1
00:01:08,799 --> 00:01:24,070
we'll check for you

2
00:01:29,590 --> 00:01:25,590
would you like me to try and uh start

3
00:01:29,600 --> 00:01:45,190
affirmative eric you can proceed

4
00:01:45,200 --> 00:02:17,830
the furnace has to start moving

5
00:02:23,190 --> 00:02:20,630
and space lab huntsville for aghf it'll

6
00:02:25,750 --> 00:02:23,200
probably take about 10 or 15 minutes for

7
00:02:27,430 --> 00:02:25,760
the furnace to complete its translation

8
00:02:29,110 --> 00:02:27,440
but you have a go to proceed with that

9
00:02:32,070 --> 00:02:29,120
cartridge exchange as soon as it's

10
00:02:37,030 --> 00:02:35,110
okay when we see the

11
00:03:16,710 --> 00:02:40,309
to insert the next country

12
00:03:20,229 --> 00:03:18,390
above the earth we just crossed over the

13
00:03:21,910 --> 00:03:20,239

united states and we're out over the

14
00:03:24,149 --> 00:03:21,920
atlantic now

15
00:03:26,070 --> 00:03:24,159
well you do that about uh every 90

16
00:03:28,229 --> 00:03:26,080
minutes or so what's it like circling

17
00:03:32,149 --> 00:03:28,239
the earth that high and that often over

18
00:03:36,390 --> 00:03:34,070
well it's been fantastic so far the

19
00:03:37,830 --> 00:03:36,400
first passes we see in the morning are a

20
00:03:40,550 --> 00:03:37,840
gorgeous uh

21
00:03:42,229 --> 00:03:40,560
panoramic view of the mediterranean area

22
00:03:43,830 --> 00:03:42,239
we have two alternate payload

23
00:03:46,070 --> 00:03:43,840
specialists that train with us and

24
00:03:47,750 --> 00:03:46,080
they're from spain and italy so we see

25
00:03:49,509 --> 00:03:47,760
their home countries every morning just

26
00:03:51,110 --> 00:03:49,519
after we arrive

27
00:03:54,949 --> 00:03:51,120
too bad they can't pass up some food as

28
00:03:59,830 --> 00:03:57,509
now this is a the longest mission that

29
00:04:02,070 --> 00:03:59,840
they nasa has attempted with the space

30
00:04:03,990 --> 00:04:02,080
shuttle 16 days you can stay an extra

31
00:04:06,149 --> 00:04:04,000
two if you need to for contingencies

32
00:04:08,070 --> 00:04:06,159
there and weather ops uh and i

33
00:04:09,830 --> 00:04:08,080
understand one of the primary missions

34
00:04:11,750 --> 00:04:09,840
is to study microgravity and

35
00:04:14,070 --> 00:04:11,760
weightlessness in space now we've been

36
00:04:15,830 --> 00:04:14,080
in space for 30 years and we've had long

37
00:04:17,030 --> 00:04:15,840
duration missions in the sky lab and

38
00:04:20,069 --> 00:04:17,040

certainly now with the mirror with

39
00:04:22,390 --> 00:04:20,079
american astronauts up with the russians

40
00:04:23,909 --> 00:04:22,400
why is it important to know what happens

41
00:04:28,310 --> 00:04:23,919
to the human body and weightless

42
00:04:31,590 --> 00:04:29,990
that's a great question gene we uh we

43
00:04:33,590 --> 00:04:31,600
have had a lot of experience both in the

44
00:04:35,350 --> 00:04:33,600
american program and with the soviet

45
00:04:37,749 --> 00:04:35,360
program uh

46
00:04:39,510 --> 00:04:37,759
we have on this flight however began

47
00:04:41,030 --> 00:04:39,520
some real baseline collection

48
00:04:42,790 --> 00:04:41,040
particularly in the muslim bomb

49
00:04:44,469 --> 00:04:42,800
physiology area

50
00:04:45,830 --> 00:04:44,479
probably the most extensive collection

51
00:04:48,150 --> 00:04:45,840
of sampling

52
00:04:49,350 --> 00:04:48,160
from muscle and bone tissue that's been

53
00:04:51,030 --> 00:04:49,360
done to date

54
00:04:52,710 --> 00:04:51,040
and we have a chance for a long duration

55
00:04:54,950 --> 00:04:52,720
mission to accumulate that we've used a

56
00:04:56,950 --> 00:04:54,960
lot of great data that's accumulated

57
00:04:58,469 --> 00:04:56,960
from prior missions to formulated

58
00:04:59,670 --> 00:04:58,479
experiments that we're trying to do on

59
00:05:01,670 --> 00:04:59,680
this one

60
00:05:03,430 --> 00:05:01,680
specifically this crew is getting

61
00:05:06,469 --> 00:05:03,440
payload crews getting biopsies of their

62
00:05:07,830 --> 00:05:06,479
muscle tissues pre and postmission and

63
00:05:10,150 --> 00:05:07,840

this issue is going to be examined by

64
00:05:12,950 --> 00:05:10,160
investigators around the world and this

65
00:05:14,310 --> 00:05:12,960
is very valuable uh sampling has not

66
00:05:15,909 --> 00:05:14,320
been done before

67
00:05:17,670 --> 00:05:15,919
and we're getting really extensive

68
00:05:18,950 --> 00:05:17,680
studies of the calcium system and we

69
00:05:21,029 --> 00:05:18,960
really hope that

70
00:05:22,710 --> 00:05:21,039
some of this data also interrelates and

71
00:05:25,270 --> 00:05:22,720
correlates with diseases like

72
00:05:28,629 --> 00:05:25,280
osteoporosis back here on earth

73
00:05:30,950 --> 00:05:28,639
so it has both a a purpose for a long

74
00:05:31,670 --> 00:05:30,960
duration future space missions and also

75
00:05:38,230 --> 00:05:31,680
for

76
00:05:41,990 --> 00:05:39,590
regime we've really got some great

77
00:05:43,350 --> 00:05:42,000
investigators both uh in the u.s and

78
00:05:45,909 --> 00:05:43,360
around the world looking at these

79
00:05:47,510 --> 00:05:45,919
samples and certainly the diseases of

80
00:05:50,230 --> 00:05:47,520
all like osteoporosis and many of the

81
00:05:52,469 --> 00:05:50,240
muscle diseases correlate highly with

82
00:05:55,189 --> 00:05:52,479
many things we find happen to astronauts

83
00:05:56,950 --> 00:05:55,199
in microgravity and we're very hopeful

84
00:05:58,230 --> 00:05:56,960
that some of these spin-offs from some

85
00:05:59,510 --> 00:05:58,240
of this research will be helpful in

86
00:06:02,550 --> 00:05:59,520
those areas

87
00:06:04,710 --> 00:06:02,560
okay let me ask susan helms real quickly

88
00:06:09,590 --> 00:06:04,720

what is it like just to live in the

89
00:06:14,550 --> 00:06:12,230
well actually the best correlation i can

90
00:06:15,990 --> 00:06:14,560
make is with a camping trip where you're

91
00:06:17,590 --> 00:06:16,000
well prepared

92
00:06:19,909 --> 00:06:17,600
we basically have a fixed amount of

93
00:06:22,230 --> 00:06:19,919
volume inside the space shuttle and

94
00:06:24,790 --> 00:06:22,240
inside here we've got living quarters

95
00:06:27,430 --> 00:06:24,800
working quarters habitability quarters

96
00:06:29,189 --> 00:06:27,440
and uh it's home for as long as two

97
00:06:32,390 --> 00:06:29,199
weeks or even longer hopefully on this

98
00:06:34,390 --> 00:06:32,400
flight and we we definitely

99
00:06:36,950 --> 00:06:34,400
get to be a team we work together as a

100
00:06:38,790 --> 00:06:36,960
team for over a year and become a family

101
00:06:40,710 --> 00:06:38,800
as that progresses and when we get up

102
00:06:42,790 --> 00:06:40,720
here we've got a job to do

103
00:06:45,189 --> 00:06:42,800
and uh we we work back in the module

104
00:06:47,430 --> 00:06:45,199
primarily during the day on this flight

105
00:06:49,510 --> 00:06:47,440
and then when or i should say during the

106
00:06:50,790 --> 00:06:49,520
work shift on this flight and then when

107
00:06:52,550 --> 00:06:50,800
it comes time for the crew to go to

108
00:06:53,990 --> 00:06:52,560
sleep we turn the front end into a

109
00:06:55,990 --> 00:06:54,000
sleeping quarters

110
00:06:57,749 --> 00:06:56,000
and and it's very much like a camping

111
00:06:59,430 --> 00:06:57,759
trip we're we're sort of in a volkswagen

112
00:07:02,790 --> 00:06:59,440
bus here locked up with the door closed

113
00:07:04,469 --> 00:07:02,800

for over two weeks and it definitely

114
00:07:06,710 --> 00:07:04,479
takes a lot of choreography and a lot of

115
00:07:08,550 --> 00:07:06,720
practice but it's working extremely well

116
00:07:10,550 --> 00:07:08,560
let me ask very quickly charles brady

117
00:07:12,469 --> 00:07:10,560
about uh about

118
00:07:16,550 --> 00:07:12,479
carrying the olympic torch when he was

119
00:07:18,469 --> 00:07:16,560
doing his exercises the other day

120
00:07:20,390 --> 00:07:18,479
well i didn't expect that my uh my

121
00:07:22,230 --> 00:07:20,400
crewmates uh handed it off to me it

122
00:07:23,270 --> 00:07:22,240
really was a great honor something that

123
00:07:24,710 --> 00:07:23,280
we all

124
00:07:26,309 --> 00:07:24,720
take great honor and pride in the fact

125
00:07:28,390 --> 00:07:26,319
that columbia has been able to carry the

126
00:07:30,790 --> 00:07:28,400
olympic torch here with us and also

127
00:07:33,110 --> 00:07:30,800
olympic banner we hope to unfold here on

128
00:07:35,510 --> 00:07:33,120
our day off and uh we all feel

129
00:07:37,110 --> 00:07:35,520
tremendous uh honor and respect for the

130
00:07:38,950 --> 00:07:37,120
olympic to international spirit we have

131
00:07:41,029 --> 00:07:38,960
an international crew

132
00:07:43,589 --> 00:07:41,039
from uh many different countries spain

133
00:07:45,589 --> 00:07:43,599
italy canada france and the u.s is

134
00:07:47,909 --> 00:07:45,599
represented along with a respected space

135
00:07:49,510 --> 00:07:47,919
agency so we feel like this is uh our

136
00:07:51,430 --> 00:07:49,520
play is a real representation of the

137
00:07:53,670 --> 00:07:51,440
olympic spirit and it was quite an honor

138
00:07:55,270 --> 00:07:53,680

to be exercising with that

139
00:07:57,749 --> 00:07:55,280
well thank you very much for joining us

140
00:07:59,670 --> 00:07:57,759
we appreciate it taking your time out

141
00:08:02,550 --> 00:07:59,680
aboard your busy schedule and talking to

142
00:08:06,309 --> 00:08:04,469
well it's been a pleasure talking to you

143
00:09:07,670 --> 00:08:06,319
from aboard the space shuttle columbia

144
00:09:11,350 --> 00:09:09,350
during the life and microgravity space

145
00:09:13,670 --> 00:09:11,360
lab mission we're going to make a very

146
00:09:16,150 --> 00:09:13,680
aggressive and coordinated effort to try

147
00:09:18,949 --> 00:09:16,160
to understand the extent of muscle

148
00:09:20,470 --> 00:09:18,959
atrophy and also the mechanisms behind

149
00:09:22,470 --> 00:09:20,480
it and for that reason we brought

150
00:09:25,269 --> 00:09:22,480
together six different teams from the

151
00:09:28,230 --> 00:09:25,279
united states and europe to study this

152
00:09:30,070 --> 00:09:28,240
in a comprehensive fashion

153
00:09:32,310 --> 00:09:30,080
to support the muscle physiology

154
00:09:34,389 --> 00:09:32,320
experiments we're making use of a very

155
00:09:37,269 --> 00:09:34,399
sophisticated device called a torque

156
00:09:38,790 --> 00:09:37,279
velocity dynamometer or tvd

157
00:09:41,030 --> 00:09:38,800
it's contributed to the mission by the

158
00:09:43,030 --> 00:09:41,040
european space agency

159
00:09:45,910 --> 00:09:43,040
i sort of think of the torque velocity

160
00:09:47,990 --> 00:09:45,920
dynamometer as an arm wrestling or a leg

161
00:09:50,389 --> 00:09:48,000
wrestling machine this morning as jean

162
00:09:52,150 --> 00:09:50,399
jacques fabian my colleague is working

163
00:09:54,150 --> 00:09:52,160

out here he's using it in the light

164
00:09:56,550 --> 00:09:54,160
wrestling mode

165
00:09:58,710 --> 00:09:56,560
sometimes the machine wins the wrestling

166
00:10:00,949 --> 00:09:58,720
match against us and sometimes it lets

167
00:10:02,310 --> 00:10:00,959
us win but who wins the wrestling match

168
00:10:05,110 --> 00:10:02,320
is not important

169
00:10:07,590 --> 00:10:05,120
what is important is that the tvd can

170
00:10:08,710 --> 00:10:07,600
measure the torque or the force applied

171
00:10:10,870 --> 00:10:08,720
by the limb

172
00:10:13,269 --> 00:10:10,880
and also the speed at which we contract

173
00:10:16,230 --> 00:10:13,279
our muscles and the position of the the

174
00:10:18,069 --> 00:10:16,240
foot or the arm at any instant in time

175
00:10:20,949 --> 00:10:18,079
and with this information the scientists

176
00:10:22,470 --> 00:10:20,959
on the ground can understand how muscle

177
00:10:24,069 --> 00:10:22,480
performance is adapting to

178
00:10:25,829 --> 00:10:24,079
weightlessness

179
00:10:27,750 --> 00:10:25,839
for example they can look at the results

180
00:10:29,269 --> 00:10:27,760
coming out of this machine here and

181
00:10:31,670 --> 00:10:29,279
understand what's happening at the level

182
00:10:36,069 --> 00:10:31,680
of muscle

183
00:10:38,389 --> 00:10:36,079
in our body we have fast twitch fibers

184
00:10:40,870 --> 00:10:38,399
and we have slow twitch fibers

185
00:10:43,990 --> 00:10:40,880
fast twitch fibers contract muscles very

186
00:10:46,310 --> 00:10:44,000
quickly but they fatigued quite readily

187
00:10:48,389 --> 00:10:46,320
slow twitch fibers on the other hand

188
00:10:50,470 --> 00:10:48,399

contract more slowly but they have a lot

189
00:10:54,069 --> 00:10:50,480
more endurance

190
00:10:57,190 --> 00:10:54,079
the lms scientists theorize that

191
00:10:57,990 --> 00:10:57,200
during our 17 days here in space that

192
00:10:59,910 --> 00:10:58,000
our

193
00:11:02,310 --> 00:10:59,920
slow muscle fibers are going to take on

194
00:11:03,350 --> 00:11:02,320
properties of fast muscle fibers

195
00:11:04,790 --> 00:11:03,360
that means that they'll be able to

196
00:11:07,670 --> 00:11:04,800
contract quicker but they'll be more

197
00:11:12,230 --> 00:11:09,829
but the muscle wasting and the loss of

198
00:11:14,069 --> 00:11:12,240
strength is not totally explained by the

199
00:11:15,509 --> 00:11:14,079
fact that changes occur at the level of

200
00:11:17,509 --> 00:11:15,519
muscle fibers

201
00:11:19,269 --> 00:11:17,519
there must be other changes going on as

202
00:11:21,269 --> 00:11:19,279
well and therefore we have some

203
00:11:22,949 --> 00:11:21,279
investigators who are looking at changes

204
00:11:25,670 --> 00:11:22,959
at the hormonal level

205
00:11:27,670 --> 00:11:25,680
and the neurological level as well for

206
00:11:30,949 --> 00:11:27,680
instance we have one particular group

207
00:11:33,590 --> 00:11:30,959
from ucla we're looking at the level of

208
00:11:37,910 --> 00:11:33,600
neurological activation required to

209
00:11:39,829 --> 00:11:37,920
energize the muscles in our legs

210
00:11:41,269 --> 00:11:39,839
because of all the electrodes that we

211
00:11:43,350 --> 00:11:41,279
wear on our body

212
00:11:45,750 --> 00:11:43,360
and because of all the blood samples and

213
00:11:47,110 --> 00:11:45,760

muscle biopsies that are taken from us

214
00:11:49,910 --> 00:11:47,120
and because of the fact that we spend a

215
00:11:51,829 --> 00:11:49,920
lot of time inside the tvd every day we

216
00:11:54,870 --> 00:11:51,839
light-heartedly refer to ourselves as

217
00:11:56,790 --> 00:11:54,880
the rat crew as in laboratory rats

218
00:11:58,949 --> 00:11:56,800
however we and the scientists on the

219
00:12:00,470 --> 00:11:58,959
ground fully expect the results coming

220
00:12:02,230 --> 00:12:00,480
out of the muscle physiology set of

221
00:12:04,389 --> 00:12:02,240
experiments will go a long way to

222
00:12:06,310 --> 00:12:04,399
helping us understand the adaptation of

223
00:12:07,910 --> 00:12:06,320
muscles to weightlessness

224
00:12:10,230 --> 00:12:07,920
and in the future we're going to be able

225
00:12:11,990 --> 00:12:10,240
to provide counter measures for

226
00:12:14,710 --> 00:12:12,000
astronauts flying on the international

227
00:12:16,710 --> 00:12:14,720
space station and on exploratory

228
00:12:18,629 --> 00:12:16,720
missions to the inner solar system

229
00:12:20,629 --> 00:12:18,639
and we also expect that some of the

230
00:12:23,990 --> 00:12:20,639
results coming out from the muscle

231
00:12:26,230 --> 00:12:24,000
physiology work will have application to

232
00:12:28,949 --> 00:12:26,240
uh rehabilitation programs on earth for

233
00:12:30,310 --> 00:12:28,959
spinal cord injured patients and also

234
00:12:33,350 --> 00:12:30,320
patients who suffer from muscle

235
00:12:35,350 --> 00:12:33,360
unloading uh illnesses

236
00:12:37,750 --> 00:12:35,360
well that's about it for the muscle

237
00:12:39,430 --> 00:12:37,760
physiology experiments um i hope you now

238
00:12:41,829 --> 00:12:39,440

have an understanding of what we're

239
00:12:44,629 --> 00:12:41,839
doing when you see us in downlink images

240
00:12:46,790 --> 00:12:44,639
in the torque velocity dynamometer

241
00:13:12,389 --> 00:12:46,800
so long from the space shuttle columbia

242
00:13:16,470 --> 00:13:14,550
this television uh

243
00:13:18,550 --> 00:13:16,480
being seen from the space lab science

244
00:13:20,949 --> 00:13:18,560
module showing payload specialist jean

245
00:13:22,470 --> 00:13:20,959
jacques favier who is working along with

246
00:13:24,230 --> 00:13:22,480
pilot kevin kriegel and payload

247
00:13:26,069 --> 00:13:24,240
commander susan helms

248
00:13:27,190 --> 00:13:26,079
on a in-flight maintenance procedure

249
00:13:29,670 --> 00:13:27,200
which should take about an hour and a

250
00:13:31,750 --> 00:13:29,680
half to complete that we'll bring back

251
00:13:33,670 --> 00:13:31,760
to full operation one of the key

252
00:13:35,350 --> 00:13:33,680
experiments in the space lab that is the

253
00:13:37,910 --> 00:13:35,360
bubble drop facility

254
00:13:40,710 --> 00:13:37,920
a power cable has experienced a short

255
00:13:42,870 --> 00:13:40,720
circuit on board and as was mentioned

256
00:13:44,470 --> 00:13:42,880
during the mission update program it is