



**SPACESTATION
LIVE**

1
00:00:09,750 --> 00:00:07,430
in the five weeks since expedition 47

2
00:00:11,589 --> 00:00:09,760
got underway the six crew members on

3
00:00:13,350 --> 00:00:11,599
board the international space station

4
00:00:15,749 --> 00:00:13,360
have been very busy with science

5
00:00:18,070 --> 00:00:15,759
research activities and they have had a

6
00:00:20,870 --> 00:00:18,080
lot of opportunities to show the

7
00:00:22,550 --> 00:00:20,880
international part of this operation and

8
00:00:24,390 --> 00:00:22,560
this morning we're going to get a little

9
00:00:26,790 --> 00:00:24,400
overview of that research that's

10
00:00:28,950 --> 00:00:26,800
underway on orbit i guess this morning

11
00:00:32,310 --> 00:00:28,960
is a yuri grenade ramirez who is the

12
00:00:35,030 --> 00:00:32,320
expedition 47 and 48 lead increment

13
00:00:36,630 --> 00:00:35,040

scientist there's a lot of station

14

00:00:38,869 --> 00:00:36,640

science that uses the crew members

15

00:00:41,270 --> 00:00:38,879

themselves as test subjects and tim

16

00:00:43,510 --> 00:00:41,280

copra and tim peake have been doing that

17

00:00:45,590 --> 00:00:43,520

for a number of weeks now

18

00:00:47,510 --> 00:00:45,600

tell me a little bit about the goals of

19

00:00:49,430 --> 00:00:47,520

some of these human life sciences

20

00:00:51,830 --> 00:00:49,440

experiments let's start with just a

21

00:00:53,350 --> 00:00:51,840

couple of them called microbiome and

22

00:00:54,709 --> 00:00:53,360

cognition

23

00:00:56,470 --> 00:00:54,719

certainly uh first i just want to

24

00:00:59,110 --> 00:00:56,480

mention a little bit about how exciting

25

00:01:00,150 --> 00:00:59,120

it is for us to see completion of human

26

00:01:01,590 --> 00:01:00,160

research

27

00:01:03,029 --> 00:01:01,600

investigations

28

00:01:04,950 --> 00:01:03,039

as you may know we consider our crew

29

00:01:07,429 --> 00:01:04,960

members our subjects and it takes

30

00:01:08,870 --> 00:01:07,439

several subjects to achieve statistical

31

00:01:11,590 --> 00:01:08,880

significance in order to be able to

32

00:01:13,270 --> 00:01:11,600

analyze the data so therefore it's many

33

00:01:14,950 --> 00:01:13,280

years in the making for us to get a

34

00:01:17,109 --> 00:01:14,960

complete set of number

35

00:01:19,109 --> 00:01:17,119

uh sub of subjects so that we can

36

00:01:21,670 --> 00:01:19,119

analyze the data and the scientists can

37

00:01:23,749 --> 00:01:21,680

can have meaningful results

38

00:01:25,670 --> 00:01:23,759

a few of these are being completed with

39
00:01:28,070 --> 00:01:25,680
this crew members coming home and some

40
00:01:29,830 --> 00:01:28,080
of their data collections after

41
00:01:32,230 --> 00:01:29,840
you mentioned cognition

42
00:01:34,310 --> 00:01:32,240
is one of those that is also

43
00:01:35,749 --> 00:01:34,320
coming to completion it's very exciting

44
00:01:37,749 --> 00:01:35,759
to see that wrapping up they are

45
00:01:41,030 --> 00:01:37,759
investigating how the environment of

46
00:01:43,590 --> 00:01:41,040
space and the stress related environment

47
00:01:46,149 --> 00:01:43,600
their sleep patterns affect the

48
00:01:49,270 --> 00:01:46,159
cognitive abilities the crew members

49
00:01:51,830 --> 00:01:49,280
perform a battery of tests that are

50
00:01:54,870 --> 00:01:51,840
designed to understand how those

51
00:01:57,510 --> 00:01:54,880
abilities related to problem solving

52
00:02:00,230 --> 00:01:57,520
creative thinking and all sorts of these

53
00:02:02,230 --> 00:02:00,240
motor skills are affected uh during

54
00:02:03,910 --> 00:02:02,240
these conditions in microgravity

55
00:02:05,670 --> 00:02:03,920
because the conditions are there it's

56
00:02:07,830 --> 00:02:05,680
not like they're on vacation and they're

57
00:02:09,430 --> 00:02:07,840
relaxing they are under some stress it

58
00:02:11,750 --> 00:02:09,440
is a very stressful exactly and all of

59
00:02:15,030 --> 00:02:11,760
these factors affect our our natural

60
00:02:16,949 --> 00:02:15,040
ability to to react another one that is

61
00:02:19,430 --> 00:02:16,959
called microbiome and that has to do

62
00:02:22,229 --> 00:02:19,440
with their insides in a different way

63
00:02:25,589 --> 00:02:22,239

that's right we are uh understanding the

64

00:02:28,309 --> 00:02:25,599

human body uh as a microcosmos if you

65

00:02:31,430 --> 00:02:28,319

would so all of the different bacteria

66

00:02:32,550 --> 00:02:31,440

and creatures that live inside our

67

00:02:33,350 --> 00:02:32,560

bodies

68

00:02:34,869 --> 00:02:33,360

are

69

00:02:36,390 --> 00:02:34,879

constantly

70

00:02:38,710 --> 00:02:36,400

being maintained and balanced and that

71

00:02:40,949 --> 00:02:38,720

balance is what allows us to be healthy

72

00:02:42,470 --> 00:02:40,959

our immune system to kick into gear

73

00:02:44,630 --> 00:02:42,480

and if anything gets a little bit off

74

00:02:46,710 --> 00:02:44,640

balance then we're not able to cope with

75

00:02:47,589 --> 00:02:46,720

illness as well and we get we get sick

76

00:02:49,750 --> 00:02:47,599

so

77

00:02:51,509 --> 00:02:49,760

understanding the interactions of that

78

00:02:53,270 --> 00:02:51,519

micro cosmos of the human body in

79

00:02:54,390 --> 00:02:53,280

relationship to the environment it's

80

00:02:57,030 --> 00:02:54,400

exposed to

81

00:02:59,110 --> 00:02:57,040

uh will yield hopefully a better

82

00:03:00,869 --> 00:02:59,120

understanding of how the immune system

83

00:03:02,390 --> 00:03:00,879

gets affected and depressed when crew

84

00:03:04,550 --> 00:03:02,400

members are in space

85

00:03:06,149 --> 00:03:04,560

so this investigation takes samples from

86

00:03:08,309 --> 00:03:06,159

the human body

87

00:03:10,149 --> 00:03:08,319

and the environment to try to understand

88

00:03:12,070 --> 00:03:10,159

uh how that is progressing through

89

00:03:13,830 --> 00:03:12,080

through their microgravity stay i

90

00:03:15,990 --> 00:03:13,840

mentioned that this is you know an

91

00:03:17,990 --> 00:03:16,000

international effort there's a japanese

92

00:03:19,830 --> 00:03:18,000

experiment that's looking about how

93

00:03:21,110 --> 00:03:19,840

being in space affects the immune

94

00:03:23,589 --> 00:03:21,120

function too

95

00:03:26,390 --> 00:03:23,599

what do the crew members do for for this

96

00:03:27,990 --> 00:03:26,400

experiment called multi-omics

97

00:03:29,670 --> 00:03:28,000

this experiment's a little bit different

98

00:03:32,149 --> 00:03:29,680

it does look at the similar environment

99

00:03:35,030 --> 00:03:32,159

in particular focusing in the in the gut

100

00:03:37,910 --> 00:03:35,040

area of the body but it is

101
00:03:40,789 --> 00:03:37,920
trying to understand if feeding the body

102
00:03:42,630 --> 00:03:40,799
with prebiotics which are essentially

103
00:03:44,949 --> 00:03:42,640
like the nutrients that a probiotic

104
00:03:47,110 --> 00:03:44,959
needs to be happy which is your gut

105
00:03:49,110 --> 00:03:47,120
flora to keep it healthy

106
00:03:51,509 --> 00:03:49,120
if we if we

107
00:03:54,309 --> 00:03:51,519
adequately provide those nutrients would

108
00:03:56,949 --> 00:03:54,319
that increase the ability of that

109
00:03:58,470 --> 00:03:56,959
gut flora to be happy healthy and

110
00:04:01,030 --> 00:03:58,480
therefore promote

111
00:04:02,309 --> 00:04:01,040
a stronger health and immune system

112
00:04:04,630 --> 00:04:02,319
and that's part of what that

113
00:04:06,630 --> 00:04:04,640

investigation is trying to understand

114

00:04:08,470 --> 00:04:06,640

in fact is the european and the canadian

115

00:04:10,949 --> 00:04:08,480

space agencies have some human life

116

00:04:13,990 --> 00:04:10,959

sciences experiments going right now too

117

00:04:16,629 --> 00:04:14,000

tell me about circadian rhythms and at

118

00:04:18,870 --> 00:04:16,639

home in space how do those fit into the

119

00:04:21,030 --> 00:04:18,880

effort to find out about what happens to

120

00:04:23,110 --> 00:04:21,040

people in weightlessness

121

00:04:25,110 --> 00:04:23,120

circadian rhythms is

122

00:04:28,150 --> 00:04:25,120

an investigation that looks at your body

123

00:04:29,189 --> 00:04:28,160

and the impacts of your biological clock

124

00:04:32,790 --> 00:04:29,199

so

125

00:04:34,150 --> 00:04:32,800

as we are conditioned to

126

00:04:35,670 --> 00:04:34,160

the day-night cycles that we have here

127

00:04:37,110 --> 00:04:35,680

on earth

128

00:04:39,189 --> 00:04:37,120

some people may be familiar that on

129

00:04:40,469 --> 00:04:39,199

station you have a day-night cycle every

130

00:04:42,950 --> 00:04:40,479

90 minutes

131

00:04:44,710 --> 00:04:42,960

and the hypothesis is to try to

132

00:04:47,510 --> 00:04:44,720

understand

133

00:04:48,950 --> 00:04:47,520

how that day night cycle that is very

134

00:04:51,270 --> 00:04:48,960

different and irregular from what we

135

00:04:53,270 --> 00:04:51,280

experience naturally on earth affects

136

00:04:55,350 --> 00:04:53,280

your whole biological clock

137

00:04:58,710 --> 00:04:55,360

so they are conducting experiments to

138

00:05:00,629 --> 00:04:58,720

measure uh your core body temperature uh

139

00:05:02,629 --> 00:05:00,639

via thermal lab sensor that they place

140

00:05:04,710 --> 00:05:02,639

on on the crew member's forehead and

141

00:05:06,629 --> 00:05:04,720

chest area and that

142

00:05:09,270 --> 00:05:06,639

temperature recording allows them to

143

00:05:12,550 --> 00:05:09,280

correlate to melatonin which is one of

144

00:05:15,749 --> 00:05:12,560

the most studied hormones that are

145

00:05:17,510 --> 00:05:15,759

associated with the circadian rhythms

146

00:05:19,270 --> 00:05:17,520

process in the body

147

00:05:21,590 --> 00:05:19,280

and then and the other one at home in

148

00:05:23,189 --> 00:05:21,600

space and at home it sounds quaint it

149

00:05:26,310 --> 00:05:23,199

does uh it is a little bit different

150

00:05:29,590 --> 00:05:26,320

looking at the psychosocial aspects

151
00:05:31,110 --> 00:05:29,600
so we understand we have crew members

152
00:05:33,350 --> 00:05:31,120
that are in a confined environment it's

153
00:05:35,830 --> 00:05:33,360
a stressful situation as we've discussed

154
00:05:37,270 --> 00:05:35,840
and you also have multi multicultural

155
00:05:38,469 --> 00:05:37,280
crew members coming together to make

156
00:05:41,430 --> 00:05:38,479
everything happen

157
00:05:43,670 --> 00:05:41,440
so at home in space is proposing that

158
00:05:46,070 --> 00:05:43,680
one of the coping mechanisms that are

159
00:05:47,990 --> 00:05:46,080
possibly being developed naturally

160
00:05:50,150 --> 00:05:48,000
is to develop an overarching space

161
00:05:51,510 --> 00:05:50,160
culture to help the crew members deal

162
00:05:52,629 --> 00:05:51,520
with that stress and have a coping

163
00:05:54,870 --> 00:05:52,639

mechanism

164

00:05:57,189 --> 00:05:54,880

it also studies their impacts

165

00:05:59,189 --> 00:05:57,199

from being away from home and their

166

00:06:00,230 --> 00:05:59,199

loved ones and their their families back

167

00:06:02,550 --> 00:06:00,240

home so

168

00:06:03,350 --> 00:06:02,560

it'll collect questionnaires

169

00:06:07,990 --> 00:06:03,360

through

170

00:06:09,670 --> 00:06:08,000

whether this is this is correct and it

171

00:06:11,430 --> 00:06:09,680

is really interesting to see that it

172

00:06:12,710 --> 00:06:11,440

could have applications here on earth

173

00:06:14,790 --> 00:06:12,720

not just for

174

00:06:16,150 --> 00:06:14,800

people that are working under confined

175

00:06:22,230 --> 00:06:16,160

uh

176

00:06:24,309 --> 00:06:22,240

elderly that are confined to some some

177

00:06:26,150 --> 00:06:24,319

human living living conditions that are

178

00:06:28,230 --> 00:06:26,160

are maybe not their homes they have to

179

00:06:31,189 --> 00:06:28,240

go into in a community living

180

00:06:32,629 --> 00:06:31,199

and if we understand how to develop that

181

00:06:34,870 --> 00:06:32,639

we may be able to provide it as a

182

00:06:37,029 --> 00:06:34,880

counter measure to help people

183

00:06:39,510 --> 00:06:37,039

achieve a better quality of life all of

184

00:06:40,870 --> 00:06:39,520

which is part of the effort to find out

185

00:06:42,629 --> 00:06:40,880

just what it's going to take to keep

186

00:06:45,590 --> 00:06:42,639

people well

187

00:06:47,590 --> 00:06:45,600

on long long missions of the future

188

00:06:49,670 --> 00:06:47,600

exactly and that and that as a great

189

00:06:50,870 --> 00:06:49,680

space application as well

190

00:06:52,390 --> 00:06:50,880

we mentioned earlier that there's

191

00:06:53,430 --> 00:06:52,400

another cargo ship launching to the

192

00:06:57,670 --> 00:06:53,440

station

193

00:06:59,990 --> 00:06:57,680

and that it is carrying

194

00:07:02,070 --> 00:07:00,000

material for experiments for this

195

00:07:03,670 --> 00:07:02,080

expedition and the next one tell me

196

00:07:05,430 --> 00:07:03,680

about a couple of that you're

197

00:07:08,309 --> 00:07:05,440

particularly looking forward to the

198

00:07:09,749 --> 00:07:08,319

cargo going up on the dragon ship today

199

00:07:11,350 --> 00:07:09,759

as you said there are so many

200

00:07:14,070 --> 00:07:11,360

experiments coming out it's really hard

201
00:07:16,469 --> 00:07:14,080
to to isolate a few so i'll just pick a

202
00:07:19,510 --> 00:07:16,479
few uh but a lot of the science is very

203
00:07:21,830 --> 00:07:19,520
exciting in the very uh

204
00:07:23,670 --> 00:07:21,840
various areas that we are investigating

205
00:07:25,749 --> 00:07:23,680
we are coming bringing

206
00:07:27,350 --> 00:07:25,759
several investigations from students

207
00:07:29,589 --> 00:07:27,360
through the nanowrimox program

208
00:07:32,150 --> 00:07:29,599
there is also a new device called the

209
00:07:35,350 --> 00:07:32,160
wet lab rna smart cycler which is

210
00:07:37,670 --> 00:07:35,360
looking at the ability to extract rna

211
00:07:39,270 --> 00:07:37,680
from biological samples

212
00:07:41,670 --> 00:07:39,280
while on station

213
00:07:43,110 --> 00:07:41,680

and that will allow scientists to

214

00:07:44,950 --> 00:07:43,120

completely revolutionize the way we're

215

00:07:46,469 --> 00:07:44,960

doing biological science today right now

216

00:07:48,309 --> 00:07:46,479

we have to bring our samples home keep

217

00:07:49,830 --> 00:07:48,319

it preserved at the right temperatures

218

00:07:52,550 --> 00:07:49,840

and conditions

219

00:07:55,430 --> 00:07:52,560

and this could open up some analyzing

220

00:07:56,869 --> 00:07:55,440

capabilities while on orbit

221

00:08:00,390 --> 00:07:56,879

we also have

222

00:08:03,670 --> 00:08:00,400

a couple of international

223

00:08:05,110 --> 00:08:03,680

investigations coming up like the

224

00:08:07,589 --> 00:08:05,120

india

225

00:08:10,469 --> 00:08:07,599

spheroids for issa excuse me which is

226

00:08:13,029 --> 00:08:10,479

studying uh the endothelial cells which

227

00:08:13,990 --> 00:08:13,039

are cells that are found in the blood

228

00:08:16,950 --> 00:08:14,000

vessels

229

00:08:18,230 --> 00:08:16,960

and it could potentially lead to some

230

00:08:20,629 --> 00:08:18,240

revolutionary

231

00:08:23,909 --> 00:08:20,639

medical treatments as well

232

00:08:26,309 --> 00:08:23,919

we have jaxa bringing two

233

00:08:27,990 --> 00:08:26,319

somewhat related cousin investigations

234

00:08:30,790 --> 00:08:28,000

if you would uh plant gravity sensing

235

00:08:32,709 --> 00:08:30,800

and cell mechanosensing it's a continued

236

00:08:35,509 --> 00:08:32,719

series of investigations that is trying

237

00:08:39,029 --> 00:08:35,519

to understand how the plants

238

00:08:42,630 --> 00:08:41,350

sense gravity so how do they know that

239

00:08:43,509 --> 00:08:42,640

they are not in the gravity what are

240

00:08:46,310 --> 00:08:43,519

those

241

00:08:47,990 --> 00:08:46,320

uh mechanisms that are altered at that

242

00:08:49,590 --> 00:08:48,000

cellular level

243

00:08:52,070 --> 00:08:49,600

that therefore are having an impact on

244

00:08:53,110 --> 00:08:52,080

how they grow and and similar to muscle

245

00:08:55,590 --> 00:08:53,120

type of cells with the cell

246

00:08:57,190 --> 00:08:55,600

mechanosensing that could also yield

247

00:08:59,590 --> 00:08:57,200

potential treatments for some of the

248

00:09:01,990 --> 00:08:59,600

muscle atrophy that we're seeing

249

00:09:04,230 --> 00:09:02,000

we also have rr3 ila lily bringing from

250

00:09:05,430 --> 00:09:04,240

the nasa side of the house a big

251

00:09:06,870 --> 00:09:05,440

investigation that can help us

252

00:09:09,269 --> 00:09:06,880

understand

253

00:09:10,790 --> 00:09:09,279

if we if we can devise a new mechanisms