1
00:01:04,370 --> 00:01:00,230
I

2
00:01:06,680 --> 00:01:04,380
the space shuttle Columbia mission

3
00:01:08,690 --> 00:01:06,690
specialist number three them standing in

4
00:01:11,060 --> 00:01:08,700
front of today an experiment developed

5
00:01:13,910 --> 00:01:11,070
by dr. Reggie Edgerton at UCLA le

6
00:01:17,240 --> 00:01:13,920
laboratories it involves measuring arm

7
00:01:19,430 --> 00:01:17,250
wrist and hand straight it is well now

8
00:01:22,340 --> 00:01:19,440
that in space over lon joist the time

9
00:01:24,470 --> 00:01:22,350
our muscles in our bodies go weaker it

10
00:01:27,490 --> 00:01:24,480
fell however that the hand in wrist and

11
00:01:30,290 --> 00:01:27,500
arm muscles stay essentially the same

12
00:01:32,600 --> 00:01:30,300
here for Columbia myself and my

13
00:01:35,380 --> 00:01:32,610

crewmates are going to actually measure

14
00:01:37,880 --> 00:01:35,390
exactly whether or not this is true this

15
00:01:40,910 --> 00:01:37,890
device I have in my hand right here

16
00:01:44,060 --> 00:01:40,920
accurately measures our hand wrist and

17
00:01:47,870 --> 00:01:44,070
arm strength its plight allograft here a

18
00:01:51,230 --> 00:01:47,880
given a a curve which we can exactly

19
00:01:53,900 --> 00:01:51,240
duplicate over time we measure this pre

20
00:01:57,020 --> 00:01:53,910
flight and four times in flight and

21
00:02:00,350 --> 00:01:57,030
post-flight basically involves grabbing

22
00:02:02,300 --> 00:02:00,360
Sahay grip dynamometer and squeezing in

23
00:02:05,389 --> 00:02:02,310
various levels of contraction ranging

24
00:02:07,730 --> 00:02:05,399
from tis a hundred percent visual later

25
00:02:10,550 --> 00:02:07,740
plotted out on curves that were asked to

26
00:02:13,040 --> 00:02:10,560
follow in graphs as spike and were asked

27
00:02:15,530 --> 00:02:13,050
to trace these this will give dr.

28
00:02:17,600 --> 00:02:15,540
Edgerton it is assistance all the data

29
00:02:19,400 --> 00:02:17,610
that they need to actually measure

30
00:02:21,980 --> 00:02:19,410
whether or not the muscles and our

31
00:02:24,830 --> 00:02:21,990
wrists and arms continue to stay the

32
00:02:26,510 --> 00:02:24,840
same or grow weaker thanks for joining

33
00:02:28,870 --> 00:02:26,520
us aboard space shuttle columbia today

34
00:02:31,430 --> 00:02:28,880
and we'll be continuing with some

35
00:02:38,030 --> 00:02:31,440
examples of muscle involve experiments

36
00:02:44,490 --> 00:02:41,880
welcome aboard Columbia and SPS 78b life

37
00:02:47,340 --> 00:02:44,500
sciences of microgravity Space Lab lms

38
00:02:49,740 --> 00:02:47,350

for short my name is Rick went ahead and

39
00:02:52,920 --> 00:02:49,750
I am the NS one of the flight and this

40
00:02:55,260 --> 00:02:52,930
is a short for askin our lung function

41
00:02:58,199 --> 00:02:55,270
experiment now alfie is the brainchild

42
00:03:00,960 --> 00:02:58,209
of dr. john west and elliot and kim

43
00:03:03,780 --> 00:03:00,970
frisk from UCSD University of California

44
00:03:05,790 --> 00:03:03,790
San Diego and it is designed to measure

45
00:03:09,030 --> 00:03:05,800
the physiological processes of gas

46
00:03:11,580 --> 00:03:09,040
exchange in the Unimog on earth and a

47
00:03:14,160 --> 00:03:11,590
space or free fall now there are

48
00:03:17,220 --> 00:03:14,170
discrete differences which will occur in

49
00:03:19,110 --> 00:03:17,230
space and there are four payload crew

50
00:03:21,210 --> 00:03:19,120
members who are participating as well as

51
00:03:24,240 --> 00:03:21,220
your crew members in our experiments

52
00:03:26,670 --> 00:03:24,250
throughout 70-day LMS flight and what we

53
00:03:29,340 --> 00:03:26,680
hope to ascertain from these experiments

54
00:03:32,550 --> 00:03:29,350
is how the gas flow rate in the law

55
00:03:36,300 --> 00:03:32,560
changes due to microgravity or free fall

56
00:03:39,180 --> 00:03:36,310
in terms of how gas dissipates or aligns

57
00:03:42,240 --> 00:03:39,190
itself in the lung now when we learn

58
00:03:44,400 --> 00:03:42,250
things like this be able to predict how

59
00:03:46,789 --> 00:03:44,410
the one will function obviously in space

60
00:03:49,710 --> 00:03:46,799
and we can use that knowledge to

61
00:03:52,259 --> 00:03:49,720
determine hopping should function on the

62
00:03:53,970 --> 00:03:52,269
ground and with this information we get

63
00:03:57,090 --> 00:03:53,980

also hope to understand various

64
00:03:59,340 --> 00:03:57,100
topological processes which occur in the

65
00:04:01,170 --> 00:03:59,350
human lung saw different diseases so

66
00:04:03,690 --> 00:04:01,180
that we might be able to study when we

67
00:04:05,670 --> 00:04:03,700
have better controls additionally will

68
00:04:07,770 --> 00:04:05,680
use this information for long term stage

69
00:04:09,780 --> 00:04:07,780
in space on the space station and

70
00:04:11,699 --> 00:04:09,790
hopefully a long-duration spaceflight

71
00:04:14,610 --> 00:04:11,709
maybe one day to colonize the planets

72
00:04:16,830 --> 00:04:14,620
all this information will be put to use

73
00:04:20,210 --> 00:04:16,840
in one way the other for long-term

74
00:04:23,100 --> 00:04:20,220
spaceflight and stays on space now this

75
00:04:26,159 --> 00:04:23,110
rather debonair suit that i'm wearing is

76
00:04:28,920 --> 00:04:26,169
now called the mark 1 mod of the RIP

77
00:04:31,080 --> 00:04:28,930
suit and rip basically it's a

78
00:04:33,540 --> 00:04:31,090
respiratory plasmid to graphene suit

79
00:04:35,610 --> 00:04:33,550
which will measure our ribcage and

80
00:04:38,700 --> 00:04:35,620
abdomen contractions and expansions

81
00:04:41,690 --> 00:04:38,710
while we breathe and this is measured

82
00:04:44,219 --> 00:04:41,700
over on our optic ATT here and with that

83
00:04:47,130 --> 00:04:44,229
signal that is rotted to the ground the

84
00:04:49,650 --> 00:04:47,140
key is elliot dr. Westman dr. Chris

85
00:04:50,360 --> 00:04:49,660
we're able to determine differences in

86
00:04:53,090 --> 00:04:50,370
how we

87
00:04:55,580 --> 00:04:53,100
and our chest muscles function in space

88
00:04:59,030 --> 00:04:55,590

when we breathe it's a very very

89
00:05:02,330 --> 00:04:59,040
important experiment and were the best

90
00:05:04,340 --> 00:05:02,340
experiments I believe to fly on the SLS

91
00:05:07,210 --> 00:05:04,350
series flights we're going to get a lot

92
00:05:09,500 --> 00:05:07,220
of today from it and I'm really excited

93
00:07:59,330 --> 00:05:09,510
to be able to participate in this

94
00:08:05,640 --> 00:08:03,120
thank you much I'm delighted to be

95
00:08:09,900 --> 00:08:05,650
speaking to you today on occasion of

96
00:08:12,030 --> 00:08:09,910
Canada's 120 ninth anniversary to you

97
00:08:14,250 --> 00:08:12,040
your excellency governor general

98
00:08:16,920 --> 00:08:14,260
applause to the right honorable Prime

99
00:08:18,900 --> 00:08:16,930
Minister taken to my fellow astronauts

100
00:08:21,480 --> 00:08:18,910
to all the other distinguished guests

101
00:08:25,500 --> 00:08:21,490
there today in to all Canadians sure

102
00:08:28,140 --> 00:08:25,510
booth on voir to made my yuzu I LoCascio

103
00:08:31,710 --> 00:08:28,150
to solve and new Kia money besaid to

104
00:08:35,219 --> 00:08:31,720
Canada actually are not that far away

105
00:08:37,290 --> 00:08:35,229
I'm 280 kilometers but straight up and

106
00:08:40,260 --> 00:08:37,300
in fact the last time I looked we were

107
00:08:43,610 --> 00:08:40,270
just about to head over Y which from my

108
00:08:47,160 --> 00:08:43,620
perspective is not that far from Ottawa

109
00:08:50,190 --> 00:08:47,170
this lease for the air do represent a la

110
00:08:53,700 --> 00:08:50,200
canada or send a septic a cheap aaj ki a

111
00:08:57,750 --> 00:08:53,710
group days are made from C to a a 10-1

112
00:09:01,290 --> 00:08:57,760
debris alerts provide an occasion

113
00:09:04,590 --> 00:09:01,300

astronaut program as well if has the

114
00:09:07,170 --> 00:09:04,600
same that the spirit is my group of

115
00:09:08,430 --> 00:09:07,180
Canadian of my group of astronauts here

116
00:09:10,710 --> 00:09:08,440
on board the life and microgravity

117
00:09:12,240 --> 00:09:10,720
Spacelab mission I'm proud to be a

118
00:09:16,470 --> 00:09:12,250
member of the Canadian astronaut program

119
00:09:18,900 --> 00:09:16,480
and internationally they're also quite

120
00:09:20,400 --> 00:09:18,910
well respected journey trick miss then

121
00:09:22,560 --> 00:09:20,410
one in the Canadian astronaut has

122
00:09:25,740 --> 00:09:22,570
recently been selected for a payload

123
00:09:28,560 --> 00:09:25,750
specialist flight sudeep I and Steve

124
00:09:30,960 --> 00:09:28,570
mcclain are recently announced mission

125
00:09:32,820 --> 00:09:30,970
specialist candidates and Dave Williams

126
00:09:35,160 --> 00:09:32,830
has recently completed his mission

127
00:09:38,710 --> 00:09:35,170
specialist candidacy is now eligible for

128
00:09:43,840 --> 00:09:41,980
I'm living in a incredible extraordinary

129
00:09:45,519 --> 00:09:43,850
experience on board the space shuttle

130
00:09:48,460 --> 00:09:45,529
Columbia this is probably the highlight

131
00:09:50,290 --> 00:09:48,470
of my career as an astronaut and of my

132
00:09:52,780 --> 00:09:50,300
personal life as well I feel very

133
00:09:54,309 --> 00:09:52,790
privileged Marc Garneau who is there

134
00:09:58,660 --> 00:09:54,319
with you today can tell you all about

135
00:10:02,290 --> 00:09:58,670
that Damone post Allison abdomen adepts

136
00:10:05,319 --> 00:10:02,300
she was and grampa tree to Canada off a

137
00:10:08,889 --> 00:10:05,329
cemetery buchla male built the wizard

138
00:10:11,949 --> 00:10:08,899

Toronto a Ottawa she say Callum a POF a

139
00:10:14,139 --> 00:10:11,959
bow or should we laugh say dog the

140
00:10:17,550 --> 00:10:14,149
privilege to sweat theatre they can add

141
00:10:22,840 --> 00:10:17,560
ya doin boo I'll open to pay during

142
00:10:24,519 --> 00:10:22,850
sleep as depth ar-15s you yay and I

143
00:10:27,699 --> 00:10:24,529
believe I have the best seat in all the

144
00:10:30,460 --> 00:10:27,709
house to wish you well for my view here

145
00:10:32,679 --> 00:10:30,470
from Canada from coast to coast I share

146
00:10:36,730 --> 00:10:32,689
with you all the pride and joy of being

147
00:10:38,559 --> 00:10:36,740
a Canadian on this can of the day I like

148
00:10:40,749 --> 00:10:38,569
to thank all the organizers of the

149
00:11:09,360 --> 00:10:40,759
Canada Day festivities and now I'll turn

150
00:11:14,640 --> 00:11:11,730
columbia this is a WBBM how do you hear

151
00:11:17,280 --> 00:11:14,650
me study BPM rod clear we're ready for

152
00:11:19,320 --> 00:11:17,290
your questions tell me about your can

153
00:11:22,440 --> 00:11:19,330
you're conducting medical tests up there

154
00:11:24,870 --> 00:11:22,450
and scientific experiments if you might

155
00:11:26,579 --> 00:11:24,880
give me an outline first of all of what

156
00:11:28,050 --> 00:11:26,589
kind of science experiments I understand

157
00:11:37,050 --> 00:11:28,060
you have a lot of critters up there rats

158
00:11:39,150 --> 00:11:37,060
and fish and such grand study but

159
00:11:41,160 --> 00:11:39,160
they're taking a backseat to the primary

160
00:11:44,070 --> 00:11:41,170
life science experiments which are the

161
00:11:46,110 --> 00:11:44,080
human experiments we've got four people

162
00:11:47,880 --> 00:11:46,120
on this flight that have volunteered to

163
00:11:50,160 --> 00:11:47,890

dedicate their bodies to science if you

164
00:11:52,230 --> 00:11:50,170
will and ever since we launched it

165
00:11:54,930 --> 00:11:52,240
before then we've been taking data on

166
00:11:57,060 --> 00:11:54,940
these guys from start to finish they've

167
00:11:59,220 --> 00:11:57,070
been doing some circadian rhythm studies

168
00:12:00,360 --> 00:11:59,230
which means that their body temperatures

169
00:12:02,790 --> 00:12:00,370
have been measured and their sleep

170
00:12:05,970 --> 00:12:02,800
pattern to be monitored addition they're

171
00:12:08,460 --> 00:12:05,980
being monitored for their moods and

172
00:12:10,650 --> 00:12:08,470
their work performance on top of that

173
00:12:13,200 --> 00:12:10,660
these guys are also giving blood and

174
00:12:15,030 --> 00:12:13,210
saliva samples to contribute to a

175
00:12:17,130 --> 00:12:15,040
metabolic studies which are very

176
00:12:19,079 --> 00:12:17,140
comprehensive and really complete

177
00:12:21,780 --> 00:12:19,089
they're on top of that without a lot

178
00:12:24,060 --> 00:12:21,790
function experiment which is helping us

179
00:12:26,640 --> 00:12:24,070
understand the mechanics of the log in

180
00:12:28,710 --> 00:12:26,650
the very basic sense we get some data up

181
00:12:30,630 --> 00:12:28,720
here in microgravity that you just can't

182
00:12:32,579 --> 00:12:30,640
do on earth as far as that experiment is

183
00:12:34,260 --> 00:12:32,589
concerned and actually all seven members

184
00:12:36,630 --> 00:12:34,270
of the crew are participating in that

185
00:12:38,640 --> 00:12:36,640
experiment and one of the workhorses of

186
00:12:40,740 --> 00:12:38,650
the life science aspect is to talk

187
00:12:42,630 --> 00:12:40,750
velocity dynamometer there are four

188
00:12:44,550 --> 00:12:42,640

separate principal investigator teams

189
00:12:48,350 --> 00:12:44,560
that are studying the musculoskeletal

190
00:12:51,960 --> 00:12:48,360
system and everything from very basic

191
00:12:53,670 --> 00:12:51,970
muscle function studies everything down

192
00:12:55,650 --> 00:12:53,680
to the microscopic level these guys have

193
00:12:58,110 --> 00:12:55,660
had biopsies on their legs before and

194
00:13:00,000 --> 00:12:58,120
after the flight and with all that

195
00:13:01,980 --> 00:13:00,010
complete data on the muscles were going

196
00:13:04,470 --> 00:13:01,990
to learn quite a bit about what happens

197
00:13:06,060 --> 00:13:04,480
to muscular structures as we launch into

198
00:13:08,040 --> 00:13:06,070
space and stay there for extended

199
00:13:09,570 --> 00:13:08,050
periods of time and that's a life

200
00:13:11,670 --> 00:13:09,580
science aspect would you like to hear

201
00:13:13,079 --> 00:13:11,680
about the microgravity side well tell me

202
00:13:15,199 --> 00:13:13,089
a little bit more about the the reason

203
00:13:17,160 --> 00:13:15,209
you're doing that in part is with

204
00:13:18,780 --> 00:13:17,170
conducting a lot of these studies is

205
00:13:20,400 --> 00:13:18,790
because of the concern about atrophy

206
00:13:22,569 --> 00:13:20,410
when you go up into space you don't have

207
00:13:24,460 --> 00:13:22,579
gravity so that that you

208
00:13:26,199 --> 00:13:24,470
problems than with your muscles were at

209
00:13:30,999 --> 00:13:26,209
least the potentiality for problems is

210
00:13:33,160 --> 00:13:31,009
that right your muscles up here it's

211
00:13:35,439 --> 00:13:33,170
really not a problem because you go back

212
00:13:37,539 --> 00:13:35,449
to some gravity field to try to stand on

213
00:13:40,210 --> 00:13:37,549

the surface and on the soul side we

214
00:13:42,759 --> 00:13:40,220
haven't had many problems per se because

215
00:13:44,619 --> 00:13:42,769
the solo missions themselves don't

216
00:13:46,749 --> 00:13:44,629
really last more than two or three weeks

217
00:13:49,329 --> 00:13:46,759
and that's not enough time to get

218
00:13:51,369 --> 00:13:49,339
capacitate anybody it is today we're

219
00:13:53,559 --> 00:13:51,379
also doing exercise up here to prepare

220
00:13:55,840 --> 00:13:53,569
for the return to Earth what's the most

221
00:13:57,519 --> 00:13:55,850
interesting part of that question is

222
00:13:59,979 --> 00:13:57,529
what are we going to do when it comes

223
00:14:02,019 --> 00:13:59,989
time to travel the bars and the trip to

224
00:14:03,609 --> 00:14:02,029
Mars as we currently have it scoped out

225
00:14:05,829 --> 00:14:03,619
it's going to be approximately one to

226
00:14:07,389 --> 00:14:05,839
two years and that's quite a bit of time

227
00:14:09,280 --> 00:14:07,399
if you would like to get out and walk

228
00:14:11,049 --> 00:14:09,290
around on the surface of Mars when your

229
00:14:12,309 --> 00:14:11,059
spaceship arrives you've got to make

230
00:14:13,660 --> 00:14:12,319
sure that your muscles are in good

231
00:14:15,429 --> 00:14:13,670
condition and that's what we're trying

232
00:14:17,259 --> 00:14:15,439
to capture with these studies or

233
00:14:18,910 --> 00:14:17,269
preventative measures in order to

234
00:14:20,139 --> 00:14:18,920
understand how we can do things in the