1
00:00:09,669 --> 00:00:07,590
there are a lot of ways that living and

2
00:00:11,509 --> 00:00:09,679
working in weightlessness impacts the

3
00:00:13,669 --> 00:00:11,519
human body we've talked about them on

4
00:00:15,509 --> 00:00:13,679
many occasions but this morning we're

5
00:00:16,790 --> 00:00:15,519
going to talk about one that you might

6
00:00:19,109 --> 00:00:16,800
not have thought of

7
00:00:20,870 --> 00:00:19,119
uh here's lori meggs at nasa's payload

8
00:00:22,150 --> 00:00:20,880
operations integration center at the

9
00:00:26,230 --> 00:00:22,160
marshall space flight center in

10
00:00:31,109 --> 00:00:28,150
we all see astronauts floating through

11
00:00:33,590 --> 00:00:31,119
the iss and it doesn't look painful but

12
00:00:42,470 --> 00:00:33,600
it can cause pain and now researchers

13
00:00:46,470 --> 00:00:44,630

astronauts have been developing

14
00:00:48,470 --> 00:00:46,480
back pain in space

15
00:00:49,910 --> 00:00:48,480
and subsequently there seems to be a

16
00:00:52,630 --> 00:00:49,920
higher risk of

17
00:00:55,590 --> 00:00:52,640
of a herniated disc among astronauts

18
00:00:58,549 --> 00:00:55,600
somehow nasa didn't know why during that

19
00:01:00,790 --> 00:00:58,559
time so we took it as an effort

20
00:01:03,510 --> 00:01:00,800
in our group to

21
00:01:06,630 --> 00:01:03,520
find out what's causing the back pain

22
00:01:08,630 --> 00:01:06,640
and herniated discs from space flight

23
00:01:11,350 --> 00:01:08,640
the idea is that

24
00:01:13,510 --> 00:01:11,360
in the literature it shows that back

25
00:01:15,190 --> 00:01:13,520
pain is a prevalent complaint and also

26
00:01:16,789 --> 00:01:15,200
some neck pain

27
00:01:18,310 --> 00:01:16,799
and what's uh

28
00:01:21,109 --> 00:01:18,320
interesting is that

29
00:01:23,590 --> 00:01:21,119
the spines of astronauts are actually

30
00:01:26,390 --> 00:01:23,600
longer they're about two to three times

31
00:01:28,550 --> 00:01:26,400
longer in space than on earth like here

32
00:01:30,390 --> 00:01:28,560
on earth we have this variation of our

33
00:01:32,950 --> 00:01:30,400
height like in the mornings we're

34
00:01:34,550 --> 00:01:32,960
tallest isn't it and at night or short

35
00:01:36,149 --> 00:01:34,560
is because of the gravitation and

36
00:01:38,550 --> 00:01:36,159
there's a change when you sleep it kind

37
00:01:42,069 --> 00:01:38,560
of the disc and the spine actually

38
00:01:44,870 --> 00:01:42,079

lengthens but 1.5 to 3 centimeter

39
00:01:46,630 --> 00:01:44,880
difference per day that's on earth

40
00:01:49,830 --> 00:01:46,640
but in space

41
00:01:52,469 --> 00:01:49,840
it's about two to three times longer

42
00:01:54,710 --> 00:01:52,479
we wrote a scientific paper

43
00:01:57,270 --> 00:01:54,720
back in 2008 when i met dr hargens when

44
00:01:58,230 --> 00:01:57,280
he when he posted the question

45
00:02:00,870 --> 00:01:58,240
um

46
00:02:03,109 --> 00:02:00,880
like there is back pain in space uh what

47
00:02:05,350 --> 00:02:03,119
could it be we don't know

48
00:02:07,030 --> 00:02:05,360
so i came i came to dr hargens and

49
00:02:09,029 --> 00:02:07,040
presented my ideas

50
00:02:11,350 --> 00:02:09,039
so it took us about seven years to write

51
00:02:12,869 --> 00:02:11,360
the paper believe it or not seven years

52
00:02:14,550 --> 00:02:12,879
we gathered all the pertinent

53
00:02:16,710 --> 00:02:14,560
information that we can find on low back

54
00:02:19,030 --> 00:02:16,720
pain and space and the most likely

55
00:02:20,710 --> 00:02:19,040
mechanism that's happening

56
00:02:23,110 --> 00:02:20,720
so we took seven years to write that

57
00:02:25,830 --> 00:02:23,120
paper and it became known as the

58
00:02:27,910 --> 00:02:25,840
pathophysiology of low back pain during

59
00:02:31,270 --> 00:02:27,920
exposure to microgravity

60
00:02:33,509 --> 00:02:31,280
it was uh the first viable theory ever

61
00:02:35,430 --> 00:02:33,519
of the most likely

62
00:02:38,229 --> 00:02:35,440
event that's happening with the spines

63
00:02:40,550 --> 00:02:38,239

of astronauts it was published in 2008

64
00:02:42,790 --> 00:02:40,560
with the aviation space and

65
00:02:45,110 --> 00:02:42,800
environmental medicine journal and from

66
00:02:47,430 --> 00:02:45,120
then then on that was 2008

67
00:02:49,430 --> 00:02:47,440
nasa had decided in the same year to

68
00:02:51,509 --> 00:02:49,440
find out what is it really that's

69
00:02:53,270 --> 00:02:51,519
causing it so

70
00:02:57,110 --> 00:02:53,280
we were invited to

71
00:02:59,750 --> 00:02:57,120
to set forth a um a proposal

72
00:03:01,110 --> 00:02:59,760
and again what nasa wanted was a quite

73
00:03:02,550 --> 00:03:01,120
interesting because it was the exact

74
00:03:06,790 --> 00:03:02,560
same

75
00:03:07,830 --> 00:03:06,800
speculations we have so we're now

76
00:03:09,750 --> 00:03:07,840
measuring

77
00:03:12,390 --> 00:03:09,760
the uh the spines of the astronauts with

78
00:03:14,470 --> 00:03:12,400
their scans and strength and and

79
00:03:15,750 --> 00:03:14,480
subjective scores

80
00:03:19,509 --> 00:03:15,760
we're giving

81
00:03:22,869 --> 00:03:19,519
the astronauts a six battery of tests

82
00:03:25,350 --> 00:03:22,879
we're giving them scans we do mris to

83
00:03:27,670 --> 00:03:25,360
find out in with spectroscopy what's

84
00:03:30,309 --> 00:03:27,680
happening inside the chemical components

85
00:03:31,830 --> 00:03:30,319
or biochemical components of the disks

86
00:03:34,309 --> 00:03:31,840
because that determines the amount of

87
00:03:36,149 --> 00:03:34,319
water coming in or going out of the disk

88
00:03:37,509 --> 00:03:36,159

as well as the amount of chemicals for

89
00:03:40,309 --> 00:03:37,519
degeneration

90
00:03:42,550 --> 00:03:40,319
we also do the mri again to figure out

91
00:03:45,110 --> 00:03:42,560
what's the size of the disc

92
00:03:47,670 --> 00:03:45,120
comparing that to when they're standing

93
00:03:49,910 --> 00:03:47,680
up because there is a change

94
00:03:51,509 --> 00:03:49,920
and then we load them up with 10 percent

95
00:03:53,429 --> 00:03:51,519
of their body weight and we see that

96
00:03:55,350 --> 00:03:53,439
there's also changes

97
00:03:56,710 --> 00:03:55,360
now we compare that of course pre-flight

98
00:03:58,869 --> 00:03:56,720
and post-flight

99
00:04:00,949 --> 00:03:58,879
the other test we're doing is a bearing

100
00:04:03,350 --> 00:04:00,959
sorensen test which is an isometric

101
00:04:05,670 --> 00:04:03,360
testing of the back muscles to find out

102
00:04:08,070 --> 00:04:05,680
how long they can hold one position

103
00:04:10,070 --> 00:04:08,080
it's in a prone position or on the

104
00:04:11,270 --> 00:04:10,080
stomach but they elevate their upper

105
00:04:13,509 --> 00:04:11,280
torso

106
00:04:15,190 --> 00:04:13,519
and hold it as long as they can

107
00:04:17,509 --> 00:04:15,200
we also have a dynamic test it's called

108
00:04:18,550 --> 00:04:17,519
a kinematic test using a uh

109
00:04:21,110 --> 00:04:18,560
a a

110
00:04:22,950 --> 00:04:21,120
fluoroscopy a fluoroscopy and it's a

111
00:04:25,430 --> 00:04:22,960
moving fluoroscopy so it's basically an

112
00:04:27,270 --> 00:04:25,440
x-ray of a moving subject we have these

113
00:04:29,990 --> 00:04:27,280

patient handling devices that the

114
00:04:33,110 --> 00:04:30,000
astronauts can use and we measure their

115
00:04:35,350 --> 00:04:33,120
ability to bend forward and backward

116
00:04:37,990 --> 00:04:35,360
sideways by

117
00:04:40,150 --> 00:04:38,000
measuring each individual level of the

118
00:04:42,070 --> 00:04:40,160
spine with mathematical and computerized

119
00:04:43,990 --> 00:04:42,080
calculations lastly we have a

120
00:04:46,150 --> 00:04:44,000
questionnaire is the oswest3

121
00:04:47,990 --> 00:04:46,160
questionnaire to find out what are they

122
00:04:49,990 --> 00:04:48,000
feeling are they feeling back pain

123
00:04:53,749 --> 00:04:50,000
before they before the examination after

124
00:04:56,230 --> 00:04:53,759
the examination and before and after

125
00:04:58,070 --> 00:04:56,240
testing post flight so where are we in

126
00:05:00,469 --> 00:04:58,080
the study now how many have we had how

127
00:05:03,909 --> 00:05:00,479
many do we want okay we are approved for

128
00:05:07,029 --> 00:05:03,919
12 astronauts we were approved in 2010

129
00:05:09,189 --> 00:05:07,039
and so far our study is good for 2014

130
00:05:11,189 --> 00:05:09,199
but we only have

131
00:05:12,230 --> 00:05:11,199
five or six five to six astronauts

132
00:05:15,830 --> 00:05:12,240
signed up

133
00:05:17,590 --> 00:05:15,840
we have two completed uh cycles of pre

134
00:05:19,590 --> 00:05:17,600
pre pre-flight and post flight of the

135
00:05:21,670 --> 00:05:19,600
two astronauts so

136
00:05:22,390 --> 00:05:21,680
the delay is due to

137
00:05:25,590 --> 00:05:22,400
the

138
00:05:27,430 --> 00:05:25,600

have a whole lot of astronauts going to

139
00:05:29,270 --> 00:05:27,440
the space station and we are testing

140
00:05:31,510 --> 00:05:29,280
them every six months

141
00:05:33,510 --> 00:05:31,520
so there's a lot of waiting time so we

142
00:05:35,350 --> 00:05:33,520
speculate that by the time we're

143
00:05:38,230 --> 00:05:35,360
finished with this this may be around

144
00:05:39,909 --> 00:05:38,240
2018 to 2019

145
00:05:42,150 --> 00:05:39,919
how do you deal with that how does

146
00:05:44,150 --> 00:05:42,160
someone who you know you say results

147
00:05:45,270 --> 00:05:44,160
aren't overnight how do you get through

148
00:05:48,310 --> 00:05:45,280
that you know that you're helping

149
00:05:52,390 --> 00:05:48,320
someone is that how it oh yes um there's

150
00:05:54,710 --> 00:05:52,400
always a this human need for a graffiti

151
00:05:57,029 --> 00:05:54,720
okay and so this is the the academic

152
00:05:59,350 --> 00:05:57,039
graffiti that i would call an academic

153
00:06:01,270 --> 00:05:59,360
graffiti like every every human being

154
00:06:03,749 --> 00:06:01,280
has to have a sense of purpose a sense

155
00:06:05,670 --> 00:06:03,759
of mission and somehow in my case

156
00:06:07,749 --> 00:06:05,680
helping out the space program because

157
00:06:11,189 --> 00:06:07,759
it's a need for fellowship and to help

158
00:06:13,749 --> 00:06:11,199
mankind in the future space exploration

159
00:06:14,790 --> 00:06:13,759
and the bottom line is it has to be

160
00:06:18,309 --> 00:06:14,800
passion

161
00:06:20,390 --> 00:06:18,319
worthwhile that's something that's going

162
00:06:22,629 --> 00:06:20,400
to be used by humanity and it's

163
00:06:25,029 --> 00:06:22,639

something that you may be remembered for

164
00:06:27,510 --> 00:06:25,039
life and i think this is inherent in any

165
00:06:30,710 --> 00:06:27,520
human being that's why the sense of awe

166
00:06:33,029 --> 00:06:30,720
for space exploration

167
00:06:35,029 --> 00:06:33,039
and since we spoke with dr seisson 12

168
00:06:36,790 --> 00:06:35,039
astronauts have signed up for this study

169
00:06:38,629 --> 00:06:36,800
that'll do it for us here at the payload