
NASA
SPACESTATION
LIVE

1
00:00:11,830 --> 00:00:09,750
the recent end of expedition 47 marked

2
00:00:13,270 --> 00:00:11,840
the conclusion of the on-orbit portion

3
00:00:14,310 --> 00:00:13,280
of some international space station

4
00:00:15,509 --> 00:00:14,320
experiments that we've been talking

5
00:00:18,710 --> 00:00:15,519
about a lot

6
00:00:20,550 --> 00:00:18,720
including cognition and microbiome as

7
00:00:22,150 --> 00:00:20,560
well as ocular health the experiment

8
00:00:24,630 --> 00:00:22,160
looking into the reasons why some crew

9
00:00:26,950 --> 00:00:24,640
members suffer diminished vision after a

10
00:00:28,870 --> 00:00:26,960
long duration stay on orbit

11
00:00:30,630 --> 00:00:28,880
recently my colleague pat ryan spoke

12
00:00:33,510 --> 00:00:30,640
with the lead increment scientist for

13
00:00:35,350 --> 00:00:33,520

expeditions 47 and 48 yuri gerhart

14
00:00:37,910 --> 00:00:35,360
ramirez and

15
00:00:40,709 --> 00:00:37,920
about some of the new experiments

16
00:00:42,950 --> 00:00:40,719
getting started on this expedition

17
00:00:51,029 --> 00:00:42,960
and about what happens next for research

18
00:00:54,869 --> 00:00:53,110
we have a huge milestone in completion

19
00:00:56,709 --> 00:00:54,879
of these investigations that started

20
00:00:58,310 --> 00:00:56,719
many expeditions ago

21
00:01:00,869 --> 00:00:58,320
and require a lot of these subjects to

22
00:01:02,709 --> 00:01:00,879
complete now that the sub our final set

23
00:01:04,950 --> 00:01:02,719
of subjects uh is home these

24
00:01:08,149 --> 00:01:04,960
investigations will undergo what we call

25
00:01:09,910 --> 00:01:08,159
post flight bdc based data collection uh

26
00:01:11,990 --> 00:01:09,920
essentially they'll go through

27
00:01:13,109 --> 00:01:12,000
similar type of in-flight

28
00:01:14,390 --> 00:01:13,119
measurements like they did during

29
00:01:16,149 --> 00:01:14,400
in-flight

30
00:01:18,630 --> 00:01:16,159
and they will collect the data

31
00:01:20,789 --> 00:01:18,640
to figure out essentially what happens

32
00:01:22,469 --> 00:01:20,799
after they come home and some of these

33
00:01:23,990 --> 00:01:22,479
collections take

34
00:01:25,670 --> 00:01:24,000
it could be three months

35
00:01:27,429 --> 00:01:25,680
it could be six months and in the case

36
00:01:29,590 --> 00:01:27,439
of ocular health for example it can take

37
00:01:32,069 --> 00:01:29,600
close to a year to continue to take

38
00:01:34,390 --> 00:01:32,079

these uh different measurements

39
00:01:36,630 --> 00:01:34,400
of the eye in the vision

40
00:01:38,310 --> 00:01:36,640
including uh tests that were not part of

41
00:01:41,830 --> 00:01:38,320
the in-flight portion

42
00:01:43,510 --> 00:01:41,840
like mris and other ways to assess the

43
00:01:45,670 --> 00:01:43,520
health of the eye

44
00:01:47,670 --> 00:01:45,680
so after all the scientists gather all

45
00:01:48,789 --> 00:01:47,680
that data they'll have lots and lots and

46
00:01:50,710 --> 00:01:48,799
lots of

47
00:01:52,789 --> 00:01:50,720
mounds of data to go through and try to

48
00:01:54,469 --> 00:01:52,799
figure out what the big picture is

49
00:01:56,230 --> 00:01:54,479
telling us across all the different

50
00:01:57,990 --> 00:01:56,240
subjects through the years

51
00:01:59,910 --> 00:01:58,000
on all these various health issues that

52
00:02:02,069 --> 00:01:59,920
were we're trying to understand better

53
00:02:03,910 --> 00:02:02,079
for for space flight had they gotten a

54
00:02:06,069 --> 00:02:03,920
start on that had they been reviewing

55
00:02:07,910 --> 00:02:06,079
the on-orbit data from the prior

56
00:02:09,430 --> 00:02:07,920
subjects already and

57
00:02:10,949 --> 00:02:09,440
they're not saving it all up for one

58
00:02:12,710 --> 00:02:10,959
time well they can they can start

59
00:02:14,150 --> 00:02:12,720
assessing some of it they can understand

60
00:02:15,270 --> 00:02:14,160
whether or not we think we have viable

61
00:02:18,070 --> 00:02:15,280
data

62
00:02:21,190 --> 00:02:18,080
some of these investigations require

63
00:02:23,830 --> 00:02:21,200

body samples and some of those came home

64
00:02:25,350 --> 00:02:23,840
with spacex eight we had a huge a huge

65
00:02:26,790 --> 00:02:25,360
set of samples that came home for human

66
00:02:28,070 --> 00:02:26,800
research with that with that mission

67
00:02:29,510 --> 00:02:28,080
return

68
00:02:31,750 --> 00:02:29,520
others

69
00:02:33,750 --> 00:02:31,760
have taken place after spacex eight for

70
00:02:36,470 --> 00:02:33,760
these specific crew members for example

71
00:02:38,229 --> 00:02:36,480
with micro microbiome and those will

72
00:02:38,949 --> 00:02:38,239
have to wait until those samples come

73
00:02:41,030 --> 00:02:38,959
home

74
00:02:43,750 --> 00:02:41,040
to finally be able to put all the puzzle

75
00:02:45,990 --> 00:02:43,760
pieces together of all the data and

76
00:02:47,750 --> 00:02:46,000
continue to assess the post flight data

77
00:02:49,910 --> 00:02:47,760
collections if you would

78
00:02:52,790 --> 00:02:49,920
expedition 47 meant the end of some

79
00:02:54,630 --> 00:02:52,800
experiments expedition 48 has got its

80
00:02:57,030 --> 00:02:54,640
own experiments that are occupying the

81
00:02:58,470 --> 00:02:57,040
the crew on orbit uh tell me what you

82
00:03:00,869 --> 00:02:58,480
think are some of the highlight

83
00:03:03,030 --> 00:03:00,879
experiments that we'll be seeing happen

84
00:03:04,710 --> 00:03:03,040
over the next three months or so

85
00:03:07,110 --> 00:03:04,720
certainly we uh there's

86
00:03:09,350 --> 00:03:07,120
a lot of investigations that continue

87
00:03:12,149 --> 00:03:09,360
one of those uh actually an interesting

88
00:03:13,589 --> 00:03:12,159

pair is csa the canadian space agency

89
00:03:14,790 --> 00:03:13,599
has marrow

90
00:03:17,110 --> 00:03:14,800
and that's an investigation that's

91
00:03:18,710 --> 00:03:17,120
looking to understand how the bone

92
00:03:22,070 --> 00:03:18,720
marrow

93
00:03:25,589 --> 00:03:22,080
transitions from its natural state into

94
00:03:28,869 --> 00:03:25,599
more adipose or fat tissue if you would

95
00:03:29,910 --> 00:03:28,879
in the bone marrow itself this adipose

96
00:03:32,710 --> 00:03:29,920
tissue

97
00:03:35,110 --> 00:03:32,720
and so that is part of the natural bone

98
00:03:37,509 --> 00:03:35,120
process as we age to the for that bone

99
00:03:39,110 --> 00:03:37,519
marrow to transition however

100
00:03:41,430 --> 00:03:39,120
they are looking at

101
00:03:43,110 --> 00:03:41,440
how the microgravity environment

102
00:03:45,589 --> 00:03:43,120
accelerates that

103
00:03:48,070 --> 00:03:45,599
and that is analogous to patients that

104
00:03:50,229 --> 00:03:48,080
are in bed rest and have to undergo long

105
00:03:51,910 --> 00:03:50,239
periods without activity and so they're

106
00:03:53,110 --> 00:03:51,920
trying to understand

107
00:03:55,429 --> 00:03:53,120
how that

108
00:03:57,830 --> 00:03:55,439
lack of microgravity loading on the body

109
00:03:59,670 --> 00:03:57,840
of the bone marrow affects not just as

110
00:04:01,670 --> 00:03:59,680
we understand our muscular skeletal

111
00:04:03,589 --> 00:04:01,680
system but deep inside into the bone

112
00:04:05,670 --> 00:04:03,599
marrow and those processes that could

113
00:04:07,670 --> 00:04:05,680

also affect the white cells and red

114
00:04:08,869 --> 00:04:07,680
cells count

115
00:04:09,910 --> 00:04:08,879
for

116
00:04:12,149 --> 00:04:09,920
possible

117
00:04:13,910 --> 00:04:12,159
mitigations in the future

118
00:04:17,110 --> 00:04:13,920
are there some experiments on expedition

119
00:04:19,189 --> 00:04:17,120
48 that are not human life sciences

120
00:04:20,789 --> 00:04:19,199
research some other kinds of science oh

121
00:04:22,870 --> 00:04:20,799
yes we have uh

122
00:04:25,830 --> 00:04:22,880
all sorts of investigations one that we

123
00:04:29,030 --> 00:04:25,840
have continued and we've seen a lot of

124
00:04:30,950 --> 00:04:29,040
that during increment 47 and we may we

125
00:04:33,830 --> 00:04:30,960
may not continue through until increment

126
00:04:35,030 --> 00:04:33,840
49 perhaps it's issa's electromagnetic

127
00:04:36,310 --> 00:04:35,040
levitator

128
00:04:37,590 --> 00:04:36,320
that is looking at a completely

129
00:04:38,629 --> 00:04:37,600
different

130
00:04:39,590 --> 00:04:38,639
process

131
00:04:42,070 --> 00:04:39,600
for

132
00:04:44,070 --> 00:04:42,080
solidification of samples you have

133
00:04:47,030 --> 00:04:44,080
different samples of different metal

134
00:04:49,189 --> 00:04:47,040
alloys iron copper nickel and different

135
00:04:51,749 --> 00:04:49,199
alloys that they're looking at

136
00:04:53,430 --> 00:04:51,759
how they solidify and

137
00:04:55,670 --> 00:04:53,440
this particular

138
00:04:58,230 --> 00:04:55,680

apparatus that's out there allows us to

139
00:05:00,710 --> 00:04:58,240
process these batches of samples and

140
00:05:02,310 --> 00:05:00,720
watch through the high speed cameras and

141
00:05:05,670 --> 00:05:02,320
thermo

142
00:05:07,189 --> 00:05:05,680
essentially trying to assess the

143
00:05:09,590 --> 00:05:07,199
temperature

144
00:05:12,550 --> 00:05:09,600
quick heating cooling

145
00:05:14,550 --> 00:05:12,560
and watching how that sample solidifies

146
00:05:17,270 --> 00:05:14,560
and the surface tension that occurs

147
00:05:18,950 --> 00:05:17,280
within that sample and it's levitating

148
00:05:21,029 --> 00:05:18,960
obviously we have the microgravity but

149
00:05:23,270 --> 00:05:21,039
the electromagnetic forces are helped to

150
00:05:25,510 --> 00:05:23,280
keep it in place

151
00:05:27,990 --> 00:05:25,520
and being able to watch

152
00:05:29,830 --> 00:05:28,000
how those processes happen can help us

153
00:05:31,749 --> 00:05:29,840
potentially yield whole new

154
00:05:35,350 --> 00:05:31,759
revolutionary ways of manufacturing here

155
00:05:37,430 --> 00:05:35,360
on earth uh in a matter of a few more

156
00:05:39,510 --> 00:05:37,440
weeks there's another

157
00:05:41,510 --> 00:05:39,520
spacex dragon cargo ship that's coming

158
00:05:43,590 --> 00:05:41,520
to the station and it's delivering some

159
00:05:45,510 --> 00:05:43,600
brand new science that new to the

160
00:05:47,029 --> 00:05:45,520
station tell me about some of the things

161
00:05:48,550 --> 00:05:47,039
that you'll find in there

162
00:05:51,189 --> 00:05:48,560
we have a couple of very exciting

163
00:05:53,189 --> 00:05:51,199

investigations again spacex has come in

164
00:05:54,870 --> 00:05:53,199
with so many investigations to add to

165
00:05:56,550 --> 00:05:54,880
our portfolio it's very exciting to have

166
00:05:59,670 --> 00:05:56,560
them arrive

167
00:06:01,590 --> 00:05:59,680
in a few of those include jaxa's mouse

168
00:06:02,710 --> 00:06:01,600
epigenetics

169
00:06:05,189 --> 00:06:02,720
and this is a very interesting

170
00:06:09,430 --> 00:06:05,199
investigation where

171
00:06:11,270 --> 00:06:09,440
we we understand how dna and

172
00:06:13,510 --> 00:06:11,280
works right we have this dna sequence

173
00:06:15,510 --> 00:06:13,520
that tells us okay you're going to be

174
00:06:18,390 --> 00:06:15,520
roughly this height and this build and

175
00:06:19,990 --> 00:06:18,400
some of those pieces of of who we are

176
00:06:23,110 --> 00:06:20,000
but we are learning more and more with

177
00:06:24,309 --> 00:06:23,120
the epigenetic side of the house that

178
00:06:26,150 --> 00:06:24,319
there's this

179
00:06:29,110 --> 00:06:26,160
external to the genetics

180
00:06:30,950 --> 00:06:29,120
factors like diet stress

181
00:06:32,550 --> 00:06:30,960
and other

182
00:06:34,309 --> 00:06:32,560
different environmental conditions that

183
00:06:37,270 --> 00:06:34,319
actually

184
00:06:38,550 --> 00:06:37,280
affect how the gene expresses itself so

185
00:06:40,390 --> 00:06:38,560
these

186
00:06:42,309 --> 00:06:40,400
functions that are happening

187
00:06:44,070 --> 00:06:42,319
outside of the genome itself are not

188
00:06:45,029 --> 00:06:44,080

changing your dna sequence that is what

189
00:06:47,029 --> 00:06:45,039
it is

190
00:06:49,029 --> 00:06:47,039
but the fact that you may or may not be

191
00:06:50,950 --> 00:06:49,039
more susceptible to some diseases or you

192
00:06:52,870 --> 00:06:50,960
may or may not be more prone to certain

193
00:06:54,550 --> 00:06:52,880
things happening

194
00:06:56,230 --> 00:06:54,560
is heavily influenced by this

195
00:06:57,270 --> 00:06:56,240
environment and we're learning a lot

196
00:06:59,589 --> 00:06:57,280
about that

197
00:07:02,230 --> 00:06:59,599
and using our mice as a human model

198
00:07:04,870 --> 00:07:02,240
one of our model organisms that we can

199
00:07:07,029 --> 00:07:04,880
study and translate that data

200
00:07:10,309 --> 00:07:07,039
can help us understand

201
00:07:12,790 --> 00:07:10,319
uh what is going to happen uh for demise

202
00:07:14,550 --> 00:07:12,800
that will be exposed for microgravity

203
00:07:16,150 --> 00:07:14,560
during mic during this period and

204
00:07:18,629 --> 00:07:16,160
they'll come home and then they'll be

205
00:07:20,790 --> 00:07:18,639
able to assess their epigenetic changes

206
00:07:21,589 --> 00:07:20,800
and different the various organs they

207
00:07:23,110 --> 00:07:21,599
have

208
00:07:25,749 --> 00:07:23,120
as well as

209
00:07:28,309 --> 00:07:25,759
their offspring another one that's very

210
00:07:29,990 --> 00:07:28,319
very very interesting is heart sales and

211
00:07:31,430 --> 00:07:30,000
that's a nasa research investigation

212
00:07:33,990 --> 00:07:31,440
coming up

213
00:07:36,469 --> 00:07:34,000

in there's a very fascinating couple

214
00:07:39,029 --> 00:07:36,479
aspects to this investigation

215
00:07:42,150 --> 00:07:39,039
the first is that the scientists have

216
00:07:43,670 --> 00:07:42,160
successfully taken skin cells

217
00:07:46,390 --> 00:07:43,680
and

218
00:07:49,029 --> 00:07:46,400
i would say deprogram them

219
00:07:50,469 --> 00:07:49,039
and turn those human skin cells into

220
00:07:52,390 --> 00:07:50,479
stem cells

221
00:07:54,230 --> 00:07:52,400
now most people may be familiar with the

222
00:07:55,990 --> 00:07:54,240
fact that stem cells are those cells in

223
00:07:57,430 --> 00:07:56,000
the body when we're born that

224
00:07:59,510 --> 00:07:57,440
can turn into any kind of cell in the

225
00:08:01,430 --> 00:07:59,520
body right right so

226
00:08:04,150 --> 00:08:01,440
we take they've taken the skin skin

227
00:08:05,670 --> 00:08:04,160
cells and deprogrammed them and then

228
00:08:07,749 --> 00:08:05,680
once they are

229
00:08:09,670 --> 00:08:07,759
turned into the the stem cell

230
00:08:11,830 --> 00:08:09,680
then they can go ahead and

231
00:08:13,510 --> 00:08:11,840
differentiate them or reprogram them

232
00:08:14,869 --> 00:08:13,520
into

233
00:08:20,390 --> 00:08:14,879
heart cells

234
00:08:22,070 --> 00:08:20,400
are will be launching on on space x9

235
00:08:23,510 --> 00:08:22,080
coming to the space station uh to

236
00:08:26,950 --> 00:08:23,520
undergo some

237
00:08:28,309 --> 00:08:26,960
uh exposure and we'll have to study them

238
00:08:30,629 --> 00:08:28,319

as they express themselves in the

239
00:08:32,310 --> 00:08:30,639
microgravity environment and

240
00:08:34,709 --> 00:08:32,320
the hope is that eventually we might be

241
00:08:37,190 --> 00:08:34,719
able to better understand cardiac

242
00:08:38,790 --> 00:08:37,200
impacts not only to our crew members as

243
00:08:40,790 --> 00:08:38,800
a result of the whole

244
00:08:41,829 --> 00:08:40,800
spaceflight environment

245
00:08:44,310 --> 00:08:41,839
but

246
00:08:46,630 --> 00:08:44,320
ideally we might we might be able to

247
00:08:48,710 --> 00:08:46,640
eventually lead to revolutionary ways of

248
00:08:51,110 --> 00:08:48,720
heart disease treatments here on earth

249
00:08:53,269 --> 00:08:51,120
and that's very very helpful very

250
00:08:55,350 --> 00:08:53,279
interesting few examples of what's going

251
00:08:56,949 --> 00:08:55,360
to be going on in terms of science on

252
00:08:57,829 --> 00:08:56,959
board the station the next few months

253
00:09:01,110 --> 00:08:57,839
and

254
00:09:03,750 --> 00:09:01,120
about how the how the operations have

255
00:09:06,470 --> 00:09:03,760
gone absolutely yes uh yuri geonard