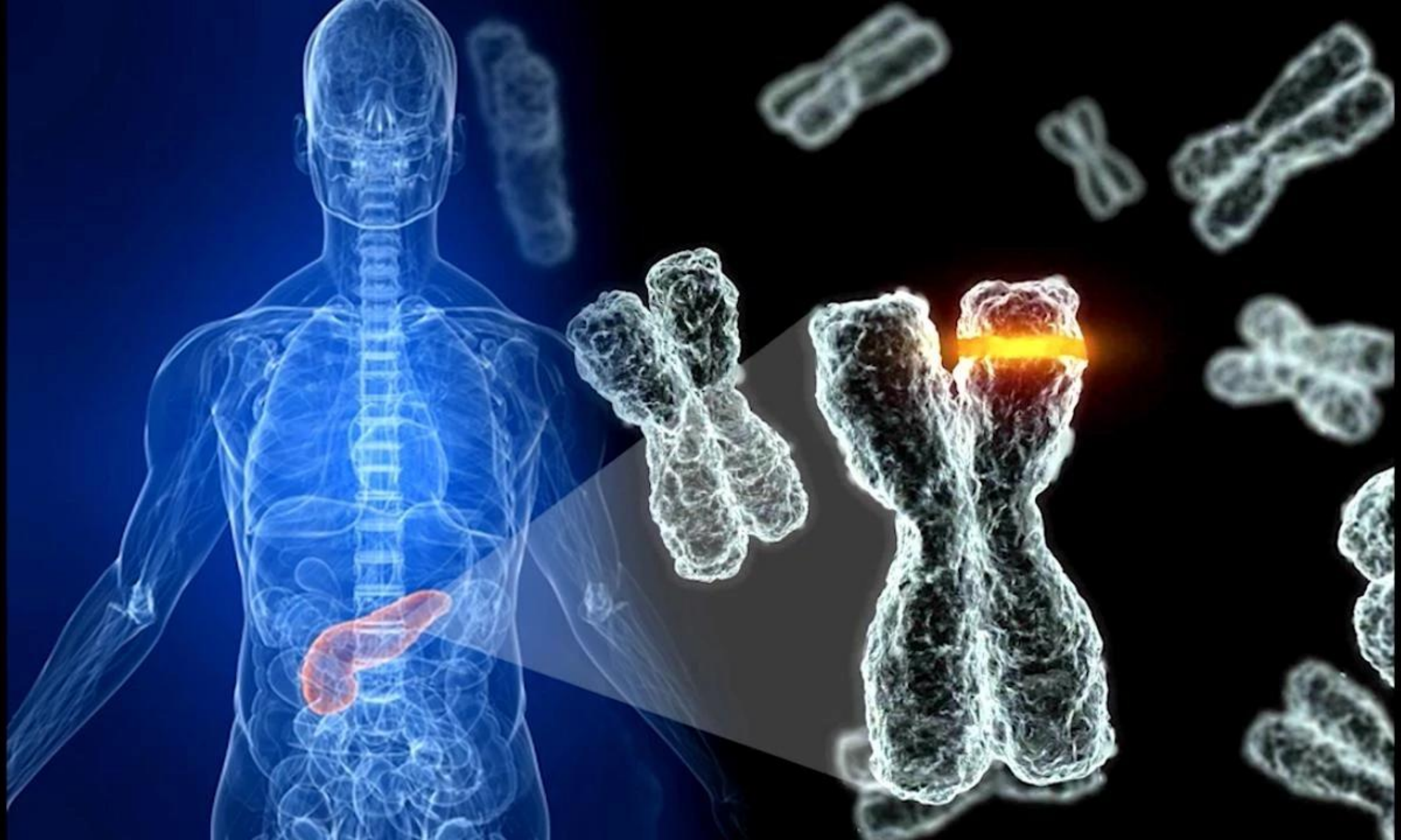

1
00:00:08,310 --> 00:00:07,190
we all know that increased stress can

2
00:00:11,589 --> 00:00:08,320
lead to

3
00:00:14,709 --> 00:00:11,599
accelerated aging cardiovascular disease

4
00:00:16,550 --> 00:00:14,719
cancer and an impaired immune system a

5
00:00:18,790 --> 00:00:16,560
new study on board the station is

6
00:00:21,349 --> 00:00:18,800
looking into part of the chromosomes of

7
00:00:23,750 --> 00:00:21,359
astronauts to find out more about this

8
00:00:25,589 --> 00:00:23,760
and how space flight affects it my

9
00:00:27,750 --> 00:00:25,599
colleague lori meggs at the marshall

10
00:00:29,750 --> 00:00:27,760
space flight center recently spoke with

11
00:00:32,389 --> 00:00:29,760
the principal investigator of this first

12
00:00:35,110 --> 00:00:32,399
of its kind study and how the one-year

13
00:00:37,510 --> 00:00:35,120

crew mission is taking part

14
00:00:39,750 --> 00:00:37,520
for the twin study yeah we are going to

15
00:00:42,470 --> 00:00:39,760
be looking at telomere length and

16
00:00:43,990 --> 00:00:42,480
telomerase activity in the astronauts so

17
00:00:45,350 --> 00:00:44,000
and not only the twins we have a

18
00:00:47,830 --> 00:00:45,360
separate project where we're also

19
00:00:49,110 --> 00:00:47,840
looking at other astronauts

20
00:00:51,029 --> 00:00:49,120
but we're going to be measuring their

21
00:00:53,990 --> 00:00:51,039
telomere length and telomeres activity

22
00:00:56,229 --> 00:00:54,000
in blood samples what is that

23
00:00:57,510 --> 00:00:56,239
so telomeres are the ends of our

24
00:00:58,869 --> 00:00:57,520
chromosomes

25
00:01:01,990 --> 00:00:58,879
and they

26
00:01:04,469 --> 00:01:02,000
are very informative biomarkers of aging

27
00:01:06,550 --> 00:01:04,479
and disease like cardiovascular disease

28
00:01:08,390 --> 00:01:06,560
for example is one example that short

29
00:01:09,830 --> 00:01:08,400
telomeres have been associated with

30
00:01:12,950 --> 00:01:09,840
increased risk

31
00:01:15,510 --> 00:01:12,960
of a variety of diseases

32
00:01:16,310 --> 00:01:15,520
cardiovascular disease cancer is another

33
00:01:18,310 --> 00:01:16,320
one

34
00:01:21,590 --> 00:01:18,320
they're also important because they get

35
00:01:23,749 --> 00:01:21,600
shorter as we age just all of us we as

36
00:01:25,350 --> 00:01:23,759
we get older and cells replicate

37
00:01:27,510 --> 00:01:25,360
telomeres shorten

38
00:01:30,310 --> 00:01:27,520

so it's becoming appreciated that they

39
00:01:33,670 --> 00:01:30,320
are very informative as far as how well

40
00:01:36,069 --> 00:01:33,680
or how quickly we're aging and a lot of

41
00:01:38,310 --> 00:01:36,079
a whole variety of lifestyle factors

42
00:01:40,230 --> 00:01:38,320
contribute to telomere shortening and

43
00:01:43,030 --> 00:01:40,240
how fast they're shortening as we get

44
00:01:45,270 --> 00:01:43,040
older so things like stress

45
00:01:47,670 --> 00:01:45,280
you know all kinds of different stress

46
00:01:49,830 --> 00:01:47,680
nutritional physical

47
00:01:53,350 --> 00:01:49,840
emotional kinds of stresses can really

48
00:01:55,510 --> 00:01:53,360
shorten telomeres faster than than just

49
00:01:57,910 --> 00:01:55,520
regular lifestyles without it so the

50
00:01:59,749 --> 00:01:57,920
idea was that space flight and strapping

51
00:02:03,030 --> 00:01:59,759
yourself to a rocket is a fairly

52
00:02:05,030 --> 00:02:03,040
stressful experience and living in space

53
00:02:05,910 --> 00:02:05,040
you know what's associated with all of

54
00:02:08,710 --> 00:02:05,920
that

55
00:02:10,229 --> 00:02:08,720
would really accelerate perhaps

56
00:02:12,710 --> 00:02:10,239
scott kelly's

57
00:02:15,270 --> 00:02:12,720
telomere loss and contribute to aging

58
00:02:18,150 --> 00:02:15,280
and perhaps increased risk of disease as

59
00:02:20,150 --> 00:02:18,160
compared to his brother mark on earth

60
00:02:22,710 --> 00:02:20,160
so that that's really what started it

61
00:02:24,710 --> 00:02:22,720
that's our hypothesis um and then we're

62
00:02:27,110 --> 00:02:24,720
also going to be measuring telomerase

63
00:02:29,990 --> 00:02:27,120

activity which is the enzyme that helps

64
00:02:31,830 --> 00:02:30,000
to maintain telomeres and and try to tie

65
00:02:33,270 --> 00:02:31,840
that to the changes that we see in

66
00:02:35,430 --> 00:02:33,280
telomere length

67
00:02:36,470 --> 00:02:35,440
so we do this by drawing blood yes so we

68
00:02:39,589 --> 00:02:36,480
just

69
00:02:42,390 --> 00:02:39,599
go from blood samples and we can get the

70
00:02:45,750 --> 00:02:42,400
dna and the protein that we need

71
00:02:47,509 --> 00:02:45,760
to look at their chromosomes and to do a

72
00:02:49,830 --> 00:02:47,519
fluorescent assay where we look at

73
00:02:52,070 --> 00:02:49,840
telomere length as well as the protein

74
00:02:54,470 --> 00:02:52,080
where we look at telomerase activity

75
00:02:57,030 --> 00:02:54,480
levels in the blood how can this help me

76
00:02:59,030 --> 00:02:57,040
here on earth well i mean we're all

77
00:03:01,589 --> 00:02:59,040
worried about getting older and aging

78
00:03:03,589 --> 00:03:01,599
and how quickly or how well we're aging

79
00:03:06,070 --> 00:03:03,599
and we're all worried about increased

80
00:03:09,190 --> 00:03:06,080
risk of disease cancer cardiovascular

81
00:03:10,790 --> 00:03:09,200
disease so if we can associate or find

82
00:03:13,190 --> 00:03:10,800
some specific factors that are

83
00:03:15,190 --> 00:03:13,200
associated with space flight because

84
00:03:17,190 --> 00:03:15,200
with the twins the beautiful thing is is

85
00:03:19,589 --> 00:03:17,200
that their genetics are the same or is

86
00:03:21,990 --> 00:03:19,599
the same as we're ever going to get so

87
00:03:23,910 --> 00:03:22,000
we can we can control for that and then

88
00:03:25,910 --> 00:03:23,920

say it's just the space flight factors

89
00:03:28,149 --> 00:03:25,920
or these stress factors that are related

90
00:03:31,270 --> 00:03:28,159
to space flight that are influencing

91
00:03:33,270 --> 00:03:31,280
telomere length so we can do other

92
00:03:35,430 --> 00:03:33,280
studies to show you know well how can we

93
00:03:37,830 --> 00:03:35,440
mitigate that how could we help slow it

94
00:03:38,869 --> 00:03:37,840
down for example if it's oxidative

95
00:03:41,190 --> 00:03:38,879
stress

96
00:03:43,750 --> 00:03:41,200
can we treat with antioxidants a simple

97
00:03:46,630 --> 00:03:43,760
thing like that to help

98
00:03:48,869 --> 00:03:46,640
slow down that rate of telomere

99
00:03:50,390 --> 00:03:48,879
length loss and so that's i mean that's

100
00:03:51,589 --> 00:03:50,400
going to be something that will benefit

101
00:03:53,030 --> 00:03:51,599
everyone

102
00:03:54,229 --> 00:03:53,040
so you say it's not just the twins

103
00:03:56,630 --> 00:03:54,239
though there are other astronauts so how

104
00:03:58,309 --> 00:03:56,640
long will the study go um the twins

105
00:04:00,630 --> 00:03:58,319
asked the twin study of course the one

106
00:04:03,110 --> 00:04:00,640
year launch and then time after that

107
00:04:04,949 --> 00:04:03,120
but we timed it so that we're also doing

108
00:04:07,030 --> 00:04:04,959
other astronaut studies over the same

109
00:04:09,750 --> 00:04:07,040
period of time so we'll be able to

110
00:04:12,309 --> 00:04:09,760
compare the twins not only to each other

111
00:04:14,710 --> 00:04:12,319
or space flight factors but also compare

112
00:04:16,469 --> 00:04:14,720
them to other unrelated astronauts to

113
00:04:18,550 --> 00:04:16,479

look for individual kind of

114
00:04:20,150 --> 00:04:18,560
susceptibility factors that might also

115
00:04:23,270 --> 00:04:20,160
be contributing to

116
00:04:25,110 --> 00:04:23,280
rates at which telomeres are lost

117
00:04:27,350 --> 00:04:25,120
so what excites you about this study

118
00:04:29,430 --> 00:04:27,360
other than you know having a study

119
00:04:31,189 --> 00:04:29,440
yourself on space station yes well i

120
00:04:33,110 --> 00:04:31,199
mean just having a study on space

121
00:04:35,189 --> 00:04:33,120
station is really remarkable and it's

122
00:04:37,990 --> 00:04:35,199
been you know the challenges that you

123
00:04:39,590 --> 00:04:38,000
have thinking about how to draw blood in

124
00:04:42,230 --> 00:04:39,600
on the space station and how you get

125
00:04:44,310 --> 00:04:42,240
your samples back and just all of those

126
00:04:45,990 --> 00:04:44,320
kinds of logistics that you don't

127
00:04:48,629 --> 00:04:46,000
normally think about that's that's

128
00:04:49,749 --> 00:04:48,639
really been exciting and a lot of fun

129
00:04:51,749 --> 00:04:49,759
and just the whole group of

130
00:04:53,990 --> 00:04:51,759
investigators for the twin studies are

131
00:04:56,710 --> 00:04:54,000
also just a remarkable group and they've

132
00:04:59,189 --> 00:04:56,720
been wonderful to to work with

133
00:05:00,950 --> 00:04:59,199
and just you know to at the thought of

134
00:05:02,390 --> 00:05:00,960
being able to do something that no one's

135
00:05:04,310 --> 00:05:02,400
ever done before

136
00:05:07,430 --> 00:05:04,320
with the astronauts and and making a

137
00:05:09,749 --> 00:05:07,440
contribution to astronaut health as well