



1
00:00:04,230 --> 00:00:02,310
this is mission control houston so it's

2
00:00:06,470 --> 00:00:04,240
a it's a very well-known fact that

3
00:00:08,470 --> 00:00:06,480
exercise down here on earth can uh go a

4
00:00:10,629 --> 00:00:08,480
long way in making you more healthy and

5
00:00:11,830 --> 00:00:10,639
just feeling better day to day today

6
00:00:13,509 --> 00:00:11,840
though we're going to learn a little bit

7
00:00:16,230 --> 00:00:13,519
more about how big of a difference that

8
00:00:17,670 --> 00:00:16,240
can mean for astronauts up in space so

9
00:00:19,830 --> 00:00:17,680
right now why don't we head out to the

10
00:00:21,670 --> 00:00:19,840
payload operations integration center at

11
00:00:23,349 --> 00:00:21,680
the marshall space flight center where

12
00:00:24,630 --> 00:00:23,359
laurie megs is there to tell us more

13
00:00:26,870 --> 00:00:24,640

lori

14

00:00:28,950 --> 00:00:26,880

astronauts exercise two hours daily to

15

00:00:30,150 --> 00:00:28,960

counter muscle and bone loss well a

16

00:00:31,750 --> 00:00:30,160

study that was on the international

17

00:00:34,150 --> 00:00:31,760

space station previously called

18

00:00:37,590 --> 00:00:34,160

treadmill kinematics has gleaned new

19

00:00:38,950 --> 00:00:37,600

information about exercising on the iss

20

00:00:41,350 --> 00:00:38,960

this is the first time that we've been

21

00:00:45,430 --> 00:00:41,360

able to actually do an in-depth

22

00:00:47,270 --> 00:00:45,440

evaluation of exercise running styles on

23

00:00:49,350 --> 00:00:47,280

on the treadmill up in space station

24

00:00:51,590 --> 00:00:49,360

primarily because the second generation

25

00:00:53,830 --> 00:00:51,600

treadmill allows us to capture ground

26
00:00:55,430 --> 00:00:53,840
reaction forces the astronauts have been

27
00:00:57,670 --> 00:00:55,440
exercising on treadmills since the

28
00:00:59,830 --> 00:00:57,680
beginning of iss but the earlier

29
00:01:01,830 --> 00:00:59,840
treadmill which was called tevus only

30
00:01:03,189 --> 00:01:01,840
went up to seven miles an hour and

31
00:01:05,109 --> 00:01:03,199
didn't capture any of these ground

32
00:01:07,109 --> 00:01:05,119
reaction forces so the new treadmill

33
00:01:09,270 --> 00:01:07,119
that's been in service now for a couple

34
00:01:11,109 --> 00:01:09,280
of years allows us to capture the ground

35
00:01:12,950 --> 00:01:11,119
reaction forces and this is really

36
00:01:15,510 --> 00:01:12,960
important because the ground reaction

37
00:01:17,350 --> 00:01:15,520
force is the basically the force between

38
00:01:19,510 --> 00:01:17,360

the foot and the treadmill belt when

39
00:01:21,670 --> 00:01:19,520
someone's running and and what this does

40
00:01:23,910 --> 00:01:21,680
is it quantifies the amount of

41
00:01:26,230 --> 00:01:23,920
mechanical load that the astronaut has

42
00:01:27,990 --> 00:01:26,240
during exercise which is bottom line is

43
00:01:30,469 --> 00:01:28,000
it tells how effective the exercise is

44
00:01:31,910 --> 00:01:30,479
for protecting bone and muscle

45
00:01:33,510 --> 00:01:31,920
in general you want higher ground

46
00:01:35,590 --> 00:01:33,520
reaction forces

47
00:01:37,590 --> 00:01:35,600
for on earth a lot of times we want to

48
00:01:39,190 --> 00:01:37,600
reduce the ground reaction force because

49
00:01:41,350 --> 00:01:39,200
they get too high we start to get stress

50
00:01:43,350 --> 00:01:41,360
fractures and those sort of things but

51
00:01:44,630 --> 00:01:43,360
up in space we want to maximize these

52
00:01:45,910 --> 00:01:44,640
because these are the only forces that

53
00:01:47,429 --> 00:01:45,920
the astronauts

54
00:01:50,389 --> 00:01:47,439
have applied to their body throughout

55
00:01:51,990 --> 00:01:50,399
the entire day is during their exercise

56
00:01:54,069 --> 00:01:52,000
so we wanted to look and see how the

57
00:01:56,230 --> 00:01:54,079
ground reaction forces were different

58
00:01:57,670 --> 00:01:56,240
during space flight than on the ground

59
00:01:59,270 --> 00:01:57,680
because during space flight you can't

60
00:02:00,469 --> 00:01:59,280
run on a treadmill like you would

61
00:02:01,910 --> 00:02:00,479
underground if you did you would just

62
00:02:04,469 --> 00:02:01,920
keep bumping your head up into the

63
00:02:06,389 --> 00:02:04,479

ceiling of the iss so the astronauts

64

00:02:08,630 --> 00:02:06,399

wear a harness and they wear a bungee

65

00:02:11,110 --> 00:02:08,640

system that pulls them back down

66

00:02:13,910 --> 00:02:11,120

and this bungee loading causes you to

67

00:02:16,070 --> 00:02:13,920

have to change the way you run

68

00:02:18,390 --> 00:02:16,080

we hadn't had any data that allowed us

69

00:02:21,750 --> 00:02:18,400

to show specifically how there were

70

00:02:23,750 --> 00:02:21,760

changes we just knew there probably were

71

00:02:25,990 --> 00:02:23,760

so this was the first activity that we

72

00:02:28,949 --> 00:02:26,000

did a formal evaluation of how people

73

00:02:30,790 --> 00:02:28,959

run and compared running styles in

74

00:02:33,270 --> 00:02:30,800

normal gravity to running styles up on

75

00:02:35,270 --> 00:02:33,280

the space station we learned a lot of

76
00:02:36,790 --> 00:02:35,280
really cool things

77
00:02:37,990 --> 00:02:36,800
first of all from an exercise

78
00:02:40,630 --> 00:02:38,000
perspective

79
00:02:43,190 --> 00:02:40,640
we found out that running fast is really

80
00:02:44,869 --> 00:02:43,200
really important the faster you run the

81
00:02:46,869 --> 00:02:44,879
greater the forces between the foot and

82
00:02:48,550 --> 00:02:46,879
the ground from a

83
00:02:50,710 --> 00:02:48,560
brain perspective and this is where

84
00:02:52,790 --> 00:02:50,720
people who study motor control and how

85
00:02:54,070 --> 00:02:52,800
the brain works and maybe people who are

86
00:02:57,910 --> 00:02:54,080
interested in studying how the brain

87
00:02:59,990 --> 00:02:57,920
might change due to injury or due to

88
00:03:01,750 --> 00:03:00,000

aging or these sort of things

89

00:03:04,309 --> 00:03:01,760

what this means is that

90

00:03:07,190 --> 00:03:04,319

gravity is not necessary for someone to

91

00:03:08,790 --> 00:03:07,200

run the same way that they would run

92

00:03:10,869 --> 00:03:08,800

on the ground so

93

00:03:12,550 --> 00:03:10,879

the data tell us that when it comes to

94

00:03:14,710 --> 00:03:12,560

running people can pretty much do this

95

00:03:16,710 --> 00:03:14,720

automatically even though that input is

96

00:03:18,309 --> 00:03:16,720

different from on the ground and

97

00:03:20,309 --> 00:03:18,319

there hasn't been any other studies that

98

00:03:22,790 --> 00:03:20,319

have been able to study a real

99

00:03:25,270 --> 00:03:22,800

large-scale multi-joint movement like

100

00:03:27,509 --> 00:03:25,280

running where you take away gravity to

101
00:03:29,030 --> 00:03:27,519
see what the effects are so this is one

102
00:03:30,949 --> 00:03:29,040
of the first that's i've been able to do

103
00:03:33,509 --> 00:03:30,959
that it was kind of a serendipitous

104
00:03:35,430 --> 00:03:33,519
finding our purpose was to understand

105
00:03:37,750 --> 00:03:35,440
exercise but we also found out a little

106
00:03:40,229 --> 00:03:37,760
bit about how the body controls running

107
00:03:42,390 --> 00:03:40,239
and speaking of exercise we know that it

108
00:03:43,670 --> 00:03:42,400
is good for the astronauts but it's also

109
00:03:45,270 --> 00:03:43,680
good for us here on earth we're getting

110
00:03:46,869 --> 00:03:45,280
ready for an event here at the marshall

111
00:03:49,509 --> 00:03:46,879
space flight center that has really

112
00:03:51,589 --> 00:03:49,519
close ties to the iss it's called race

113
00:03:53,990 --> 00:03:51,599

in the station and joining me now is the

114

00:03:56,149 --> 00:03:54,000

race director kent criswell and can't

115

00:03:58,070 --> 00:03:56,159

tell us it's a cool name so tell me what

116

00:04:00,390 --> 00:03:58,080

race in the station is we'll race the

117

00:04:03,030 --> 00:04:00,400

station's actually a duathlon and the

118

00:04:05,830 --> 00:04:03,040

goal is to finish the course before the

119

00:04:07,990 --> 00:04:05,840

space station orbits the earth which is

120

00:04:09,270 --> 00:04:08,000

91 minutes 12 seconds

121

00:04:12,630 --> 00:04:09,280

so

122

00:04:15,910 --> 00:04:12,640

your goal is to run bike run

123

00:04:18,310 --> 00:04:15,920

and that's the course run pi kilometers

124

00:04:21,270 --> 00:04:18,320

bike e to the pi power kilometers which

125

00:04:23,990 --> 00:04:21,280

is 23 kilometers and run pi kilometers

126

00:04:26,870 --> 00:04:24,000

again he totally lost me

127

00:04:29,030 --> 00:04:26,880

well e is the logarithmic constant 2.71

128

00:04:30,950 --> 00:04:29,040

and pi to the pi power so it's about

129

00:04:34,550 --> 00:04:30,960

1.95 miles

130

00:04:36,070 --> 00:04:34,560

uh 14.3 mile bike and 1.95 mile run

131

00:04:37,990 --> 00:04:36,080

again yeah we're seeing some of the

132

00:04:39,430 --> 00:04:38,000

video from last year it's been been very

133

00:04:41,990 --> 00:04:39,440

successful how many years have we done

134

00:04:43,670 --> 00:04:42,000

this now this is the third year so we

135

00:04:44,950 --> 00:04:43,680

started in 2012

136

00:04:47,189 --> 00:04:44,960

had about

137

00:04:49,670 --> 00:04:47,199

180 participants

138

00:04:52,550 --> 00:04:49,680

last year we added a youth event

139

00:04:54,870 --> 00:04:52,560

we call it an anti-duathlon because it's

140

00:04:55,749 --> 00:04:54,880

a bike run bike instead of a run bike

141

00:04:58,150 --> 00:04:55,759

run

142

00:04:58,950 --> 00:04:58,160

so the kids can bike a little more than

143

00:05:01,110 --> 00:04:58,960

run

144

00:05:04,070 --> 00:05:01,120

and so we had about 200 last year and

145

00:05:06,629 --> 00:05:04,080

this year we're on track to even beat

146

00:05:07,670 --> 00:05:06,639

last year's participation why do we do

147

00:05:09,270 --> 00:05:07,680

this

148

00:05:11,510 --> 00:05:09,280

so the goal of the race is actually to

149

00:05:12,950 --> 00:05:11,520

raise money for scholarships marshall

150

00:05:15,430 --> 00:05:12,960

association

151
00:05:17,830 --> 00:05:15,440
is a is a group of martial employees and

152
00:05:19,670 --> 00:05:17,840
redstone employees and other community

153
00:05:20,870 --> 00:05:19,680
people that have access to the arsenal

154
00:05:22,950 --> 00:05:20,880
and

155
00:05:24,950 --> 00:05:22,960
we raise money also

156
00:05:26,550 --> 00:05:24,960
turned it more into an outreach as well

157
00:05:28,390 --> 00:05:26,560
to show the amazing things we do here at

158
00:05:30,790 --> 00:05:28,400
redstone not just the nasa things with

159
00:05:32,390 --> 00:05:30,800
the space station eclipse

160
00:05:34,629 --> 00:05:32,400
sls

161
00:05:38,550 --> 00:05:34,639
mighty eagle but also the army

162
00:05:40,950 --> 00:05:38,560
ties we have with the patriot missile

163
00:05:43,510 --> 00:05:40,960

with uavs

164

00:05:44,550 --> 00:05:43,520

also decatur bringing in ula who do the

165

00:05:46,310 --> 00:05:44,560

atlas

166

00:05:48,550 --> 00:05:46,320

5 and the delta iv and they're bringing

167

00:05:49,909 --> 00:05:48,560

some of their models so really try to

168

00:05:51,909 --> 00:05:49,919

treat this as an outreach to the

169

00:05:53,430 --> 00:05:51,919

community because half the participants

170

00:05:55,029 --> 00:05:53,440

don't even have access to the arsenal

171

00:05:58,230 --> 00:05:55,039

right so i'll work their access they get

172

00:06:00,230 --> 00:05:58,240

in and they see amazing things we do and

173

00:06:02,629 --> 00:06:00,240

don't get to normally see it's all about

174

00:06:03,590 --> 00:06:02,639

getting healthy and raising money and

175

00:06:04,950 --> 00:06:03,600

wow

176

00:06:07,110 --> 00:06:04,960

looks like a beautiful day there you

177

00:06:10,309 --> 00:06:07,120

have this when late september so it'll

178

00:06:12,309 --> 00:06:10,319

be cooler then and a nice run and bike

179

00:06:15,590 --> 00:06:12,319

day right september 27th the last

180

00:06:18,230 --> 00:06:15,600

saturday of the fiscal year 8 30 start

181

00:06:20,550 --> 00:06:18,240

we race and you can register up till the

182

00:06:22,629 --> 00:06:20,560

23rd if you don't have access

183

00:06:23,990 --> 00:06:22,639

and the 25th if you do have access to

184

00:06:25,749 --> 00:06:24,000

the arsenal

185

00:06:27,510 --> 00:06:25,759

all right i better get right on that

186

00:06:29,189 --> 00:06:27,520

i'll give it a try there you go i may

187

00:06:31,029 --> 00:06:29,199

not get far i may not cross that finish

188

00:06:32,629 --> 00:06:31,039

line but good luck to you it's a great

189

00:06:34,550 --> 00:06:32,639

idea and we help other centers get

190

00:06:37,110 --> 00:06:34,560

involved too right nobody else does this

191

00:06:39,430 --> 00:06:37,120

no one does it johnson's talked about it

192

00:06:40,870 --> 00:06:39,440

so all right there's a challenge

193

00:06:42,550 --> 00:06:40,880

well that'll do it for us from the

194

00:06:44,550 --> 00:06:42,560

payload operations integration center

195

00:06:47,430 --> 00:06:44,560

here in huntsville now back to you at

196

00:06:49,510 --> 00:06:47,440

mission control in houston

197

00:06:51,430 --> 00:06:49,520

thank you to lori and all the folks out