1
00:00:05,590 --> 00:00:04,550
so in addition to the usual complement

2
00:00:07,670 --> 00:00:05,600
of

3
00:00:09,350 --> 00:00:07,680
maintenance work that the crew has been

4
00:00:10,790 --> 00:00:09,360
engaged in pretty heavily this week

5
00:00:12,789 --> 00:00:10,800
they're always

6
00:00:14,549 --> 00:00:12,799
participating in the multitude of

7
00:00:17,269 --> 00:00:14,559
science experiments taking place on

8
00:00:19,910 --> 00:00:17,279
board the station one of these ongoing

9
00:00:22,550 --> 00:00:19,920
goals of the overall science research

10
00:00:24,390 --> 00:00:22,560
taking place onboard the iss

11
00:00:25,429 --> 00:00:24,400
is to help

12
00:00:27,429 --> 00:00:25,439
assess

13
00:00:29,750 --> 00:00:27,439

how crew members can better overcome the

14
00:00:31,990 --> 00:00:29,760
negative effects of weightlessness as

15
00:00:33,670 --> 00:00:32,000
they spend about six months

16
00:00:35,590 --> 00:00:33,680
five to six months in this weightless

17
00:00:37,750 --> 00:00:35,600
environment can have a pretty big impact

18
00:00:40,630 --> 00:00:37,760
on their body specifically through the

19
00:00:42,150 --> 00:00:40,640
loss of bone and muscle mass a little

20
00:00:43,910 --> 00:00:42,160
bit later this week the crew is

21
00:00:46,470 --> 00:00:43,920
scheduled to start working with a new

22
00:00:48,389 --> 00:00:46,480
experiment from the japanese aerospace

23
00:00:51,029 --> 00:00:48,399
exploration agency called hybrid

24
00:00:53,670 --> 00:00:51,039
training which is looking to test a new

25
00:00:56,470 --> 00:00:53,680
exercise protocol that could hopefully

26
00:00:59,349 --> 00:00:56,480
help crew members on board the station

27
00:01:00,630 --> 00:00:59,359
as well as crews on future exploration

28
00:01:02,389 --> 00:01:00,640
missions

29
00:01:04,310 --> 00:01:02,399
as well as also having now some pretty

30
00:01:05,830 --> 00:01:04,320
big implications potentially down here

31
00:01:07,590 --> 00:01:05,840
on the ground

32
00:01:10,149 --> 00:01:07,600
so to speak about this study a little

33
00:01:12,390 --> 00:01:10,159
bit earlier this week i was able to talk

34
00:01:14,070 --> 00:01:12,400
with dr masaki shirakawa

35
00:01:16,149 --> 00:01:14,080
the manager for space station life

36
00:01:17,830 --> 00:01:16,159
science mission integration at jax's

37
00:01:20,149 --> 00:01:17,840
space environment utilization

38
00:01:22,310 --> 00:01:20,159

utilization center in tokyo and i

39
00:01:24,390 --> 00:01:22,320
started off just asking him to explain

40
00:01:26,310 --> 00:01:24,400
what's new about this hybrid training

41
00:01:27,990 --> 00:01:26,320
protocol and what the crew members are

42
00:01:29,910 --> 00:01:28,000
going to be doing to actively

43
00:01:31,350 --> 00:01:29,920
participate in it

44
00:01:34,230 --> 00:01:31,360
so the

45
00:01:35,830 --> 00:01:34,240
uh current muscle training device on

46
00:01:37,670 --> 00:01:35,840
board iss

47
00:01:39,830 --> 00:01:37,680
such as airaid

48
00:01:42,389 --> 00:01:39,840
is very large

49
00:01:45,030 --> 00:01:42,399
on the other hand the hybrid training

50
00:01:48,310 --> 00:01:45,040
system is so compact

51
00:01:51,670 --> 00:01:48,320
that it can be used as a back axis

52
00:01:54,710 --> 00:01:51,680
system for conventional uh resistive

53
00:01:58,310 --> 00:01:54,720
training device in iss

54
00:02:01,990 --> 00:01:58,320
and in the current experiment plan

55
00:02:06,149 --> 00:02:02,000
a crew member will conduct the training

56
00:02:10,309 --> 00:02:06,159
three times per week for four weeks

57
00:02:13,830 --> 00:02:10,319
that is a total 12 times

58
00:02:16,790 --> 00:02:13,840
using the hybrid training system

59
00:02:19,430 --> 00:02:16,800
and each training time is about

60
00:02:22,470 --> 00:02:19,440
20 minutes or so

61
00:02:24,470 --> 00:02:22,480
and after the series of training is

62
00:02:27,510 --> 00:02:24,480
completed

63
00:02:30,869 --> 00:02:27,520

effect of the training or muscle

64
00:02:33,589 --> 00:02:30,879
function will be measured on both and on

65
00:02:35,589 --> 00:02:33,599
the ground after return

66
00:02:37,350 --> 00:02:35,599
okay and you make mention you know the

67
00:02:40,229 --> 00:02:37,360
hybrid training system it's very small

68
00:02:42,470 --> 00:02:40,239
it's compact what exactly is it and what

69
00:02:43,990 --> 00:02:42,480
is it doing to you know stimulate the

70
00:02:47,830 --> 00:02:44,000
muscles of these astronauts while

71
00:02:49,750 --> 00:02:47,840
they're in microgravity uh yes uh

72
00:02:53,270 --> 00:02:49,760
when uh

73
00:02:57,030 --> 00:02:53,280
stimulation is applied to a muscle

74
00:02:59,830 --> 00:02:57,040
the muscle contraction will occur and

75
00:03:01,190 --> 00:02:59,840
this will generate a

76
00:03:06,070 --> 00:03:01,200
force

77
00:03:09,190 --> 00:03:06,080
effect to

78
00:03:12,309 --> 00:03:09,200
that produced by weight

79
00:03:15,830 --> 00:03:12,319
so against this force if you

80
00:03:17,750 --> 00:03:15,840
intentionally bend or stretch out your

81
00:03:21,589 --> 00:03:17,760
arm

82
00:03:25,350 --> 00:03:21,599
this muscle will be strengthened

83
00:03:28,630 --> 00:03:25,360
so in the other world uh the force

84
00:03:30,309 --> 00:03:28,640
produced by weight on the ground is uh

85
00:03:31,190 --> 00:03:30,319
replaced by

86
00:03:34,869 --> 00:03:31,200
that

87
00:03:37,270 --> 00:03:34,879
generated by electrical stimulation

88
00:03:39,030 --> 00:03:37,280

so i know electrical stimulation is used

89
00:03:40,550 --> 00:03:39,040
sometimes here on the ground in medical

90
00:03:41,990 --> 00:03:40,560
treatments and various physical

91
00:03:44,470 --> 00:03:42,000
therapies is it going to be kind of

92
00:03:45,350 --> 00:03:44,480
similar to that same mechanism

93
00:03:52,630 --> 00:03:45,360
uh

94
00:03:53,830 --> 00:03:52,640
stimulation we need to care the position

95
00:03:55,990 --> 00:03:53,840
of

96
00:03:58,949 --> 00:03:56,000
uh

97
00:04:02,149 --> 00:03:58,959
muscle to apply stimulus

98
00:04:03,350 --> 00:04:02,159
if the position of the erect road is not

99
00:04:07,670 --> 00:04:03,360
good

100
00:04:09,830 --> 00:04:07,680
it will not be an effective training

101
00:04:13,350 --> 00:04:09,840
for the crew member the position of the

102
00:04:15,750 --> 00:04:13,360
electrode is determined at the baseline

103
00:04:16,870 --> 00:04:15,760
data collection session before the

104
00:04:21,430 --> 00:04:16,880
flight

105
00:04:24,870 --> 00:04:21,440
and it indicated by the support on orbit

106
00:04:26,070 --> 00:04:24,880
and also the intensity of the stimulus

107
00:04:28,390 --> 00:04:26,080
is

108
00:04:29,830 --> 00:04:28,400
also important

109
00:04:31,110 --> 00:04:29,840
so uh

110
00:04:36,230 --> 00:04:31,120
crew

111
00:04:37,270 --> 00:04:36,240
and position

112
00:04:38,310 --> 00:04:37,280
will be

113
00:04:41,270 --> 00:04:38,320

a

114
00:04:43,670 --> 00:04:41,280
selected or right

115
00:04:45,670 --> 00:04:43,680
okay and so this stuff taking place on

116
00:04:48,870 --> 00:04:45,680
the station this week and continuing on

117
00:04:51,030 --> 00:04:48,880
is kind of the trial runs of this

118
00:04:53,749 --> 00:04:51,040
hybrid training how might and you may

119
00:04:55,670 --> 00:04:53,759
mention that the device is very small

120
00:04:57,590 --> 00:04:55,680
how might hybrid training be beneficial

121
00:05:00,150 --> 00:04:57,600
to future astronaut crews on long

122
00:05:01,350 --> 00:05:00,160
missions going way beyond earth orbit

123
00:05:05,830 --> 00:05:01,360
yes

124
00:05:09,430 --> 00:05:05,840
the hybrid training system is so

125
00:05:10,390 --> 00:05:09,440
compact that the crew member can use

126
00:05:11,510 --> 00:05:10,400
this

127
00:05:16,390 --> 00:05:11,520
system

128
00:05:18,070 --> 00:05:16,400
even in a spaceship towards exploration

129
00:05:21,749 --> 00:05:18,080
in addition

130
00:05:25,990 --> 00:05:21,759
the investigators team has studied

131
00:05:30,390 --> 00:05:29,110
as a resistive exercise while doing

132
00:05:34,070 --> 00:05:30,400
aerobic

133
00:05:35,350 --> 00:05:34,080
like bicycle

134
00:05:36,629 --> 00:05:35,360
training

135
00:05:38,469 --> 00:05:36,639
so we

136
00:05:41,749 --> 00:05:38,479
expect that

137
00:05:42,590 --> 00:05:41,759
crew can conduct effective exercise with

138
00:05:45,510 --> 00:05:42,600

short

139
00:05:47,430 --> 00:05:45,520
exercise time in total

140
00:05:49,350 --> 00:05:47,440
i'm sure it's a lot easier to carry that

141
00:05:51,350 --> 00:05:49,360
out into space than a big stationary

142
00:05:54,150 --> 00:05:51,360
bike

143
00:05:55,830 --> 00:05:54,160
so one one one final question for you or

144
00:05:57,749 --> 00:05:55,840
what are some of the potential benefits

145
00:06:00,230 --> 00:05:57,759
that you guys are maybe hoping to learn

146
00:06:02,309 --> 00:06:00,240
that could be applicable to people down

147
00:06:03,670 --> 00:06:02,319
here on the ground on planet earth uh

148
00:06:06,390 --> 00:06:03,680
yes

149
00:06:09,189 --> 00:06:06,400
actually the investigators team has

150
00:06:10,710 --> 00:06:09,199
already applied the hybrid training

151
00:06:14,469 --> 00:06:10,720
method to

152
00:06:18,230 --> 00:06:14,479
a patient who need rehabilitation

153
00:06:19,990 --> 00:06:18,240
or who can't move just off just after

154
00:06:22,870 --> 00:06:20,000
surgery

155
00:06:23,830 --> 00:06:22,880
and you know the astronauts will suffer

156
00:06:27,749 --> 00:06:23,840
from

157
00:06:31,110 --> 00:06:27,759
rapid muscle atrophy during space flight

158
00:06:34,950 --> 00:06:31,120
so if effectiveness of the hybrid

159
00:06:36,550 --> 00:06:34,960
training for astronaut is showed

160
00:06:38,070 --> 00:06:36,560
in this

161
00:06:41,670 --> 00:06:38,080
experiment

162
00:06:44,550 --> 00:06:41,680
we may be able to accelerate application

163
00:06:46,550 --> 00:06:44,560

of the hybrid training system

164
00:06:48,870 --> 00:06:46,560
on the ground

165
00:06:52,469 --> 00:06:48,880
and consequently

166
00:06:55,270 --> 00:06:52,479
i think we can demonstrate the

167
00:06:57,749 --> 00:06:55,280
uh human research in space is beneficial

168
00:07:00,230 --> 00:06:57,759
for few people in

169
00:07:02,150 --> 00:07:00,240
earth we always get excited uh when

170
00:07:03,990 --> 00:07:02,160
something taking place on space can help

171
00:07:05,189 --> 00:07:04,000
those just right back down here on the

172
00:07:08,150 --> 00:07:05,199
ground

173
00:07:10,550 --> 00:07:08,160
well uh again thank you for your time dr

174
00:07:13,350 --> 00:07:10,560
shivakama best of luck to you and the

175
00:07:15,110 --> 00:07:13,360
investigation team in this ongoing study