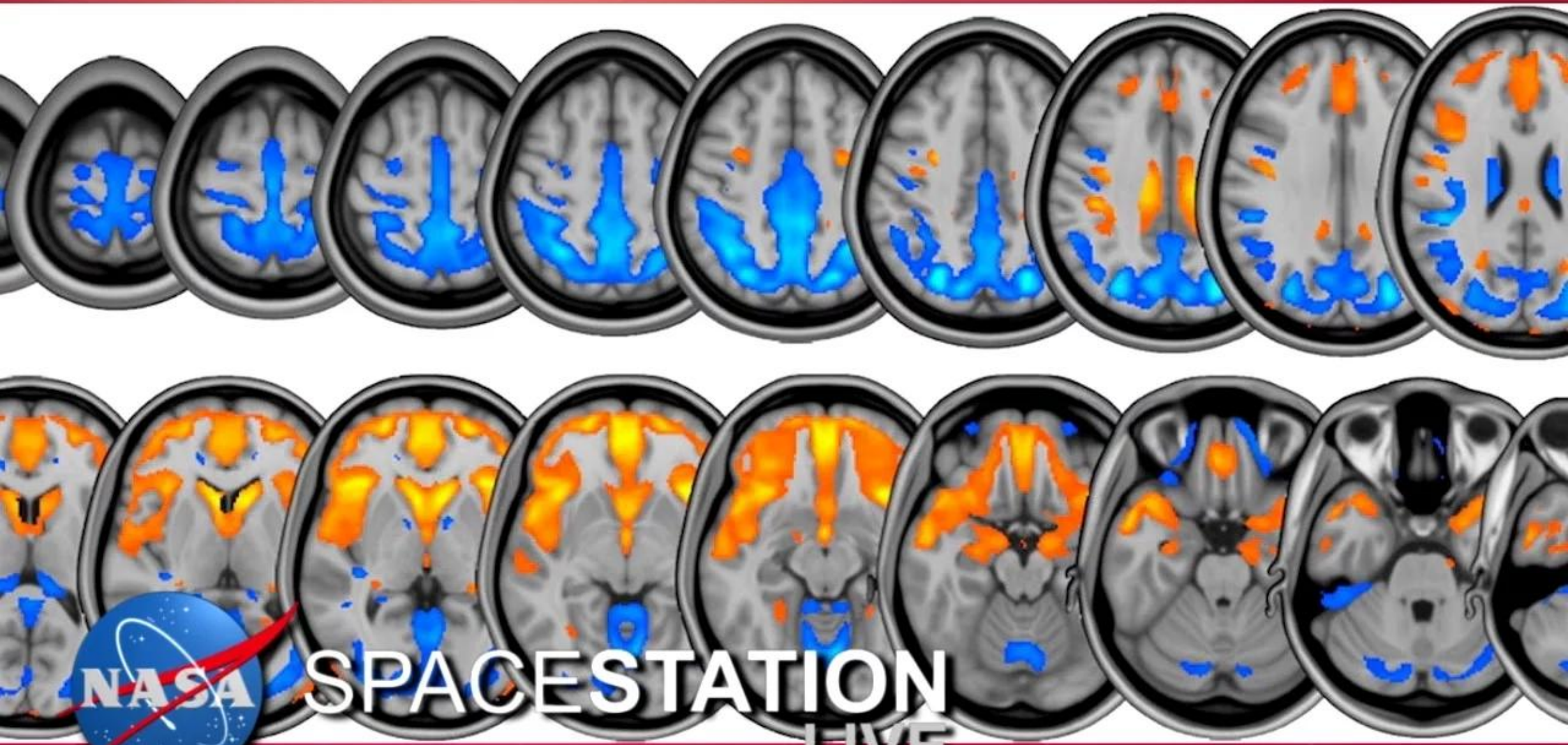
NASA
SPACESTATION
LIVE

1
00:00:09,990 --> 00:00:07,110
a big portion of the research that's

2
00:00:12,629 --> 00:00:10,000
being done on people in space on this

3
00:00:14,910 --> 00:00:12,639
space station especially the one-year

4
00:00:19,029 --> 00:00:14,920
crew members scott kelly and mikhail

5
00:00:21,029 --> 00:00:19,039
krienko is designed to learn how a long

6
00:00:22,710 --> 00:00:21,039
exposure in the weightless environment

7
00:00:25,029 --> 00:00:22,720
affects the human body

8
00:00:26,950 --> 00:00:25,039
and that does include the brain

9
00:00:28,550 --> 00:00:26,960
astronauts who returned from the space

10
00:00:30,870 --> 00:00:28,560
station have been found to have

11
00:00:33,030 --> 00:00:30,880
experienced some changes in their brain

12
00:00:35,110 --> 00:00:33,040
when it comes to things like balance and

13
00:00:36,630 --> 00:00:35,120

movement and cognition

14
00:00:39,190 --> 00:00:36,640
there is an experiment called

15
00:00:42,389 --> 00:00:39,200
neuromapping which will use magnetic

16
00:00:44,630 --> 00:00:42,399
resonance imaging to look for changes

17
00:00:45,510 --> 00:00:44,640
in the brains when those astronauts come

18
00:00:47,430 --> 00:00:45,520
home

19
00:00:49,270 --> 00:00:47,440
but the neuromapping protocol is keeping

20
00:00:50,790 --> 00:00:49,280
close tabs on them while they're in

21
00:00:52,869 --> 00:00:50,800
space too

22
00:00:54,790 --> 00:00:52,879
my colleague lori meggs at the payload

23
00:00:56,869 --> 00:00:54,800
operations center at the marshall space

24
00:00:58,709 --> 00:00:56,879
flight center in huntsville alabama

25
00:01:00,709 --> 00:00:58,719
spoke with the neuromapping principal

26
00:01:03,349 --> 00:01:00,719
investigator about her study of the

27
00:01:06,070 --> 00:01:03,359
brain in space

28
00:01:09,270 --> 00:01:06,080
i i'm really interested in

29
00:01:11,510 --> 00:01:09,280
changes that will occur in vestibularly

30
00:01:13,429 --> 00:01:11,520
mediated behaviors so these are things

31
00:01:15,990 --> 00:01:13,439
like balance

32
00:01:17,670 --> 00:01:16,000
spatial orientation figuring out which

33
00:01:20,070 --> 00:01:17,680
way is up and down

34
00:01:22,950 --> 00:01:20,080
making decisions processing spatial

35
00:01:24,710 --> 00:01:22,960
information based on that so cognitive

36
00:01:26,950 --> 00:01:24,720
and motor behaviors

37
00:01:29,190 --> 00:01:26,960
and then with the imaging work we're

38
00:01:30,310 --> 00:01:29,200

particularly interested in brain regions

39
00:01:32,789 --> 00:01:30,320
that we know

40
00:01:35,109 --> 00:01:32,799
control these behaviors so things like

41
00:01:37,270 --> 00:01:35,119
the cerebellum motor cortex

42
00:01:39,270 --> 00:01:37,280
somatosensory cortex

43
00:01:40,870 --> 00:01:39,280
these are the regions that we think will

44
00:01:43,109 --> 00:01:40,880
show big changes

45
00:01:44,710 --> 00:01:43,119
and we're really interested in whether

46
00:01:46,230 --> 00:01:44,720
those changes correlate with the

47
00:01:48,550 --> 00:01:46,240
behavioral effects

48
00:01:51,109 --> 00:01:48,560
and we're also interested in looking at

49
00:01:53,429 --> 00:01:51,119
once the behavior returns to normal post

50
00:01:55,830 --> 00:01:53,439
flight which we know happens for

51
00:01:56,950 --> 00:01:55,840
most individuals within a few weeks to a

52
00:01:58,870 --> 00:01:56,960
month

53
00:02:00,950 --> 00:01:58,880
we're interested in whether the brain

54
00:02:03,429 --> 00:02:00,960
control of these behaviors has also

55
00:02:06,830 --> 00:02:03,439
returned to normal or if there are some

56
00:02:08,469 --> 00:02:06,840
persistent changes as compensation or

57
00:02:10,550 --> 00:02:08,479
reorganization

58
00:02:12,790 --> 00:02:10,560
how does that relate to me on earth

59
00:02:15,110 --> 00:02:12,800
sure so we think this is really

60
00:02:15,830 --> 00:02:15,120
interesting as well in terms of earth

61
00:02:17,910 --> 00:02:15,840
for

62
00:02:19,910 --> 00:02:17,920
firstly because this is really an

63
00:02:22,790 --> 00:02:19,920

interesting example for studying the

64
00:02:24,550 --> 00:02:22,800
brain's capacity for neuroplasticity

65
00:02:27,510 --> 00:02:24,560
so these individuals are exposed to

66
00:02:29,430 --> 00:02:27,520
microgravity 24 hours a day for either

67
00:02:31,110 --> 00:02:29,440
six months or one year in the case of

68
00:02:33,270 --> 00:02:31,120
the one year mission

69
00:02:36,790 --> 00:02:33,280
so we think we'll be able to really look

70
00:02:38,710 --> 00:02:36,800
at how the healthy brain can reorganize

71
00:02:39,910 --> 00:02:38,720
in response to this very profound

72
00:02:41,910 --> 00:02:39,920
stimulus

73
00:02:42,869 --> 00:02:41,920
it's also interesting to people on earth

74
00:02:45,430 --> 00:02:42,879
because

75
00:02:46,710 --> 00:02:45,440
these vestibular changes that we see in

76
00:02:50,390 --> 00:02:46,720
astronauts

77
00:02:52,229 --> 00:02:50,400
are paralleled in healthy aging

78
00:02:53,509 --> 00:02:52,239
what have you learned from the first bed

79
00:02:54,710 --> 00:02:53,519
rest study since you've completed that

80
00:02:56,710 --> 00:02:54,720
is there anything you can share with us

81
00:02:58,790 --> 00:02:56,720
that you've learned sure i can share

82
00:03:01,350 --> 00:02:58,800
that we have seen rather profound

83
00:03:02,470 --> 00:03:01,360
changes in brain structure and brain

84
00:03:04,790 --> 00:03:02,480
function

85
00:03:08,070 --> 00:03:04,800
and in some cases these brain changes

86
00:03:10,229 --> 00:03:08,080
are correlated with the balance changes

87
00:03:12,149 --> 00:03:10,239
so if you're someone who changes

88
00:03:14,229 --> 00:03:12,159

structure

89
00:03:16,309 --> 00:03:14,239
more than somebody else

90
00:03:19,670 --> 00:03:16,319
in the cerebellum a region that controls

91
00:03:21,509 --> 00:03:19,680
balance you actually show less balance

92
00:03:23,990 --> 00:03:21,519
perturbation when you get out of bed

93
00:03:26,710 --> 00:03:24,000
rest suggesting that the brain is trying

94
00:03:28,390 --> 00:03:26,720
to compensate or upregulate some of

95
00:03:31,990 --> 00:03:28,400
these structures

96
00:03:33,030 --> 00:03:32,000
to adapt to the bed rest environment

97
00:03:34,470 --> 00:03:33,040
lastly

98
00:03:35,350 --> 00:03:34,480
why does it interest you to study the

99
00:03:39,589 --> 00:03:35,360
brain

100
00:03:42,710 --> 00:03:39,599
fascinating it's one of our our last

101
00:03:45,350 --> 00:03:42,720
great scientific frontiers understanding

102
00:03:47,990 --> 00:03:45,360
what makes us human how do we control

103
00:03:49,830 --> 00:03:48,000
our movements what differentiates one

104
00:03:52,229 --> 00:03:49,840
individual from another in terms of

105
00:03:54,070 --> 00:03:52,239
their motor and cognitive abilities

106
00:03:56,949 --> 00:03:54,080
and space flight is a different way to

107
00:03:59,110 --> 00:03:56,959
study this a unique way to study it yes

108
00:04:00,630 --> 00:03:59,120
in my laboratory at university of

109
00:04:02,949 --> 00:04:00,640
michigan i conduct a number of

110
00:04:05,110 --> 00:04:02,959
experiments on neuroplasticity

111
00:04:07,190 --> 00:04:05,120
but in that case i get subjects that

112
00:04:09,750 --> 00:04:07,200
come into my lab and practice some motor

113
00:04:12,070 --> 00:04:09,760

behavior maybe for an hour maybe for a

114
00:04:14,070 --> 00:04:12,080
few sessions but again here i have

115
00:04:15,270 --> 00:04:14,080
people learning to control movement of

116
00:04:17,509 --> 00:04:15,280
their body

117
00:04:19,670 --> 00:04:17,519
in an altered environment that is

118
00:04:22,150 --> 00:04:19,680
present around the clock for months on