STATION
LIFE

1
00:00:17,939 --> 00:00:15,869
nasa is known for its iconic Mission

2
00:00:20,429 --> 00:00:17,949
Control Center in Houston Texas where

3
00:00:23,009 --> 00:00:20,439
every NASA human mission into space has

4
00:00:25,080 --> 00:00:23,019
been controlled since 1965

5
00:00:26,490 --> 00:00:25,090
well just like NASA uses a mission

6
00:00:29,009 --> 00:00:26,500
control center to run its human

7
00:00:30,960 --> 00:00:29,019
operations in space the human body has

8
00:00:34,590 --> 00:00:30,970
it's very own mission control center the

9
00:00:35,880 --> 00:00:34,600
brain but just imagine if NASA's mission

10
00:00:37,470 --> 00:00:35,890
control center had to work in

11
00:00:40,320 --> 00:00:37,480
environments it wasn't designed to

12
00:00:42,150 --> 00:00:40,330
operate in things might not operate and

13
00:00:44,070 --> 00:00:42,160

function as planned and that's what

14
00:00:46,740 --> 00:00:44,080
we'll be looking at how the human body's

15
00:00:49,320 --> 00:00:46,750
mission control the brain operates in

16
00:00:51,690 --> 00:00:49,330
the unique environment of space hi I'm

17
00:01:07,349 --> 00:00:51,700
NASA astronaut Tracy Dyson welcome to

18
00:01:09,300 --> 00:01:07,359
station life in this episode of station

19
00:01:11,849 --> 00:01:09,310
life we're going to look at the brain in

20
00:01:13,770 --> 00:01:11,859
space and the Associated studies

21
00:01:15,929 --> 00:01:13,780
conducted onboard the International

22
00:01:17,999 --> 00:01:15,939
Space Station we'll learn about the

23
00:01:20,310 --> 00:01:18,009
effects of microgravity on the brain and

24
00:01:23,010 --> 00:01:20,320
the psychological effects of living in

25
00:01:25,169 --> 00:01:23,020
relative isolation far away from home in

26
00:01:27,929 --> 00:01:25,179
a stressful and hazardous environment

27
00:01:29,279 --> 00:01:27,939
we'll see how the European Space Agency

28
00:01:31,169 --> 00:01:29,289
is studying the effects of microgravity

29
00:01:33,809 --> 00:01:31,179
and neuroplasticity

30
00:01:35,550 --> 00:01:33,819
using parabolic flight we'll talk about

31
00:01:38,099 --> 00:01:35,560
what it's like to acclimate to living in

32
00:01:40,230 --> 00:01:38,109
microgravity we'll hear from scientists

33
00:01:42,209 --> 00:01:40,240
here at the Johnson Space Center that

34
00:01:44,249 --> 00:01:42,219
are studying sensory motor adaptability

35
00:01:45,809 --> 00:01:44,259
training and recovery of functional

36
00:01:49,139 --> 00:01:45,819
performance following long-duration

37
00:01:54,090 --> 00:01:49,149
spaceflight get ready lots of

38
00:01:55,590 --> 00:01:54,100

information is heading your way one of

39
00:01:58,440 --> 00:01:55,600
the many challenges that we face on our

40
00:02:00,649 --> 00:01:58,450
mission to Mars is how our brain will

41
00:02:02,330 --> 00:02:00,659
adapt to the changes in gravity

42
00:02:04,100 --> 00:02:02,340
if you take up the six months to get

43
00:02:05,959 --> 00:02:04,110
there but here's the problem the more

44
00:02:07,789 --> 00:02:05,969
time you spend in space the longer takes

45
00:02:09,559 --> 00:02:07,799
your brain to readapt to gravity so what

46
00:02:11,120 --> 00:02:09,569
does that mean landing on Mars after

47
00:02:12,979 --> 00:02:11,130
being weightless for six months you have

48
00:02:14,870 --> 00:02:12,989
trouble walking straight your vision is

49
00:02:18,140 --> 00:02:14,880
affected poor eye hand coordination

50
00:02:20,660 --> 00:02:18,150
motion sickness dizziness vomiting some

51
00:02:22,070 --> 00:02:20,670
people don't even want to move landing

52
00:02:24,020 --> 00:02:22,080
is one of the most critical aspects of

53
00:02:26,270 --> 00:02:24,030
the journey so how will this impact our

54
00:02:28,280 --> 00:02:26,280
trip to Mars first of all landing on

55
00:02:30,290 --> 00:02:28,290
Mars will require good eye hand

56
00:02:32,030 --> 00:02:30,300
coordination and perception so say you

57
00:02:33,830 --> 00:02:32,040
have a safe touchdown but there's an

58
00:02:34,370 --> 00:02:33,840
emergency situation and you have to exit

59
00:02:36,229 --> 00:02:34,380
the vehicle

60
00:02:38,660 --> 00:02:36,239
if you can't function it could be a

61
00:02:40,130 --> 00:02:38,670
pretty dangerous situation this is just

62
00:02:41,990 --> 00:02:40,140
one of the human challenges we'll face

63
00:02:43,850 --> 00:02:42,000

on a mission to Mars we don't have all

64
00:02:46,130 --> 00:02:43,860
the answers yet but we do have the key

65
00:02:47,750 --> 00:02:46,140
the International Space Station every

66
00:02:49,670 --> 00:02:47,760
day aboard we're learning more and more

67
00:02:50,990 --> 00:02:49,680
about how our bodies adapt to weightless

68
00:02:53,539 --> 00:02:51,000
environments and gravitational

69
00:02:55,580 --> 00:02:53,549
transitions we're going to Mars it won't

70
00:02:57,620 --> 00:02:55,590
be easy but because of the research that

71
00:02:59,600 --> 00:02:57,630
we're doing today on the ground and

72
00:03:01,450 --> 00:02:59,610
aboard the International Space Station

73
00:03:20,790 --> 00:03:01,460
we'll be ready

74
00:03:27,250 --> 00:03:24,100
today I've been looking actually at the

75
00:03:30,220 --> 00:03:27,260
brain and how the brain the brain reacts

76
00:03:32,940 --> 00:03:30,230
to microgravity in a sense it's a very

77
00:03:36,670 --> 00:03:32,950
simple experiment because we do before

78
00:03:39,850 --> 00:03:36,680
we take off in which parabolic flight we

79
00:03:43,090 --> 00:03:39,860
do an MRI measurement this scanner in a

80
00:03:45,040 --> 00:03:43,100
hospital in Bordeaux and then I off to

81
00:03:47,320 --> 00:03:45,050
the fight we do the same and then we

82
00:03:49,810 --> 00:03:47,330
look at the image of the brain and by

83
00:03:52,330 --> 00:03:49,820
subtracting both images before and after

84
00:03:55,540 --> 00:03:52,340
microgravity by parabolic flights we

85
00:03:57,780 --> 00:03:55,550
hope to see changes these changes it

86
00:04:00,910 --> 00:03:57,790
it's called neuroplasticity and

87
00:04:03,460 --> 00:04:00,920
neuroplasticity is something we all know

88
00:04:05,410 --> 00:04:03,470

somehow I can give the example of a

89
00:04:08,080 --> 00:04:05,420
bicycle if you are a kid and you're

90
00:04:10,240 --> 00:04:08,090
right a bicycle or you try you fall over

91
00:04:12,250 --> 00:04:10,250
all the time because you can't do it and

92
00:04:16,090 --> 00:04:12,260
then suddenly like this you can do it

93
00:04:17,650 --> 00:04:16,100
and it's very tricky wise but some

94
00:04:19,090 --> 00:04:17,660
somewhere in the brain there must be

95
00:04:21,310 --> 00:04:19,100
some connections something which is

96
00:04:23,080 --> 00:04:21,320
happening actually we want to do the

97
00:04:24,490 --> 00:04:23,090
same to find out how is the brain

98
00:04:28,180 --> 00:04:24,500
reacting to microgravity

99
00:04:31,480 --> 00:04:28,190
where does changes take place in the

100
00:04:33,390 --> 00:04:31,490
brain we all know it is a very very

101
00:04:35,170 --> 00:04:33,400
complicated system with a lot of

102
00:04:37,390 --> 00:04:35,180
connections actually and it's the

103
00:04:39,880 --> 00:04:37,400
connections which make differences

104
00:04:41,650 --> 00:04:39,890
between people why people can make some

105
00:04:45,130 --> 00:04:41,660
logical reasoning and other people can

106
00:04:47,620 --> 00:04:45,140
do it less or be creative or other type

107
00:04:49,320 --> 00:04:47,630
of habits it has much to do with the

108
00:04:52,210 --> 00:04:49,330
create we take connections in the brain

109
00:04:57,220 --> 00:04:52,220
and these connections sometimes are also

110
00:04:58,840 --> 00:04:57,230
missing when in patients races so we

111
00:05:01,810 --> 00:04:58,850
want to look with this method or

112
00:05:04,390 --> 00:05:01,820
methodology of looking at the brain

113
00:05:06,730 --> 00:05:04,400

before and after such a huge impact as

114
00:05:09,100 --> 00:05:06,740
microgravity we found we want to find

115
00:05:11,520 --> 00:05:09,110
out where does the change take place

116
00:05:16,450 --> 00:05:11,530
which F really we are related to

117
00:05:19,050 --> 00:05:16,460
dizziness motion sickness fluid shifts

118
00:05:21,940 --> 00:05:19,060
things which really happen in

119
00:05:24,220 --> 00:05:21,950
astronautical notes but the same during

120
00:05:26,590 --> 00:05:24,230
on board on this parabolic flight

121
00:05:29,920 --> 00:05:26,600
by using the model of three and post

122
00:05:32,860 --> 00:05:29,930
parabolic flight we hope to find regions

123
00:05:35,670 --> 00:05:32,870
which are particularly busy and

124
00:05:38,860 --> 00:05:35,680
continuing to change all the time to

125
00:05:42,340 --> 00:05:38,870
adapt to microgravity because it's known

126
00:05:43,750 --> 00:05:42,350
that people who fly the first day many

127
00:05:46,180 --> 00:05:43,760
of them are ill if they don't take

128
00:05:49,390 --> 00:05:46,190
medication but the second day on the

129
00:05:51,490 --> 00:05:49,400
third day they are much better so the

130
00:05:53,890 --> 00:05:51,500
must have been changes in the brain real

131
00:05:57,460 --> 00:05:53,900
changes that's what I want to look at

132
00:06:00,760 --> 00:05:57,470
the methodology of MRI methods we use is

133
00:06:04,210 --> 00:06:00,770
a bit different than the normal ones we

134
00:06:07,030 --> 00:06:04,220
look at diffusion in the neural tracts

135
00:06:08,590 --> 00:06:07,040
and I can explain it simply by saying

136
00:06:11,680 --> 00:06:08,600
suppose you have a helicopter and you

137
00:06:14,200 --> 00:06:11,690
stay with this helicopter like one day

138
00:06:17,050 --> 00:06:14,210

on top of a big city I'm Saddam or

139
00:06:19,240 --> 00:06:17,060
Brussels or London and but this camera

140
00:06:21,640 --> 00:06:19,250
of this helicopter head it's not a power

141
00:06:24,160 --> 00:06:21,650
to see the buildings only the people who

142
00:06:27,010 --> 00:06:24,170
are moving on their bike walking or in

143
00:06:29,800 --> 00:06:27,020
the cars after one day we will have a

144
00:06:32,650 --> 00:06:29,810
map of this city we will know the main

145
00:06:36,280 --> 00:06:32,660
roads the small roads the places where

146
00:06:39,160 --> 00:06:36,290
things are happening or big big streams

147
00:06:41,950 --> 00:06:39,170
of connectivity that's what we do with

148
00:06:56,200 --> 00:06:41,960
this methodology of tractography by

149
00:07:05,450 --> 00:07:01,159
so when I first got to space on sts-118

150
00:07:08,469 --> 00:07:05,460
unborn endeavor it was my job to unstrap

151
00:07:11,089 --> 00:07:08,479
as soon as we got main engine cutoff and

152
00:07:13,609 --> 00:07:11,099
blow it out of my seat grab a video

153
00:07:15,649 --> 00:07:13,619
camera and videotape the external tank

154
00:07:17,420 --> 00:07:15,659
falling away so I was one of the very

155
00:07:19,189 --> 00:07:17,430
first people to get out of my seat and

156
00:07:21,159 --> 00:07:19,199
all I remember is I hope I don't screw

157
00:07:23,719 --> 00:07:21,169
this up so I had no time to think about

158
00:07:25,820 --> 00:07:23,729
acclimating to microgravity I had no

159
00:07:28,040 --> 00:07:25,830
time to think of am I gonna get sick am

160
00:07:30,079 --> 00:07:28,050
I gonna be disoriented I just knew I had

161
00:07:33,219 --> 00:07:30,089
to get that camera on the external tank

162
00:07:36,559 --> 00:07:33,229
and it did that without any hitches and

163
00:07:38,869 --> 00:07:36,569

after I launched on the Soyuz rocket and

164
00:07:40,999 --> 00:07:38,879
I got inside the space station I just

165
00:07:43,040 --> 00:07:41,009
remember it being like this big swim

166
00:07:46,339 --> 00:07:43,050
tank your brain goes through this period

167
00:07:49,369 --> 00:07:46,349
where you you think that's not the way

168
00:07:51,619 --> 00:07:49,379
it is at home but it was a matter of

169
00:07:53,600 --> 00:07:51,629
minutes before I just made sense out of

170
00:07:56,209 --> 00:07:53,610
it and flipped myself around so it was

171
00:07:57,739 --> 00:07:56,219
you don't like that for everybody but

172
00:08:00,040 --> 00:07:57,749
some of us get up there and it's just

173
00:08:03,139 --> 00:08:00,050
like you were made to float in space

174
00:08:04,969 --> 00:08:03,149
okay so now coming back home that's kind

175
00:08:09,019 --> 00:08:04,979
of a different story when you come back

176
00:08:11,929 --> 00:08:09,029
into the tentacles of gravity it it

177
00:08:14,389 --> 00:08:11,939
pulls you down it weighs you down it

178
00:08:16,909 --> 00:08:14,399
makes you heavy it makes you tired it

179
00:08:19,850 --> 00:08:16,919
makes you feel like you are a big

180
00:08:21,769 --> 00:08:19,860
concrete cinder block and it's it's all

181
00:08:24,350 --> 00:08:21,779
you can do to just lift your arm I

182
00:08:27,170 --> 00:08:24,360
remember coming back from on my shuttle

183
00:08:30,079 --> 00:08:27,180
flight that I did feel a little

184
00:08:32,659 --> 00:08:30,089
disoriented and walking by myself was a

185
00:08:34,550 --> 00:08:32,669
little bit of a challenge but you get

186
00:08:36,170 --> 00:08:34,560
over it kind of quickly but when I was

187
00:08:38,000 --> 00:08:36,180
on board the space station and I lived

188
00:08:41,980 --> 00:08:38,010

there for six months and I came back on

189
00:08:45,470 --> 00:08:41,990
a capsule and bam landed on the ground

190
00:08:49,370 --> 00:08:45,480
that was one of those cases where I felt

191
00:08:51,650 --> 00:08:49,380
like I wait I I weighed about like an

192
00:08:54,410 --> 00:08:51,660
anvil and I couldn't even lift my arm up

193
00:08:55,790 --> 00:08:54,420
to unhook myself from my seat and I

194
00:08:56,070 --> 00:08:55,800
didn't know how I was going to get out

195
00:09:08,730 --> 00:08:56,080
of

196
00:09:11,430 --> 00:09:08,740
rude awakening hi I'm Terry Virts and I

197
00:09:12,570 --> 00:09:11,440
want to talk about floating in space one

198
00:09:14,910 --> 00:09:12,580
of the first things that you need to

199
00:09:16,620 --> 00:09:14,920
realize when you get into space is that

200
00:09:19,560 --> 00:09:16,630
even though you feel like you're falling

201
00:09:22,290 --> 00:09:19,570
you're not and you don't have to flail

202
00:09:26,220 --> 00:09:22,300
like that you can just sit still you can

203
00:09:28,230 --> 00:09:26,230
let go and you float it's not a problem

204
00:09:30,900 --> 00:09:28,240
if something really have to train your

205
00:09:32,100 --> 00:09:30,910
brain to think about and it takes a

206
00:09:34,440 --> 00:09:32,110
little bit of time to get used to that

207
00:09:37,170 --> 00:09:34,450
that sensation of falling but realizing

208
00:09:38,670 --> 00:09:37,180
you're not falling and you can pretend

209
00:09:43,800 --> 00:09:38,680
like you're on the moon we have some

210
00:09:45,660 --> 00:09:43,810
buddies here you can go down it's not

211
00:09:57,000 --> 00:09:45,670
quite gravity but you can sort of be

212
00:09:58,920 --> 00:09:57,010
walking on the moon well welcome would

213
00:10:01,410 --> 00:09:58,930

you would you can you believe who we

214
00:10:03,390 --> 00:10:01,420
have with us today I am so excited I can

215
00:10:06,810 --> 00:10:03,400
hardly get a sentence out but we have

216
00:10:09,780 --> 00:10:06,820
with us today the one the only Mike

217
00:10:15,090 --> 00:10:09,790
Suffredini the outgoing ISS program

218
00:10:16,500 --> 00:10:15,100
manager big station life welcome to you

219
00:10:18,420 --> 00:10:16,510
thank you so much for being here thank

220
00:10:19,650 --> 00:10:18,430
you so much for having me oh I am

221
00:10:22,260 --> 00:10:19,660
obviously you can tell I'm really

222
00:10:24,000 --> 00:10:22,270
excited I mean we just to put this in

223
00:10:27,060 --> 00:10:24,010
context we have with us the the Big

224
00:10:30,000 --> 00:10:27,070
Kahuna the the tribal leader the the

225
00:10:34,080 --> 00:10:30,010
decision-making dude of the ISS for the

226
00:10:38,400 --> 00:10:34,090
last decade and there is just I think no

227
00:10:39,570 --> 00:10:38,410
better way to to say bon voyage than to

228
00:10:41,130 --> 00:10:39,580
be here on station life what do you

229
00:10:43,830 --> 00:10:41,140
think absolutely I think that's right I

230
00:10:45,960 --> 00:10:43,840
be I walked through the front of

231
00:10:48,540 --> 00:10:45,970
building one on my way in and out every

232
00:10:52,140 --> 00:10:48,550
day and I see you talking about station

233
00:10:54,780 --> 00:10:52,150
life and all these things I go sometimes

234
00:10:57,960 --> 00:10:54,790
we are making dreams come true here on

235
00:11:00,960 --> 00:10:57,970
station like well you know when it comes

236
00:11:03,300 --> 00:11:00,970
to station I think there's the name

237
00:11:04,319 --> 00:11:03,310
Suffredini and station are almost

238
00:11:06,539 --> 00:11:04,329

synonymous

239
00:11:08,309 --> 00:11:06,549
because you have been with the station

240
00:11:10,109 --> 00:11:08,319
since the beginning when it was being

241
00:11:12,449 --> 00:11:10,119
assembled and even before you became

242
00:11:14,759 --> 00:11:12,459
program manager you have been a part of

243
00:11:16,949 --> 00:11:14,769
building and developing this space

244
00:11:19,379 --> 00:11:16,959
station and you when you stepped into

245
00:11:22,229 --> 00:11:19,389
the role as program manager you had a

246
00:11:25,109 --> 00:11:22,239
vision and I'm I'm curious now as you

247
00:11:27,509 --> 00:11:25,119
are retiring from NASA and leaving the

248
00:11:29,970 --> 00:11:27,519
station and some very capable hands if

249
00:11:32,489 --> 00:11:29,980
how you feel your vision from the

250
00:11:36,090 --> 00:11:32,499
beginning meets the vision here as

251
00:11:37,439 --> 00:11:36,100
you're leaving so you know when I came

252
00:11:40,049 --> 00:11:37,449
to the program

253
00:11:41,869 --> 00:11:40,059
it's been about 20 years so in his

254
00:11:45,419 --> 00:11:41,879
program answer that's Tim before that

255
00:11:47,989 --> 00:11:45,429
you know it was the idea of just

256
00:11:51,539 --> 00:11:47,999
building a station was a daunting task

257
00:11:54,119 --> 00:11:51,549
the first several years of everyone's

258
00:11:56,970 --> 00:11:54,129
life was really about building it is it

259
00:11:59,069 --> 00:11:56,980
remotely possible to build it we had all

260
00:12:01,019 --> 00:11:59,079
kinds of wild plans every element that

261
00:12:03,119 --> 00:12:01,029
flew to space station we assumed in the

262
00:12:05,639 --> 00:12:03,129
design that it would fly twice that it

263
00:12:07,259 --> 00:12:05,649

would go up to station once we wouldn't

264
00:12:09,210 --> 00:12:07,269
wouldn't be successful it could fly home

265
00:12:10,710 --> 00:12:09,220
on the shuttle we'd fix whatever problem

266
00:12:11,879 --> 00:12:10,720
with us and fly it again every single

267
00:12:14,309 --> 00:12:11,889
module was built that way

268
00:12:17,659 --> 00:12:14,319
and of course we never had to which is a

269
00:12:20,759 --> 00:12:17,669
miracle in and of itself so as we

270
00:12:22,169 --> 00:12:20,769
started to see the end and insight and

271
00:12:24,569 --> 00:12:22,179
said oh my goodness gracious we're

272
00:12:26,280 --> 00:12:24,579
actually gonna get this done then we

273
00:12:28,100 --> 00:12:26,290
start thinking about the research more

274
00:12:30,299 --> 00:12:28,110
and more and other the research guys

275
00:12:32,639 --> 00:12:30,309
we're always thinking about research

276
00:12:35,549 --> 00:12:32,649
through the rest of us even as the even

277
00:12:37,319 --> 00:12:35,559
as the research guy the rest of us were

278
00:12:38,999 --> 00:12:37,329
focusing on just getting built but

279
00:12:40,319 --> 00:12:39,009
saying okay we have to do research then

280
00:12:42,600 --> 00:12:40,329
sometime and that's what the research

281
00:12:45,600 --> 00:12:42,610
guys really helped us keep the focus on

282
00:12:47,309 --> 00:12:45,610
and and a lot of the folks in management

283
00:12:49,409 --> 00:12:47,319
today have spent their time and research

284
00:12:51,030 --> 00:12:49,419
which i think is good but what research

285
00:12:54,389 --> 00:12:51,040
was back then was even different than

286
00:12:55,799 --> 00:12:54,399
what it is today so it also with the the

287
00:12:57,720 --> 00:12:55,809
research and this the things you were

288
00:12:59,699 --> 00:12:57,730

mentioning there's a lot of benefits of

289
00:13:02,579 --> 00:12:59,709
the International Space Station to

290
00:13:06,059 --> 00:13:02,589
humanity in all sorts of ways and not

291
00:13:06,509 --> 00:13:06,069
just humanity in terms of right here on

292
00:13:08,970 --> 00:13:06,519
earth

293
00:13:12,240 --> 00:13:08,980
but also going beyond lower

294
00:13:14,069 --> 00:13:12,250
but what are some of the things that you

295
00:13:18,389 --> 00:13:14,079
see the space station doing to help us

296
00:13:20,460 --> 00:13:18,399
get to beyond low-earth orbit to Mars so

297
00:13:23,069 --> 00:13:20,470
you know the biggest one right how do we

298
00:13:25,860 --> 00:13:23,079
keep people after you healthy and that's

299
00:13:27,449 --> 00:13:25,870
John that's that's a tough nut to crack

300
00:13:28,949 --> 00:13:27,459
you know we're starting to sort it out

301
00:13:30,750 --> 00:13:28,959
in low-earth orbit

302
00:13:32,759 --> 00:13:30,760
I think crews are coming home now with

303
00:13:34,850 --> 00:13:32,769
in a lot of cases more bone mass than

304
00:13:37,829 --> 00:13:34,860
they left with yeah that's right amazing

305
00:13:39,750 --> 00:13:37,839
so we now we're learning other things

306
00:13:42,269 --> 00:13:39,760
the eyes issues associated with the eye

307
00:13:43,949 --> 00:13:42,279
that we're working on so so human health

308
00:13:47,970 --> 00:13:43,959
of course is the most important thing

309
00:13:50,340 --> 00:13:47,980
and we say we need till 2026 but I would

310
00:13:53,189 --> 00:13:50,350
tell you it'll take beyond that we'll be

311
00:13:57,269 --> 00:13:53,199
always learning about the human system

312
00:13:59,129 --> 00:13:57,279
so I know that you've got you've got to

313
00:14:01,860 --> 00:13:59,139

leave the station in very capable hands

314
00:14:03,300 --> 00:14:01,870
with Kirk Shireman coming on board you

315
00:14:05,040 --> 00:14:03,310
and Kirk have worked a long time

316
00:14:07,590 --> 00:14:05,050
together man you've known each other for

317
00:14:08,939 --> 00:14:07,600
a long time what would you like to say

318
00:14:11,870 --> 00:14:08,949
anything more about that or should I

319
00:14:15,840 --> 00:14:11,880
tell everybody which guys go way back

320
00:14:19,949 --> 00:14:15,850
I've been on the same street from the

321
00:14:21,030 --> 00:14:19,959
same city we were pals back then but I'm

322
00:14:25,139 --> 00:14:21,040
sure it has something to do with the

323
00:14:27,689 --> 00:14:25,149
water we were drinking exactly that Kirk

324
00:14:30,509 --> 00:14:27,699
was when I became program manager took

325
00:14:32,129 --> 00:14:30,519
me a little while to find a deputy and

326
00:14:34,860 --> 00:14:32,139
Kirk was it and Kirk has been with me

327
00:14:36,449 --> 00:14:34,870
for about seven and a half I don't

328
00:14:37,710 --> 00:14:36,459
remember the time but it's like 7-7

329
00:14:40,829 --> 00:14:37,720
after years anyone ought to be deputy

330
00:14:44,040 --> 00:14:40,839
center director now he's back so Kirk no

331
00:14:46,800 --> 00:14:44,050
station cold he's he's a wonderful

332
00:14:48,449 --> 00:14:46,810
individual he's a great leader so he'll

333
00:14:50,069 --> 00:14:48,459
do a great job I feel like I've lived in

334
00:14:52,350 --> 00:14:50,079
capable hands and of course we have a

335
00:14:54,840 --> 00:14:52,360
number of individuals that operate

336
00:14:57,059 --> 00:14:54,850
different organizations flight ops is

337
00:14:58,410 --> 00:14:57,069
one there's a bunch of them and I feel

338
00:15:00,540 --> 00:14:58,420

like the leadership team that's in

339
00:15:02,759 --> 00:15:00,550
places is very capable as well so I feel

340
00:15:04,769 --> 00:15:02,769
good about that part of it as much as I

341
00:15:06,809 --> 00:15:04,779
hate leaving this wonderful job that we

342
00:15:09,509 --> 00:15:06,819
do and I can well is there anything else

343
00:15:10,360 --> 00:15:09,519
that you can think of about the space

344
00:15:12,730 --> 00:15:10,370
station you

345
00:15:15,549 --> 00:15:12,740
share with the audience sir you know

346
00:15:17,110 --> 00:15:15,559
it's I will I you know station people

347
00:15:20,590 --> 00:15:17,120
have asked me you know what's your

348
00:15:21,220 --> 00:15:20,600
legacy and to me the station is not my

349
00:15:26,470 --> 00:15:21,230
legacy

350
00:15:28,540 --> 00:15:26,480
no kidding no matter what anybody thinks

351
00:15:30,160 --> 00:15:28,550
today it is no kidding in the end would

352
00:15:32,079 --> 00:15:30,170
work the one of Mars we're gonna look

353
00:15:33,549 --> 00:15:32,089
back and go we were able to do it

354
00:15:35,920 --> 00:15:33,559
because we built that station we

355
00:15:36,999 --> 00:15:35,930
successfully use that station we kept it

356
00:15:38,290 --> 00:15:37,009
on a little bit long enough to get

357
00:15:41,290 --> 00:15:38,300
everything we needed out of it so we

358
00:15:43,389 --> 00:15:41,300
could go do exploration and and we will

359
00:15:45,549 --> 00:15:43,399
look back on this and go that was that

360
00:15:47,769 --> 00:15:45,559
was it that's what we did to get us

361
00:15:49,360 --> 00:15:47,779
started and long-term exploration so I

362
00:15:50,799 --> 00:15:49,370
think that's something that we ought to

363
00:15:52,689 --> 00:15:50,809

be proud of every day when you come to

364
00:15:54,480 --> 00:15:52,699
work say this is it this is the stepping

365
00:15:57,910 --> 00:15:54,490
stone this is really the stepping stone

366
00:16:00,160 --> 00:15:57,920
all right I can't add to that that was

367
00:16:01,780 --> 00:16:00,170
awesome and I just want to thank you so

368
00:16:04,150 --> 00:16:01,790
much Mike for being thank you for having

369
00:16:05,860 --> 00:16:04,160
me it's awesome I appreciate it this is

370
00:16:07,840 --> 00:16:05,870
a real treat so thank you and best

371
00:16:10,689 --> 00:16:07,850
wishes to you from everybody here at

372
00:16:11,290 --> 00:16:10,699
station life and we are gonna miss you

373
00:16:14,650 --> 00:16:11,300
so much

374
00:16:47,540 --> 00:16:14,660
won't forget about you I'll be paying

375
00:16:52,199 --> 00:16:50,340
so not only are we studying the brain in

376
00:16:54,210 --> 00:16:52,209
space but we're working on new

377
00:16:57,000 --> 00:16:54,220
countermeasures to train the brain for

378
00:16:59,730 --> 00:16:57,010
sensory motor adaptability right here on

379
00:17:01,829 --> 00:16:59,740
the ground the Johnson Space Center Zone

380
00:17:04,079 --> 00:17:01,839
dr. Jacob Bloomberg and his team are

381
00:17:06,240 --> 00:17:04,089
hard at work creating new integrative

382
00:17:08,160 --> 00:17:06,250
counter measures to mitigate post-flight

383
00:17:10,380 --> 00:17:08,170
disturbances in locomotor function

384
00:17:12,240 --> 00:17:10,390
that's a fancy way to say that they are

385
00:17:14,340 --> 00:17:12,250
working on new training methods so

386
00:17:16,230 --> 00:17:14,350
astronauts can return home and adjust

387
00:17:18,660 --> 00:17:16,240
more quickly to the effects of gravity

388
00:17:20,910 --> 00:17:18,670

let's hear more about this training and

389
00:17:29,610 --> 00:17:20,920
its benefits from the man himself dr.

390
00:17:31,530 --> 00:17:29,620
Jacob Bloomberg well one of the

391
00:17:34,260 --> 00:17:31,540
countermeasures that we're now currently

392
00:17:36,600 --> 00:17:34,270
developing is called sensory motor

393
00:17:37,860 --> 00:17:36,610
adaptability training and what we're

394
00:17:41,130 --> 00:17:37,870
trying to do in this countermeasure is

395
00:17:44,160 --> 00:17:41,140
basically train the brain to become more

396
00:17:45,930 --> 00:17:44,170
adaptable the brain is a very adaptable

397
00:17:48,150 --> 00:17:45,940
machine allows you to adapt to so many

398
00:17:50,340 --> 00:17:48,160
things that were ordinary life and we're

399
00:17:53,040 --> 00:17:50,350
trying to tap in to that inherent

400
00:17:54,480 --> 00:17:53,050
adaptability to improve your ability to

401
00:17:57,030 --> 00:17:54,490
adapt to different gravitational

402
00:17:59,970 --> 00:17:57,040
transitions now the way we're going to

403
00:18:02,100 --> 00:17:59,980
do that essentially is to train you on

404
00:18:05,010 --> 00:18:02,110
the ground to become a better adapter

405
00:18:09,060 --> 00:18:05,020
but exposing you to different sensory

406
00:18:11,010 --> 00:18:09,070
motor transformations and what that

407
00:18:13,350 --> 00:18:11,020
really means is what we're going to do

408
00:18:15,270 --> 00:18:13,360
is put you on a treadmill that's placed

409
00:18:17,520 --> 00:18:15,280
on a six degree of freedom freedom

410
00:18:19,799 --> 00:18:17,530
motion base with a virtual scene in

411
00:18:23,130 --> 00:18:19,809
front and have you walk in very unusual

412
00:18:25,110 --> 00:18:23,140
walking and visual environments and what

413
00:18:28,140 --> 00:18:25,120

we know is that kind of training

414
00:18:30,000 --> 00:18:28,150
enhances your ability to adapt to new

415
00:18:30,720 --> 00:18:30,010
environments so we can't simulate here

416
00:18:34,280 --> 00:18:30,730
on the ground

417
00:18:38,180 --> 00:18:34,290
a partial gravitational environment

418
00:18:40,850 --> 00:18:38,190
or marks but we can simulate some of the

419
00:18:42,770 --> 00:18:40,860
sensory motor disturbances you will

420
00:18:45,530 --> 00:18:42,780
experience so you can think of these

421
00:18:46,940 --> 00:18:45,540
more as surrogate challenges and the

422
00:18:48,799 --> 00:18:46,950
idea is the more you train with these

423
00:18:51,020 --> 00:18:48,809
surrogate challenges the better your

424
00:18:53,330 --> 00:18:51,030
brain will be when they encounter you

425
00:18:56,870 --> 00:18:53,340
get a new challenge and it hinges on

426
00:18:58,789 --> 00:18:56,880
this whole idea of learning to learn but

427
00:19:00,799 --> 00:18:58,799
this training does enhances the brain to

428
00:19:02,510 --> 00:19:00,809
learn to learn and that's really what

429
00:19:05,120 --> 00:19:02,520
we're trying to do in our new

430
00:19:06,250 --> 00:19:05,130
countermeasure approach well prior to

431
00:19:08,299 --> 00:19:06,260
this we've been really discussing

432
00:19:09,650 --> 00:19:08,309
changes in behavior and effects of

433
00:19:12,169 --> 00:19:09,660
spaceflight on behavior for example

434
00:19:13,700 --> 00:19:12,179
postural and gaining stability but the

435
00:19:16,310 --> 00:19:13,710
brain itself is a tissue

436
00:19:18,770 --> 00:19:16,320
just like bone and muscle and it could

437
00:19:20,960 --> 00:19:18,780
potentially change a result of exposure

438
00:19:22,970 --> 00:19:20,970

long duration space like we have some

439
00:19:25,100 --> 00:19:22,980
evidence with some of the animal work

440
00:19:26,000 --> 00:19:25,110
that there are structural changes that

441
00:19:27,860 --> 00:19:26,010
are associated with long-duration

442
00:19:30,169 --> 00:19:27,870
spaceflights so we're now very

443
00:19:33,440 --> 00:19:30,179
interested to see if long-duration space

444
00:19:35,440 --> 00:19:33,450
by the is associated with chamber

445
00:19:38,000 --> 00:19:35,450
changes in brain structure and function

446
00:19:40,220 --> 00:19:38,010
so we now have a new study called neural

447
00:19:42,080 --> 00:19:40,230
mapping and the pilot studies dr. Rachel

448
00:19:44,120 --> 00:19:42,090
Seidler from the University of Michigan

449
00:19:47,570 --> 00:19:44,130
we're collaborating with her on this new

450
00:19:50,630 --> 00:19:47,580
study to investigate this issue so what

451
00:19:53,330 --> 00:19:50,640
this study entails is looking at brain

452
00:19:55,700 --> 00:19:53,340
structure and function using modern

453
00:19:58,100 --> 00:19:55,710
neural mapping methodology to look at

454
00:20:00,409 --> 00:19:58,110
how the brain as the tissue changes and

455
00:20:03,080 --> 00:20:00,419
then compare that with potential changes

456
00:20:05,060 --> 00:20:03,090
in behavior and performance and look at

457
00:20:07,070 --> 00:20:05,070
the correlation between the toes and

458
00:20:08,780 --> 00:20:07,080
we're very excited about this new study

459
00:20:33,680 --> 00:20:08,790
and I think it's going to real real some

460
00:20:38,610 --> 00:20:36,240
welcome back and thanks for watching

461
00:20:40,860 --> 00:20:38,620
this episode of station life brain in

462
00:20:43,020 --> 00:20:40,870
space today we learned how we're using

463
00:20:45,090 --> 00:20:43,030

the International Space Station to

464
00:20:46,320 --> 00:20:45,100
better understand how our bodies adapt

465
00:20:48,870 --> 00:20:46,330
to weightless environments and

466
00:20:50,580 --> 00:20:48,880
gravitational transitions this gain

467
00:20:52,980 --> 00:20:50,590
knowledge will help us once we get to

468
00:20:55,350 --> 00:20:52,990
Mars we learned about sensory motor

469
00:20:57,300 --> 00:20:55,360
adaptability training and functional

470
00:20:59,670 --> 00:20:57,310
recovery which also helps us better

471
00:21:01,440 --> 00:20:59,680
understand mobility challenges here on

472
00:21:03,180 --> 00:21:01,450
the earth such as defining more

473
00:21:06,570 --> 00:21:03,190
effective rehabilitation interventions

474
00:21:08,760 --> 00:21:06,580
in clinical populations and we got to

475
00:21:12,180 --> 00:21:08,770
know the outgoing ISS program manager

476
00:21:14,880 --> 00:21:12,190
Mike Suffredini talk about a solid show

477
00:21:16,500 --> 00:21:14,890
this was it be sure to stay in touch and

478
00:21:18,570 --> 00:21:16,510
follow us on Facebook and Twitter for

479
00:21:20,490 --> 00:21:18,580
the latest research news and don't

480
00:21:21,300 --> 00:21:20,500
forget to download our groovy app on

481
00:21:23,970 --> 00:21:21,310
your mobile device