1
00:00:06,720 --> 00:00:05,490
the upcoming mission that we've been

2
00:00:08,520 --> 00:00:06,730
talking a lot about the year-long

3
00:00:10,620 --> 00:00:08,530
mission by Scott Kelly and Mikhail

4
00:00:12,360 --> 00:00:10,630
Kornienko is going to focus a lot of

5
00:00:15,000 --> 00:00:12,370
energy on gathering information about

6
00:00:17,579 --> 00:00:15,010
how living in space for one year affects

7
00:00:19,919 --> 00:00:17,589
them but the work won't end when they

8
00:00:21,900 --> 00:00:19,929
come back from space in fact for dr.

9
00:00:24,029 --> 00:00:21,910
Miller droshky who's joining us today it

10
00:00:27,450 --> 00:00:24,039
will just be beginning he is at the

11
00:00:28,859 --> 00:00:27,460
co-principal investigator of a of a

12
00:00:30,899 --> 00:00:28,869
joint experiment with the Russians

13
00:00:34,200 --> 00:00:30,909

called filled tests and that's short for

14
00:00:36,750 --> 00:00:34,210
recovery of functional since so since

15
00:00:38,610 --> 00:00:36,760
the sensorimotor Wright performance

16
00:00:41,160 --> 00:00:38,620
following long-duration spaceflight he's

17
00:00:42,300 --> 00:00:41,170
also the chief of Neuroscience at NASA

18
00:00:43,770 --> 00:00:42,310
and he's going to tell us a little bit

19
00:00:47,160 --> 00:00:43,780
about that experiment thanks so much for

20
00:00:51,270 --> 00:00:47,170
joining us meal good morning all right

21
00:00:53,970 --> 00:00:51,280
well I know that we know a lot about how

22
00:00:55,440 --> 00:00:53,980
spaceflight affects astronauts when they

23
00:00:56,520 --> 00:00:55,450
get back to ground back to the ground

24
00:00:59,220 --> 00:00:56,530
but can you tell us a little bit about

25
00:01:01,440 --> 00:00:59,230
what some of those effects are well it's

26
00:01:05,760 --> 00:01:01,450
a it's really a pretty complicated

27
00:01:08,249 --> 00:01:05,770
question you're asking it's the simple

28
00:01:10,020 --> 00:01:08,259
answer is that most of the changes we

29
00:01:12,239 --> 00:01:10,030
see are due to a number of different

30
00:01:15,389 --> 00:01:12,249
factors one is that the time that's

31
00:01:17,370 --> 00:01:15,399
spent on orbit as well as the

32
00:01:20,249 --> 00:01:17,380
transitions from the Earth's

33
00:01:23,130 --> 00:01:20,259
gravitational field to the the

34
00:01:24,690 --> 00:01:23,140
weightlessness of flight and then from

35
00:01:27,539 --> 00:01:24,700
weightless back to the Earth's

36
00:01:29,789 --> 00:01:27,549
gravitational field again that's where

37
00:01:32,779 --> 00:01:29,799
we see the biggest changes primarily

38
00:01:35,520 --> 00:01:32,789

because the the organs that are

39
00:01:39,260 --> 00:01:35,530
responsible for our spatial orientation

40
00:01:42,020 --> 00:01:39,270
and balance located in the inner ear are

41
00:01:46,859 --> 00:01:42,030
affected by these kinds of changes as

42
00:01:49,529 --> 00:01:46,869
are the pressure sensors for example in

43
00:01:52,289 --> 00:01:49,539
the bottom of the feet the astronauts

44
00:01:55,859 --> 00:01:52,299
have been unloaded now in in this case

45
00:01:57,989 --> 00:01:55,869
for six months or more okay and this is

46
00:01:59,370 --> 00:01:57,999
something we studied a good bit during

47
00:02:02,190 --> 00:01:59,380
the shuttle days right but not so much

48
00:02:06,719 --> 00:02:02,200
during Space Station time yes that's

49
00:02:09,429 --> 00:02:06,729
right we had a really nice ongoing

50
00:02:13,960 --> 00:02:09,439
program with

51
00:02:16,509 --> 00:02:13,970
the shuttle flights but we looked at

52
00:02:20,679 --> 00:02:16,519
various components associated with

53
00:02:23,369 --> 00:02:20,689
balance and returned from space light as

54
00:02:28,380 --> 00:02:23,379
well as other systems in the body and

55
00:02:31,210 --> 00:02:28,390
then we had a very nice program that was

56
00:02:34,569 --> 00:02:31,220
done with the Russians that we're

57
00:02:37,569 --> 00:02:34,579
looking both at the shuttle and the MIR

58
00:02:39,190 --> 00:02:37,579
flight okay so this is work that's been

59
00:02:41,530 --> 00:02:39,200
ongoing for a while but we're gonna I

60
00:02:43,539 --> 00:02:41,540
guess amp it up a little bit with Kelly

61
00:02:46,720 --> 00:02:43,549
and Kornienko staying a whole year in

62
00:02:49,809 --> 00:02:46,730
space yes the importance of that is

63
00:02:52,300 --> 00:02:49,819

really looking at how people are going

64
00:02:55,690 --> 00:02:52,310
to be able to perform after very long

65
00:02:58,030 --> 00:02:55,700
duration flights say for example a trip

66
00:02:59,770 --> 00:02:58,040
to Mars right because we want them not

67
00:03:01,089 --> 00:02:59,780
only to be ok when they get back to

68
00:03:05,319 --> 00:03:01,099
earth but also be able to function when

69
00:03:07,059 --> 00:03:05,329
they're on Mars right correct ok well so

70
00:03:08,830 --> 00:03:07,069
what what did the crew members actually

71
00:03:12,250 --> 00:03:08,840
have to do when they get back from space

72
00:03:15,189 --> 00:03:12,260
to take part in this study well we began

73
00:03:19,030 --> 00:03:15,199
this study with what's called a pilot

74
00:03:21,640 --> 00:03:19,040
field test simply because I think there

75
00:03:24,879 --> 00:03:21,650
was some concern whether or not we could

76
00:03:26,770 --> 00:03:24,889
actually get the crews to perform in the

77
00:03:30,809 --> 00:03:26,780
various testing that we were going to be

78
00:03:34,720 --> 00:03:30,819
asking them to do okay and the pilot

79
00:03:37,089 --> 00:03:34,730
field test essentially did some very

80
00:03:41,349 --> 00:03:37,099
simple measurements to start with that

81
00:03:43,140 --> 00:03:41,359
were titrated from easy to some very

82
00:03:46,449 --> 00:03:43,150
complex and difficult ones for example

83
00:03:49,599 --> 00:03:46,459
the simplest is simply rising from a

84
00:03:51,129 --> 00:03:49,609
chair unaided okay and this is right

85
00:03:53,770 --> 00:03:51,139
after they returned right before they

86
00:03:56,770 --> 00:03:53,780
even left the landing field that's

87
00:03:59,890 --> 00:03:56,780
correct is immediately after they we

88
00:04:01,990 --> 00:03:59,900

take them from the Soyuz capsule where

89
00:04:08,050 --> 00:04:02,000
they're put in the recovery chair were

90
00:04:11,319 --> 00:04:08,060
you know TV ceremonies and then into a

91
00:04:13,869 --> 00:04:11,329
medical tent and begin testing there

92
00:04:15,219 --> 00:04:13,879
okay and then does it continue for

93
00:04:17,649 --> 00:04:15,229
longer after that or is that pretty much

94
00:04:18,910 --> 00:04:17,659
the end of that part of the test what

95
00:04:21,580 --> 00:04:18,920
we're interested in

96
00:04:22,420 --> 00:04:21,590
is developing a time constant of

97
00:04:25,780 --> 00:04:22,430
recovery

98
00:04:27,820 --> 00:04:25,790
okay the various functions so we test in

99
00:04:30,130 --> 00:04:27,830
the field or if it's impossible as it

100
00:04:31,470 --> 00:04:30,140
was this last flight same with the

101
00:04:36,250 --> 00:04:31,480
weather in Tarragona

102
00:04:40,270 --> 00:04:36,260
or in caucus 10 being what it was kind

103
00:04:43,270 --> 00:04:40,280
of often right March is very bad time so

104
00:04:46,060 --> 00:04:43,280
we test at the airport that's

105
00:04:48,730 --> 00:04:46,070
transferred to either in a carry ganda

106
00:04:50,620 --> 00:04:48,740
or digestives con so you've done several

107
00:04:52,450 --> 00:04:50,630
of these pilot tests and they've gone

108
00:04:54,850 --> 00:04:52,460
okay you're confident that you'll be

109
00:04:59,410 --> 00:04:54,860
able to do the same with with Scott and

110
00:05:01,390 --> 00:04:59,420
McGill yes we are we the Russians

111
00:05:04,990 --> 00:05:01,400
actually our Russian counterparts have

112
00:05:08,680 --> 00:05:05,000
been doing part of the advanced field

113
00:05:11,020 --> 00:05:08,690

test that we don't do so we feel pretty

114
00:05:13,300 --> 00:05:11,030
confident that we'll be able to carry

115
00:05:15,070 --> 00:05:13,310
out these measurements but to finish

116
00:05:19,600 --> 00:05:15,080
what I was what I was saying just

117
00:05:22,240 --> 00:05:19,610
briefly we test again at the at the

118
00:05:24,880 --> 00:05:22,250
refueling station in Scotland on their

119
00:05:25,480 --> 00:05:24,890
way home and then when they arrive in

120
00:05:28,690 --> 00:05:25,490
Houston

121
00:05:32,470 --> 00:05:28,700
okay all right so we're waiting on a

122
00:05:35,370 --> 00:05:32,480
long time to get just a few not even a

123
00:05:37,540 --> 00:05:35,380
whole day's worth of tests done yes

124
00:05:39,370 --> 00:05:37,550
hopefully that'll get you some good

125
00:05:40,780 --> 00:05:39,380
results I know that part of this is that

126
00:05:42,970 --> 00:05:40,790
you're working pretty closely with the

127
00:05:45,520 --> 00:05:42,980
Russian researchers on the test why is

128
00:05:47,860 --> 00:05:45,530
that important to the to the study well

129
00:05:50,410 --> 00:05:47,870
it's important because the Russians

130
00:05:54,270 --> 00:05:50,420
bring a number of tests that we

131
00:05:56,770 --> 00:05:54,280
typically don't do and in looking at

132
00:05:59,920 --> 00:05:56,780
returning crew members and their ability

133
00:06:03,310 --> 00:05:59,930
to recover what kind of tests can you

134
00:06:06,400 --> 00:06:03,320
say for example they do some things that

135
00:06:08,680 --> 00:06:06,410
are ask the crew members to perform some

136
00:06:10,870 --> 00:06:08,690
relatively difficult maneuvers like

137
00:06:11,920 --> 00:06:10,880
getting up from a chair and walking as

138
00:06:14,530 --> 00:06:11,930

quickly as they can

139
00:06:16,420 --> 00:06:14,540
turning around the corner and then

140
00:06:18,700 --> 00:06:16,430
stepping over obstacles in their way

141
00:06:21,100 --> 00:06:18,710
okay interesting

142
00:06:22,510 --> 00:06:21,110
all right well are there any benefits to

143
00:06:27,090 --> 00:06:22,520
the research for those of us Beck your

144
00:06:30,330 --> 00:06:27,100
honor yes there hopefully there will be

145
00:06:33,330 --> 00:06:30,340
when you look at our population

146
00:06:36,930 --> 00:06:33,340
in the world I mean we are somewhat of

147
00:06:40,350 --> 00:06:36,940
an aging society and we have people

148
00:06:42,629 --> 00:06:40,360
coming back from battlefields that have

149
00:06:44,790 --> 00:06:42,639
difficulty because of injuries and so

150
00:06:47,010 --> 00:06:44,800
forth take for example the simple

151
00:06:49,890 --> 00:06:47,020
sit-to-stand test that I was talking

152
00:06:52,520 --> 00:06:49,900
about it's a very common thing that

153
00:06:57,350 --> 00:06:52,530
everybody does every day multiple times

154
00:07:01,140 --> 00:06:57,360
but for a returning astronaut for a

155
00:07:04,170 --> 00:07:01,150
person 55 years or older for example or

156
00:07:08,159 --> 00:07:04,180
people with disabilities it's not an

157
00:07:11,330 --> 00:07:08,169
easy exercise many times and failure to

158
00:07:15,140 --> 00:07:11,340
be able to do this results in

159
00:07:18,870 --> 00:07:15,150
dysfunction in the sensory motor system

160
00:07:20,490 --> 00:07:18,880
perhaps institutionalization and in the

161
00:07:22,710 --> 00:07:20,500
worst cases even death

162
00:07:24,420 --> 00:07:22,720
okay all right well it sounds like very

163
00:07:25,650 --> 00:07:24,430

interesting and important research we

164
00:07:26,540 --> 00:07:25,660
appreciate you coming in and tell us a