
NASA
SPACESTATION
LIVE

1
00:00:08,230 --> 00:00:06,630
so a lot of studies are taking place on

2
00:00:09,990 --> 00:00:08,240
board the international space station

3
00:00:11,830 --> 00:00:10,000
looking at various changes that happen

4
00:00:13,350 --> 00:00:11,840
to the human body and one of the major

5
00:00:15,190 --> 00:00:13,360
concerns that we're looking at right now

6
00:00:16,950 --> 00:00:15,200
is actually vision changes in the

7
00:00:19,029 --> 00:00:16,960
astronauts that have been experienced

8
00:00:20,870 --> 00:00:19,039
and that we've been paying attention to

9
00:00:23,269 --> 00:00:20,880
i'm joined today by

10
00:00:25,029 --> 00:00:23,279
dr scott smith from the new nutritional

11
00:00:27,189 --> 00:00:25,039
biochemistry lab here at the johnson

12
00:00:28,310 --> 00:00:27,199
space center who just had a report

13
00:00:30,470 --> 00:00:28,320

published

14
00:00:33,190 --> 00:00:30,480
in the federation of american societies

15
00:00:35,510 --> 00:00:33,200
for experimental biology journal uh but

16
00:00:37,670 --> 00:00:35,520
he's actually looking at vision changes

17
00:00:39,830 --> 00:00:37,680
as well so uh doctor first off thank you

18
00:00:41,270 --> 00:00:39,840
so much for joining us tell us what give

19
00:00:43,110 --> 00:00:41,280
us some background real quick what are

20
00:00:45,029 --> 00:00:43,120
some of the changes or the effects to

21
00:00:46,310 --> 00:00:45,039
astronaut vision that we're looking at

22
00:00:47,590 --> 00:00:46,320
solving

23
00:00:49,110 --> 00:00:47,600
well

24
00:00:51,590 --> 00:00:49,120
thanks for the invitation and it's a

25
00:00:54,869 --> 00:00:51,600
pleasure to be here this morning um

26
00:00:57,510 --> 00:00:54,879
with regard to the vision changes

27
00:00:59,990 --> 00:00:57,520
in simple terms that i understand we see

28
00:01:03,189 --> 00:01:00,000
people going up with perfect vision

29
00:01:04,469 --> 00:01:03,199
that come home and need glasses okay um

30
00:01:06,070 --> 00:01:04,479
it's a little more complex than that

31
00:01:07,990 --> 00:01:06,080
when you do some detailed eye exams you

32
00:01:10,149 --> 00:01:08,000
see things like what they call disc

33
00:01:11,429 --> 00:01:10,159
edema you see changes in the shape of

34
00:01:12,469 --> 00:01:11,439
the eye or what they call globe

35
00:01:15,109 --> 00:01:12,479
flattening

36
00:01:16,469 --> 00:01:15,119
cotton wool spots a number of

37
00:01:17,350 --> 00:01:16,479
different things that the eye doctors

38
00:01:19,109 --> 00:01:17,360

find

39
00:01:21,510 --> 00:01:19,119
um they're a little more nuanced but

40
00:01:23,350 --> 00:01:21,520
again the bottom line is

41
00:01:24,710 --> 00:01:23,360
people that had what you would call

42
00:01:27,510 --> 00:01:24,720
perfect vision

43
00:01:29,350 --> 00:01:27,520
don't okay and so we've been talking a

44
00:01:31,030 --> 00:01:29,360
lot this week about fluid shifts it's an

45
00:01:33,510 --> 00:01:31,040
experiment for the one-year crew that's

46
00:01:35,190 --> 00:01:33,520
looking at um the potential that the

47
00:01:37,590 --> 00:01:35,200
fluid redistributing could be changing

48
00:01:39,590 --> 00:01:37,600
the vision and so tell me how does

49
00:01:40,950 --> 00:01:39,600
nutritional biochemistry come into the

50
00:01:42,870 --> 00:01:40,960
mix

51
00:01:44,389 --> 00:01:42,880
well that's that's a great question i

52
00:01:46,310 --> 00:01:44,399
get i said a lot my daughter asked me

53
00:01:47,670 --> 00:01:46,320
that this past weekend so you got a good

54
00:01:49,990 --> 00:01:47,680
answer

55
00:01:51,590 --> 00:01:50,000
i hope um first of all you need to

56
00:01:53,109 --> 00:01:51,600
realize that nutrition is more than just

57
00:01:54,950 --> 00:01:53,119
what you put in your mouth

58
00:01:56,469 --> 00:01:54,960
and that the study of nutrition involves

59
00:01:59,270 --> 00:01:56,479
not only things like carbohydrate and

60
00:02:01,990 --> 00:01:59,280
protein and vitamins and minerals

61
00:02:04,389 --> 00:02:02,000
but how those things work in the body

62
00:02:06,389 --> 00:02:04,399
and the biochemistry behind how your

63
00:02:09,029 --> 00:02:06,399

muscles make energy and how your brain

64
00:02:11,750 --> 00:02:09,039
utilizes glucose and how vitamins help

65
00:02:13,030 --> 00:02:11,760
with biochemical functions is all part

66
00:02:14,229 --> 00:02:13,040
of nutrition

67
00:02:16,070 --> 00:02:14,239
and

68
00:02:18,630 --> 00:02:16,080
that's that's how we got involved in

69
00:02:20,070 --> 00:02:18,640
this in this short story okay and so

70
00:02:22,150 --> 00:02:20,080
there's more to it than just the

71
00:02:23,510 --> 00:02:22,160
nutritional aspect in this paper and

72
00:02:25,190 --> 00:02:23,520
everything you guys are also looking at

73
00:02:26,949 --> 00:02:25,200
the genetics behind it tell me how that

74
00:02:27,750 --> 00:02:26,959
got into the mix as well

75
00:02:29,430 --> 00:02:27,760
well

76
00:02:30,949 --> 00:02:29,440
what happened was this was about five

77
00:02:32,630 --> 00:02:30,959
years ago now when there were a lot of

78
00:02:34,150 --> 00:02:32,640
folks trying to figure out

79
00:02:35,350 --> 00:02:34,160
what was going on with these with these

80
00:02:37,190 --> 00:02:35,360
vision issues

81
00:02:38,390 --> 00:02:37,200
and when we looked at our data what we

82
00:02:40,470 --> 00:02:38,400
found is

83
00:02:41,990 --> 00:02:40,480
differences in blood chemistry

84
00:02:44,949 --> 00:02:42,000
between astronauts that had vision

85
00:02:48,070 --> 00:02:44,959
issues and those that did not okay

86
00:02:49,670 --> 00:02:48,080
and we ruled out lots of things and

87
00:02:51,110 --> 00:02:49,680
one of the things that struck us was

88
00:02:52,630 --> 00:02:51,120

that we found

89
00:02:53,589 --> 00:02:52,640
that individuals that had these vision

90
00:02:56,070 --> 00:02:53,599
issues

91
00:02:57,509 --> 00:02:56,080
had these different blood chemistries

92
00:02:59,430 --> 00:02:57,519
before flight

93
00:03:01,750 --> 00:02:59,440
okay so it might be some kind of

94
00:03:04,070 --> 00:03:01,760
predisposed exactly at that point we

95
00:03:05,350 --> 00:03:04,080
started looking for

96
00:03:07,830 --> 00:03:05,360
reasons that there could be differences

97
00:03:10,630 --> 00:03:07,840
beforehand and the key thing that jumped

98
00:03:13,830 --> 00:03:10,640
up was the potential for genetics

99
00:03:15,910 --> 00:03:13,840
and we started looking at the genetics

100
00:03:17,830 --> 00:03:15,920
related to the chemicals that we were

101
00:03:20,070 --> 00:03:17,840
seeing in the blood that were different

102
00:03:21,430 --> 00:03:20,080
and that's what the

103
00:03:22,390 --> 00:03:21,440
that's what the paper we just published

104
00:03:25,030 --> 00:03:22,400
found

105
00:03:27,589 --> 00:03:25,040
is some key findings related to

106
00:03:29,990 --> 00:03:27,599
differences in genetics that explain

107
00:03:32,309 --> 00:03:30,000
uh those biochemical differences

108
00:03:35,030 --> 00:03:32,319
that we now need to try to go figure out

109
00:03:36,630 --> 00:03:35,040
what is it about those individuals

110
00:03:38,949 --> 00:03:36,640
that is leading them to have vision

111
00:03:40,630 --> 00:03:38,959
issues while others do not okay so

112
00:03:42,710 --> 00:03:40,640
obviously this is going to be an issue

113
00:03:44,550 --> 00:03:42,720

that could have a whole bunch of

114
00:03:45,990 --> 00:03:44,560
potential causes

115
00:03:47,430 --> 00:03:46,000
and so what's some of the work that you

116
00:03:50,070 --> 00:03:47,440
guys are going to be going ahead and

117
00:03:51,750 --> 00:03:50,080
doing to try and solve it on your end to

118
00:03:53,350 --> 00:03:51,760
solve what you were just talking about

119
00:03:55,429 --> 00:03:53,360
well the first thing we need to do is

120
00:03:57,270 --> 00:03:55,439
when we first looked at this we took a

121
00:03:58,229 --> 00:03:57,280
very small look at the genetics we

122
00:04:01,110 --> 00:03:58,239
looked at

123
00:04:02,949 --> 00:04:01,120
literally a handful of points in the dna

124
00:04:05,429 --> 00:04:02,959
where we thought there could be issues

125
00:04:07,350 --> 00:04:05,439
we knew at the time that there was a

126
00:04:09,350 --> 00:04:07,360
broader set to be looked at

127
00:04:11,830 --> 00:04:09,360
we looked at five of these genetic

128
00:04:13,270 --> 00:04:11,840
differences we should have looked at 300

129
00:04:14,309 --> 00:04:13,280
400

130
00:04:16,150 --> 00:04:14,319
but at the time we were a little

131
00:04:18,310 --> 00:04:16,160
reluctant to go in that deep

132
00:04:19,670 --> 00:04:18,320
um so we took a small stab and we got

133
00:04:21,590 --> 00:04:19,680
very lucky because

134
00:04:23,430 --> 00:04:21,600
two of those five came up as significant

135
00:04:25,270 --> 00:04:23,440
okay what we now want to do is go back

136
00:04:26,950 --> 00:04:25,280
and look at those three or four hundred

137
00:04:28,950 --> 00:04:26,960
points because

138
00:04:29,909 --> 00:04:28,960

while we did find significance with

139
00:04:31,430 --> 00:04:29,919
those two

140
00:04:34,230 --> 00:04:31,440
there's a lot of folks that had vision

141
00:04:35,430 --> 00:04:34,240
issues that didn't fit our model if you

142
00:04:36,870 --> 00:04:35,440
will

143
00:04:39,030 --> 00:04:36,880
and we're thinking that we may be able

144
00:04:40,390 --> 00:04:39,040
to get a better picture by looking at a

145
00:04:42,870 --> 00:04:40,400
broader set of the genetics so that's

146
00:04:44,950 --> 00:04:42,880
one of the first things we hope to do

147
00:04:47,430 --> 00:04:44,960
okay so i mean obviously a whole lot to

148
00:04:49,350 --> 00:04:47,440
be done still and this this is an issue

149
00:04:52,070 --> 00:04:49,360
that is stemming from something we

150
00:04:53,749 --> 00:04:52,080
noticed in space in astronauts but we

151
00:04:55,670 --> 00:04:53,759
always like to talk about and we always

152
00:04:57,990 --> 00:04:55,680
like to know are there any impacts that

153
00:05:00,469 --> 00:04:58,000
this kind of research could have to

154
00:05:02,390 --> 00:05:00,479
those of us living here on planet earth

155
00:05:04,629 --> 00:05:02,400
well indeed and and

156
00:05:06,230 --> 00:05:04,639
with regard to this one um

157
00:05:08,070 --> 00:05:06,240
one of the things that we found

158
00:05:09,990 --> 00:05:08,080
in review our data

159
00:05:11,749 --> 00:05:10,000
and in reviewing the literature the

160
00:05:12,629 --> 00:05:11,759
scientific literature what we found is

161
00:05:15,590 --> 00:05:12,639
that

162
00:05:17,990 --> 00:05:15,600
um there's a population out there with

163
00:05:18,950 --> 00:05:18,000

several characteristics that are very

164
00:05:21,350 --> 00:05:18,960
similar

165
00:05:22,790 --> 00:05:21,360
to astronauts with vision issues okay

166
00:05:24,390 --> 00:05:22,800
everything from the differences in

167
00:05:25,510 --> 00:05:24,400
chemistry blood chemistry that i talked

168
00:05:27,510 --> 00:05:25,520
about

169
00:05:28,469 --> 00:05:27,520
differences in intracranial pressure

170
00:05:29,990 --> 00:05:28,479
that

171
00:05:31,189 --> 00:05:30,000
everybody seems to think is related to

172
00:05:33,029 --> 00:05:31,199
this thing

173
00:05:35,510 --> 00:05:33,039
differences in carbohydrate metabolism

174
00:05:37,110 --> 00:05:35,520
differences in hormones differences in

175
00:05:39,830 --> 00:05:37,120
lots of things

176
00:05:40,950 --> 00:05:39,840
what we found is a clinical population

177
00:05:42,710 --> 00:05:40,960
that

178
00:05:44,550 --> 00:05:42,720
is very similar appears to be very

179
00:05:46,230 --> 00:05:44,560
similar to our astronauts

180
00:05:47,590 --> 00:05:46,240
and that population

181
00:05:48,950 --> 00:05:47,600
is women

182
00:05:53,430 --> 00:05:48,960
diagnosed with what's known as

183
00:05:54,950 --> 00:05:53,440
polycystic ovary syndrome or pcos

184
00:05:58,550 --> 00:05:54,960
and

185
00:06:01,430 --> 00:05:58,560
that is is something that we found that

186
00:06:02,870 --> 00:06:01,440
um again there's a lot of similarities

187
00:06:04,230 --> 00:06:02,880
one of the studies we've proposed is to

188
00:06:05,350 --> 00:06:04,240

look at that a little closer we've

189
00:06:06,790 --> 00:06:05,360
actually

190
00:06:08,870 --> 00:06:06,800
we're trying to work with folks up at

191
00:06:10,710 --> 00:06:08,880
the mayo clinic okay um they've got a

192
00:06:11,830 --> 00:06:10,720
study in women with pcos and what we're

193
00:06:14,150 --> 00:06:11,840
trying to do

194
00:06:15,430 --> 00:06:14,160
is a study to expand that

195
00:06:17,830 --> 00:06:15,440
and see if we can look at the

196
00:06:20,230 --> 00:06:17,840
differences that we found in astronauts

197
00:06:22,070 --> 00:06:20,240
and see if we can match that up and the

198
00:06:23,909 --> 00:06:22,080
potential implications in both

199
00:06:26,629 --> 00:06:23,919
directions that things we could learn

200
00:06:28,070 --> 00:06:26,639
from women with pcos about astronauts

201
00:06:30,070 --> 00:06:28,080
and vice versa things we could learn

202
00:06:32,309 --> 00:06:30,080
from the space program that might have

203
00:06:34,469 --> 00:06:32,319
implications for

204
00:06:36,309 --> 00:06:34,479
a significant you know it's estimated

205
00:06:39,270 --> 00:06:36,319
that 10 to 15

206
00:06:41,029 --> 00:06:39,280
of women have pcos oh wow so the the

207
00:06:43,029 --> 00:06:41,039
potential implications are huge all

208
00:06:45,029 --> 00:06:43,039
right well again dr scott smith from the

209
00:06:47,189 --> 00:06:45,039
nutritional biochemistry lab here at the

210
00:06:49,350 --> 00:06:47,199
johnson space center talking to us about

211
00:06:51,270 --> 00:06:49,360
vision changes doctor thanks so much for

212
00:06:52,950 --> 00:06:51,280
joining me today it's a fascinating

213
00:06:54,550 --> 00:06:52,960

paper it's a fascinating study and i'm