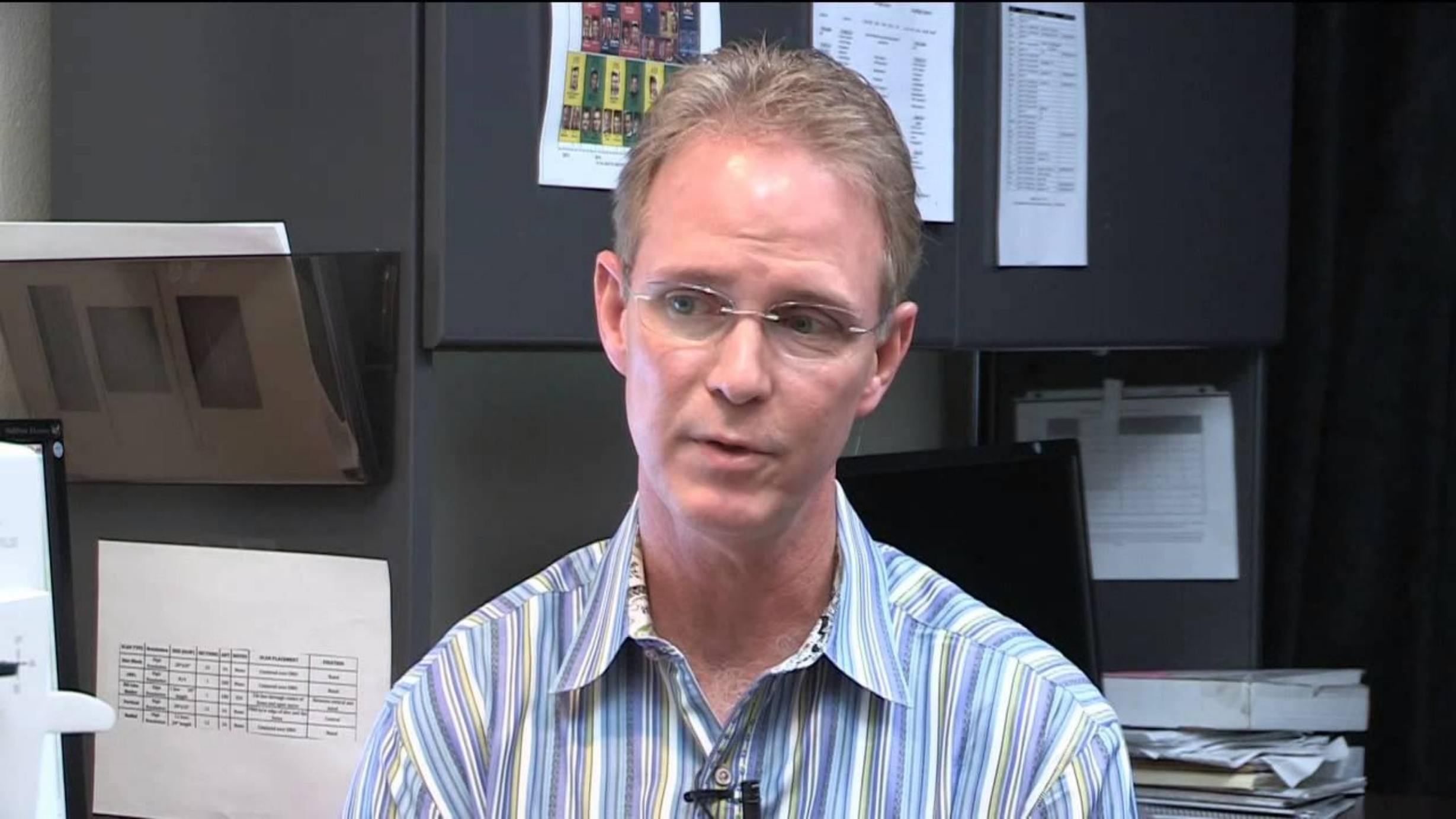

1
00:00:04,550 --> 00:00:03,110
uh june was vision research awareness

2
00:00:06,470 --> 00:00:04,560
month uh one of

3
00:00:08,070 --> 00:00:06,480
my colleagues here at uh nasa public

4
00:00:10,870 --> 00:00:08,080
affairs brandy dean actually got a

5
00:00:12,629 --> 00:00:10,880
chance to talk to one of the doctors

6
00:00:15,110 --> 00:00:12,639
involved in this research taking place

7
00:00:17,189 --> 00:00:15,120
on board the station she was able to

8
00:00:18,950 --> 00:00:17,199
actually get a personal demonstration

9
00:00:20,790 --> 00:00:18,960
and learn a little bit more about this

10
00:00:22,870 --> 00:00:20,800
research taking place on board the

11
00:00:24,470 --> 00:00:22,880
orbiting laboratory

12
00:00:26,550 --> 00:00:24,480
hi welcome to the flight medicine

13
00:00:28,070 --> 00:00:26,560

optometry clinic at johnson space center

14
00:00:30,150 --> 00:00:28,080
where in honor of flight research

15
00:00:31,830 --> 00:00:30,160
awareness month we are here talking with

16
00:00:33,190 --> 00:00:31,840
dr bob gibson who's one of our

17
00:00:34,389 --> 00:00:33,200
optometrists and he's going to tell us a

18
00:00:36,229 --> 00:00:34,399
little bit about some of the research

19
00:00:38,069 --> 00:00:36,239
we're doing with the crew members on

20
00:00:39,590 --> 00:00:38,079
station to find out what might be

21
00:00:41,670 --> 00:00:39,600
causing the vision problem some of them

22
00:00:43,670 --> 00:00:41,680
have when they return from long flights

23
00:00:45,430 --> 00:00:43,680
in space thanks so much for joining us

24
00:00:49,029 --> 00:00:45,440
bob glad to be here

25
00:00:50,470 --> 00:00:49,039
so let's see what what exactly um are we

26
00:00:51,510 --> 00:00:50,480
looking at here

27
00:00:53,830 --> 00:00:51,520
well

28
00:00:55,990 --> 00:00:53,840
this device here is uh

29
00:00:56,869 --> 00:00:56,000
known as optical coherence tomography

30
00:01:01,349 --> 00:00:56,879
which

31
00:01:02,790 --> 00:01:01,359
to look at the various structures in the

32
00:01:05,350 --> 00:01:02,800
back of the eye

33
00:01:07,030 --> 00:01:05,360
as you may be aware a significant number

34
00:01:09,109 --> 00:01:07,040
of our long-duration flyers have

35
00:01:11,350 --> 00:01:09,119
returned from space with structural

36
00:01:13,590 --> 00:01:11,360
changes to the eye we're seeing a

37
00:01:15,510 --> 00:01:13,600
swelling of the optic nerve

38
00:01:17,590 --> 00:01:15,520

wrinkles to the retina and the choroid

39
00:01:19,270 --> 00:01:17,600
in the back of the eye

40
00:01:20,469 --> 00:01:19,280
as well as far sided shifts in their

41
00:01:21,990 --> 00:01:20,479
vision

42
00:01:24,070 --> 00:01:22,000
and to better give us a better

43
00:01:26,070 --> 00:01:24,080
understanding

44
00:01:28,789 --> 00:01:26,080
for these structural changes we have

45
00:01:30,550 --> 00:01:28,799
this diagnostic tool again known as oct

46
00:01:31,590 --> 00:01:30,560
which allows us to

47
00:01:33,510 --> 00:01:31,600
measure the back of the eye

48
00:01:36,069 --> 00:01:33,520
non-invasively

49
00:01:39,590 --> 00:01:37,510
light instead of

50
00:01:42,469 --> 00:01:39,600
ultrasound

51
00:01:44,149 --> 00:01:42,479
ultrasonic devices which use sound waves

52
00:01:45,270 --> 00:01:44,159
we use light waves

53
00:01:46,789 --> 00:01:45,280
to

54
00:01:48,310 --> 00:01:46,799
look at the structures within the back

55
00:01:49,749 --> 00:01:48,320
of the eye within the retina within the

56
00:01:51,429 --> 00:01:49,759
optic nerve

57
00:01:53,190 --> 00:01:51,439
and look for the structural changes and

58
00:01:55,190 --> 00:01:53,200
detect them much much earlier than we

59
00:01:56,709 --> 00:01:55,200
would otherwise what kind of changes can

60
00:01:58,149 --> 00:01:56,719
you see with this what i guess what

61
00:02:00,950 --> 00:01:58,159
would we look for at the back of the eye

62
00:02:03,350 --> 00:02:00,960
well if i can demonstrate with the model

63
00:02:04,709 --> 00:02:03,360

of the eye here right

64
00:02:06,830 --> 00:02:04,719
here we have the front of the eye known

65
00:02:09,430 --> 00:02:06,840
as the cornea and if

66
00:02:11,270 --> 00:02:09,440
i show you a cross section through the

67
00:02:13,190 --> 00:02:11,280
eye here we have again the cornea we

68
00:02:14,869 --> 00:02:13,200
have the internal lining of the eye

69
00:02:16,309 --> 00:02:14,879
known as the retina

70
00:02:18,150 --> 00:02:16,319
all the nerve fiber layers and the

71
00:02:19,190 --> 00:02:18,160
retina come together that form the optic

72
00:02:20,949 --> 00:02:19,200
disc

73
00:02:22,790 --> 00:02:20,959
which leads to the optic nerve which is

74
00:02:23,910 --> 00:02:22,800
an extension of the brain

75
00:02:25,190 --> 00:02:23,920
and what we're seeing in our crew

76
00:02:27,350 --> 00:02:25,200
members are

77
00:02:28,710 --> 00:02:27,360
wrinkles or folds to the inner lining

78
00:02:30,710 --> 00:02:28,720
the retina

79
00:02:32,790 --> 00:02:30,720
to the layer known as the choroid behind

80
00:02:34,869 --> 00:02:32,800
the retina we're seeing folds in this

81
00:02:37,589 --> 00:02:34,879
region as well and we're also seeing

82
00:02:41,430 --> 00:02:37,599
swelling of the retina and of the optic

83
00:02:43,990 --> 00:02:41,440
disc again also known as the optic nerve

84
00:02:45,670 --> 00:02:44,000
and so this is a machine that can that

85
00:02:48,470 --> 00:02:45,680
allows you to see those things while the

86
00:02:50,710 --> 00:02:48,480
crew is still on orbit right that is

87
00:02:53,110 --> 00:02:50,720
correct it allows us to detect very

88
00:02:55,030 --> 00:02:53,120

subtle changes within just a few microns

89
00:02:57,589 --> 00:02:55,040
of change from what we measure

90
00:02:59,830 --> 00:02:57,599
preflight so we can detect these changes

91
00:03:01,830 --> 00:02:59,840
much much sooner and have a better way

92
00:03:04,229 --> 00:03:01,840
of monitoring these changes over time

93
00:03:06,630 --> 00:03:04,239
and giving us a better understanding for

94
00:03:08,630 --> 00:03:06,640
the mechanisms for these changes

95
00:03:10,550 --> 00:03:08,640
is this something uh like an exam that

96
00:03:12,630 --> 00:03:10,560
people here on earth would be taking

97
00:03:14,470 --> 00:03:12,640
normally as part of their eye exams it's

98
00:03:18,309 --> 00:03:14,480
something that's becoming a very

99
00:03:20,309 --> 00:03:18,319
valuable diagnostic tool and and your uh

100
00:03:22,949 --> 00:03:20,319
ophthalmology clinic it's used for

101
00:03:24,309 --> 00:03:22,959
detecting and monitoring such diseases

102
00:03:26,630 --> 00:03:24,319
as glaucoma

103
00:03:28,309 --> 00:03:26,640
uh other optic nerve diseases as well

104
00:03:29,430 --> 00:03:28,319
and for looking at changes within the

105
00:03:35,350 --> 00:03:29,440
macula

106
00:03:37,110 --> 00:03:35,360
forms of retinal diseases okay so so

107
00:03:39,350 --> 00:03:37,120
this should be at least familiar to some

108
00:03:41,110 --> 00:03:39,360
people here on the ground already yeah i

109
00:03:42,390 --> 00:03:41,120
would think so okay but probably the

110
00:03:44,470 --> 00:03:42,400
first time that we had one in space i'm

111
00:03:46,070 --> 00:03:44,480
guessing how i know we've been doing

112
00:03:47,430 --> 00:03:46,080
these for a little while now so are you

113
00:03:49,509 --> 00:03:47,440

starting to get good results back

114
00:03:51,270 --> 00:03:49,519
helpful helpful data yes the crew has

115
00:03:52,789 --> 00:03:51,280
been amazing we have with the very

116
00:03:55,830 --> 00:03:52,799
little training that they get they've

117
00:03:58,149 --> 00:03:55,840
done an excellent job performing oct

118
00:03:59,910 --> 00:03:58,159
on orbit and we're we're getting some

119
00:04:01,830 --> 00:03:59,920
useful data it's very limited data at

120
00:04:03,750 --> 00:04:01,840
this point but we are getting some

121
00:04:05,509 --> 00:04:03,760
useful data showing uh

122
00:04:08,470 --> 00:04:05,519
some of the structural changes to the

123
00:04:10,710 --> 00:04:08,480
eye as a result of microgravity exposure

124
00:04:12,149 --> 00:04:10,720
are you getting in uh are you

125
00:04:13,750 --> 00:04:12,159
able to come up with any insight into

126
00:04:15,670 --> 00:04:13,760
exactly what's happening

127
00:04:17,270 --> 00:04:15,680
at this point we really don't know the

128
00:04:19,270 --> 00:04:17,280
the data is fairly limited although

129
00:04:21,349 --> 00:04:19,280
there's some theories that have been uh

130
00:04:23,110 --> 00:04:21,359
suggested one being that

131
00:04:25,270 --> 00:04:23,120
the swelling of the optic nerve and

132
00:04:26,710 --> 00:04:25,280
these changes to the to the retina as

133
00:04:28,790 --> 00:04:26,720
well as flattening of the back of the

134
00:04:31,590 --> 00:04:28,800
eye of the globe

135
00:04:33,350 --> 00:04:31,600
may be a result of elevated pressure

136
00:04:35,270 --> 00:04:33,360
behind the eye within the optic nerve

137
00:04:37,430 --> 00:04:35,280
sheath

138
00:04:40,469 --> 00:04:37,440

so i'll localize

139
00:04:43,350 --> 00:04:40,479
pressure changes due to fluid shifts

140
00:04:46,550 --> 00:04:43,360
which are experienced in microgravity uh

141
00:04:48,230 --> 00:04:46,560
also another theory is that uh

142
00:04:50,150 --> 00:04:48,240
there may be elevated intracranial

143
00:04:51,590 --> 00:04:50,160
pressure within the brain that may be

144
00:04:53,430 --> 00:04:51,600
responsible some of the for some of

145
00:04:55,030 --> 00:04:53,440
these changes there's a condition

146
00:04:56,950 --> 00:04:55,040
terrestrially known as idiopathic

147
00:04:58,870 --> 00:04:56,960
intracranial hypertension which

148
00:05:00,629 --> 00:04:58,880
has its similarities that we see in the

149
00:05:02,550 --> 00:05:00,639
space flight syndrome yet there are some

150
00:05:04,550 --> 00:05:02,560
differences as well and in that

151
00:05:06,870 --> 00:05:04,560
particular condition we see

152
00:05:09,189 --> 00:05:06,880
swelling of the optic nerve uh what we

153
00:05:11,350 --> 00:05:09,199
call papilloedema we see

154
00:05:13,510 --> 00:05:11,360
extension of the optic nerve sheath

155
00:05:16,150 --> 00:05:13,520
flattening of the globe

156
00:05:17,909 --> 00:05:16,160
and typically terrestrially that disease

157
00:05:20,070 --> 00:05:17,919
as a result of elevated intracranial

158
00:05:21,350 --> 00:05:20,080
pressure so there are some similarities

159
00:05:24,310 --> 00:05:21,360
yet differences

160
00:05:27,350 --> 00:05:24,320
from that particular disease okay and i

161
00:05:29,270 --> 00:05:27,360
guess does this machine help us narrow

162
00:05:31,350 --> 00:05:29,280
down the possibilities of what's going

163
00:05:33,029 --> 00:05:31,360

on or is it just help us

164
00:05:34,950 --> 00:05:33,039
understand what's going on

165
00:05:36,550 --> 00:05:34,960
i think both it's going to help us

166
00:05:37,909 --> 00:05:36,560
understand the structural changes that

167
00:05:39,189 --> 00:05:37,919
we're seeing and

168
00:05:41,189 --> 00:05:39,199
hopefully help us determine the

169
00:05:43,350 --> 00:05:41,199
mechanisms for these changes

170
00:05:46,710 --> 00:05:43,360
again whether it be localized effects or

171
00:05:48,629 --> 00:05:46,720
maybe elevated intracranial pressure

172
00:05:50,150 --> 00:05:48,639
but it's also a very useful clinical

173
00:05:52,390 --> 00:05:50,160
tool for

174
00:05:55,430 --> 00:05:52,400
for diagnosing these these changes and

175
00:05:56,550 --> 00:05:55,440
monitoring these changes over time okay

176
00:05:58,790 --> 00:05:56,560
all right i think now we're going to get

177
00:06:01,189 --> 00:05:58,800
a demonstration right

178
00:06:02,950 --> 00:06:01,199
we'll do it okay great all you have to

179
00:06:05,590 --> 00:06:02,960
do is you're going to see a bunch of

180
00:06:21,270 --> 00:06:05,600
blue lines just focus on the

181
00:06:24,950 --> 00:06:23,110
okay you can sit back

182
00:06:27,590 --> 00:06:24,960
all right

183
00:06:29,110 --> 00:06:27,600
here's a video of your eye brandi

184
00:06:30,150 --> 00:06:29,120
if you look up here close enough you'll

185
00:06:33,590 --> 00:06:30,160
be able to

186
00:06:37,189 --> 00:06:35,189
can you see moving in the blood vessel

187
00:06:38,550 --> 00:06:37,199
those are your blood cells okay forcing

188
00:06:39,990 --> 00:06:38,560

through the vessel

189
00:06:41,830 --> 00:06:40,000
it's kind of hard to see but if you look

190
00:06:44,070 --> 00:06:41,840
you can see it

191
00:06:45,670 --> 00:06:44,080
so i haven't been to space obviously so

192
00:06:47,270 --> 00:06:45,680
i wouldn't have anything that you

193
00:06:48,870 --> 00:06:47,280
probably are looking for i'm guessing or

194
00:06:51,189 --> 00:06:48,880
is there not actually what we're more

195
00:06:53,029 --> 00:06:51,199
interested in with videos looking at the

196
00:06:55,350 --> 00:06:53,039
the uh what we call spontaneous venus

197
00:06:57,589 --> 00:06:55,360
pulsations 80 of the population has a

198
00:06:58,790 --> 00:06:57,599
spontaneous venus pulsation

199
00:07:00,950 --> 00:06:58,800
uh

200
00:07:02,309 --> 00:07:00,960
and you have one yourself you have a

201
00:07:04,550 --> 00:07:02,319
nice pulse hitting

202
00:07:07,189 --> 00:07:04,560
central vein right here if you look real

203
00:07:09,029 --> 00:07:07,199
close you can see it pulsating

204
00:07:11,350 --> 00:07:09,039
again 80 of the population has that

205
00:07:13,189 --> 00:07:11,360
that's that's considered normal okay uh

206
00:07:15,589 --> 00:07:13,199
if you have a spontaneous venous

207
00:07:17,909 --> 00:07:15,599
pulsation however and all of a sudden

208
00:07:20,150 --> 00:07:17,919
disappears that's not normal it could be

209
00:07:22,390 --> 00:07:20,160
indicative of elevated pressure

210
00:07:25,110 --> 00:07:22,400
behind the eye or even elevated pressure

211
00:07:26,950 --> 00:07:25,120
within the within the brain okay

212
00:07:28,469 --> 00:07:26,960
well thank you so much for for showing

213
00:07:31,350 --> 00:07:28,479

us this and giving us the demonstration

214
00:07:33,270 --> 00:07:31,360
it's very interesting and i i think

215
00:07:35,990 --> 00:07:33,280
i think it helps us understand a whole

216
00:07:37,589 --> 00:07:36,000
lot better what the crew is doing on

217
00:07:38,950 --> 00:07:37,599
orbit to find out more about their own

218
00:07:40,950 --> 00:07:38,960
eyes so

219
00:07:43,990 --> 00:07:40,960
really appreciate it again this was bob

220
00:07:46,469 --> 00:07:44,000
gibson talking with us inside the flight

221
00:07:47,830 --> 00:07:46,479
medicine optometry clinic at the johnson