279
result from this plant experiment is

292
00:11:01,590 --> 00:10:59,200
that towards the end of the experiment

293
00:11:04,069 --> 00:11:01,600
after several days of growth the plant

294
00:11:06,710 --> 00:11:04,079
tissue will be taken into the u.s lab

295
00:11:08,790 --> 00:11:06,720
where we have a fluorescent microscope

296
00:11:11,509 --> 00:11:08,800
and many of the proteins some of the

297
00:11:14,790 --> 00:11:11,519
proteins that are key in signaling the

298
00:11:17,430 --> 00:11:14,800
actin how strong to grow uh have been

299
00:11:20,310 --> 00:11:17,440
tagged with a green fluorescent protein

300
00:11:22,470 --> 00:11:20,320
a so-called reporter gene that allows an

301
00:11:24,470 --> 00:11:22,480
observer through on space station

302
00:11:26,230 --> 00:11:24,480
through this fluorescent microscope and

303
00:11:27,750 --> 00:11:26,240
it's it's actually a camera that's

304
00:11:29,269 --> 00:11:27,760
looking through the microscope so the

305
00:11:32,949 --> 00:11:29,279
scientists on the ground can see the

306
00:11:36,470 --> 00:11:34,310
and this the

307
00:11:39,110 --> 00:11:36,480
green fluorescent protein is a technique

308
00:11:40,949 --> 00:11:39,120
developed in the 90s and in well matured

309
00:11:43,190 --> 00:11:40,959
today and it's widely used

310
00:11:44,310 --> 00:11:43,200
so much so that we actually have three

311
00:11:46,230 --> 00:11:44,320
fluorescent

312
00:11:48,870 --> 00:11:46,240
microscopes on the space station this

313
00:11:51,430 --> 00:11:48,880

one happens to be in the fluids rack in

314
00:11:53,590 --> 00:11:51,440
the u.s lab so we have three ways of

315
00:11:55,430 --> 00:11:53,600
looking at the results the refrigerator

316
00:11:58,470 --> 00:11:55,440
return the frozen return and the video

317
00:11:59,990 --> 00:11:58,480
return of the green pearlescent protein

318
00:12:02,470 --> 00:12:00,000
which tags the

319
00:12:04,790 --> 00:12:02,480
structural elements yeah you can see the

320
00:12:06,389 --> 00:12:04,800
u.s lab is shown circled there in the

321
00:12:08,069 --> 00:12:06,399
center

322
00:12:10,069 --> 00:12:08,079
so two other experiments we have in the

323
00:12:11,910 --> 00:12:10,079
u.s lab as we're proceeding through the

324
00:12:12,949 --> 00:12:11,920
three labs now

325
00:12:14,710 --> 00:12:12,959
the other

326
00:12:17,269 --> 00:12:14,720
the second experiment in the u.s lab is

327
00:12:18,389 --> 00:12:17,279
known as micro five this uses the model

328
00:12:20,790 --> 00:12:18,399
organism

329
00:12:21,750 --> 00:12:20,800
c elegans which is a round worm it's

330
00:12:24,470 --> 00:12:21,760
also

331
00:12:27,190 --> 00:12:24,480
known as the nematode and this

332
00:12:30,629 --> 00:12:27,200
experiment looks at the combined effect

333
00:12:33,509 --> 00:12:30,639
of reduced immunity we we know that in

334
00:12:35,590 --> 00:12:33,519
humans and in all organisms there's

335
00:12:37,750 --> 00:12:35,600
actually reduced immune response in

336
00:12:40,629 --> 00:12:37,760
microgravity

337
00:12:43,590 --> 00:12:40,639
and we also know that for some

338
00:12:46,069 --> 00:12:43,600

pathogens and bacteria like salmonella

339
00:12:48,870 --> 00:12:46,079
there's increased virulence so the

340
00:12:50,150 --> 00:12:48,880
combination of these two effects

341
00:12:52,629 --> 00:12:50,160
is

342
00:12:54,790 --> 00:12:52,639
both detrimental to the host and we're

343
00:12:57,670 --> 00:12:54,800
looking at the interactions of increased

344
00:13:02,790 --> 00:12:57,680
virulence and decreased immunity in the

345
00:13:06,310 --> 00:13:04,310
cells

346
00:13:08,389 --> 00:13:06,320
and i'm trying to remember these are

347
00:13:09,670 --> 00:13:08,399
actual full organisms of the nematode

348
00:13:12,629 --> 00:13:09,680
i'm pretty sure

349
00:13:14,710 --> 00:13:12,639
uh in response to the salmonella so in

350
00:13:18,069 --> 00:13:14,720
this experiment we'll again return both

351
00:13:21,350 --> 00:13:18,079
refrigerated and frozen samples and do a

352
00:13:22,629 --> 00:13:21,360
cellular and molecular analysis on those

353
00:13:24,470 --> 00:13:22,639
well this sounds like a lot of

354
00:13:26,550 --> 00:13:24,480
fascinating science to come sorry we're

355
00:13:27,910 --> 00:13:26,560
going to have to wrap it here but

356
00:13:30,069 --> 00:13:27,920
it just sounds like there's so much

357
00:13:32,230 --> 00:13:30,079
going on lots of exciting research and

358
00:13:33,509 --> 00:13:32,240
the best place for folks to learn more

359
00:13:35,310 --> 00:13:33,519
about these experiments is on our

360
00:13:37,829 --> 00:13:35,320
website at

361
00:13:39,509 --> 00:13:37,839
www.nasa.gov station so thank you so

362
00:13:40,710 --> 00:13:39,519
much dr cooley for joining us and we