
PAO

1
00:00:05,430 --> 00:00:02,869
and welcome to mission control houston

2
00:00:07,590 --> 00:00:05,440
and again joining us is a special guest

3
00:00:09,910 --> 00:00:07,600
uh mike barrett a veteran astronaut of

4
00:00:11,830 --> 00:00:09,920
the international space station and uh

5
00:00:13,430 --> 00:00:11,840
dr daboot welcome mike

6
00:00:15,270 --> 00:00:13,440
thanks so much kelly great to be here

7
00:00:17,189 --> 00:00:15,280
great to have you here now the reason we

8
00:00:18,870 --> 00:00:17,199
had you ended this week is because very

9
00:00:21,269 --> 00:00:18,880
early in the week the crew on board the

10
00:00:23,349 --> 00:00:21,279
space station was working on some vision

11
00:00:25,109 --> 00:00:23,359
experiments on orbit

12
00:00:26,710 --> 00:00:25,119
i know you know a lot about these you've

13
00:00:28,310 --> 00:00:26,720

been involved in experiments themselves

14
00:00:30,870 --> 00:00:28,320
can you tell us a little bit background

15
00:00:32,709 --> 00:00:30,880
about why it's important and

16
00:00:34,389 --> 00:00:32,719
what we're doing about it well sure

17
00:00:36,470 --> 00:00:34,399
kelly i have a lot of vested interest in

18
00:00:37,990 --> 00:00:36,480
this on many levels first of all being a

19
00:00:39,990 --> 00:00:38,000
medical doctor and a space medicine

20
00:00:42,069 --> 00:00:40,000
specialist but second of all having

21
00:00:44,709 --> 00:00:42,079
experienced this vision issue myself in

22
00:00:47,190 --> 00:00:44,719
2009 during a long duration flight on

23
00:00:48,470 --> 00:00:47,200
station i noticed my visual acuity was

24
00:00:51,350 --> 00:00:48,480
getting a little different it was

25
00:00:53,350 --> 00:00:51,360
shifting towards the distant vision

26
00:00:54,950 --> 00:00:53,360
and myself and bob this another

27
00:00:56,869 --> 00:00:54,960
physician

28
00:00:58,470 --> 00:00:56,879
we had decided to do eye exams on each

29
00:01:01,029 --> 00:00:58,480
other and we found a little bit of optic

30
00:01:03,029 --> 00:01:01,039
disc swelling

31
00:01:04,390 --> 00:01:03,039
and with that we actually talked to our

32
00:01:05,910 --> 00:01:04,400
specialists on the ground and they were

33
00:01:07,109 --> 00:01:05,920
able to fast track some hardware up

34
00:01:09,350 --> 00:01:07,119
there which allowed us to get very

35
00:01:10,469 --> 00:01:09,360
detailed camera hinges of images of the

36
00:01:12,390 --> 00:01:10,479
back of the eye

37
00:01:13,910 --> 00:01:12,400
and lo and behold uh since then we've

38
00:01:15,910 --> 00:01:13,920

discovered this constellation of

39
00:01:18,070 --> 00:01:15,920
findings if you will uh that include a

40
00:01:20,469 --> 00:01:18,080
lot of things with very very serious uh

41
00:01:22,870 --> 00:01:20,479
anatomy to us and so that includes uh

42
00:01:24,469 --> 00:01:22,880
swelling of the optic disc and

43
00:01:26,070 --> 00:01:24,479
distension of the the sheath that goes

44
00:01:27,830 --> 00:01:26,080
around the optic nerve and of course the

45
00:01:29,270 --> 00:01:27,840
vision changes which are just

46
00:01:31,749 --> 00:01:29,280
shifting a little bit towards the far

47
00:01:33,670 --> 00:01:31,759
side and a few other changes of of the

48
00:01:35,990 --> 00:01:33,680
retina itself and and possibly an

49
00:01:36,789 --> 00:01:36,000
increase in the pressure inside the head

50
00:01:37,910 --> 00:01:36,799
the

51
00:01:39,510 --> 00:01:37,920
central pressure as we call it

52
00:01:41,670 --> 00:01:39,520
intracranial pressure

53
00:01:43,350 --> 00:01:41,680
so the interesting thing here is that

54
00:01:45,990 --> 00:01:43,360
this has probably been going on for a

55
00:01:47,590 --> 00:01:46,000
very long time and because of iss and

56
00:01:48,950 --> 00:01:47,600
the tools that we've had available up

57
00:01:50,630 --> 00:01:48,960
there and of course because of our

58
00:01:52,310 --> 00:01:50,640
accumulated flight experience we've been

59
00:01:53,990 --> 00:01:52,320
able to characterize this now in ways

60
00:01:55,270 --> 00:01:54,000
that we couldn't before it was right

61
00:01:56,550 --> 00:01:55,280
under our noses but but now we're

62
00:01:58,149 --> 00:01:56,560
getting i think a very good

63
00:01:59,990 --> 00:01:58,159

understanding of it

64
00:02:02,950 --> 00:02:00,000
the other aspect of this is that it's uh

65
00:02:04,310 --> 00:02:02,960
it's very very highly prevalent meaning

66
00:02:06,310 --> 00:02:04,320
if you look at

67
00:02:07,990 --> 00:02:06,320
many different flyers

68
00:02:11,350 --> 00:02:08,000
and one of our series actually looked at

69
00:02:14,309 --> 00:02:11,360
26 out of 27 both space shuttle and

70
00:02:16,710 --> 00:02:14,319
space station flyers uh we we found some

71
00:02:18,470 --> 00:02:16,720
of these findings in 26 out of 27 so

72
00:02:19,830 --> 00:02:18,480
it's very high prevalence rate and what

73
00:02:22,309 --> 00:02:19,840
that tells you

74
00:02:24,390 --> 00:02:22,319
is that this is an aspect of adaptation

75
00:02:26,630 --> 00:02:24,400
to zero gravity that almost everyone

76
00:02:28,309 --> 00:02:26,640
goes through which we just weren't aware

77
00:02:30,150 --> 00:02:28,319
of for all this time but in some people

78
00:02:31,910 --> 00:02:30,160
of course it it's expressed a little bit

79
00:02:32,949 --> 00:02:31,920
more seriously in in some of the vision

80
00:02:35,509 --> 00:02:32,959
changes

81
00:02:38,150 --> 00:02:35,519
so we are mounting a very aggressive

82
00:02:40,070 --> 00:02:38,160
effort to understand how this happens

83
00:02:41,990 --> 00:02:40,080
why it happens and over what time course

84
00:02:43,990 --> 00:02:42,000
it happens so the experiments we've been

85
00:02:46,309 --> 00:02:44,000
doing this week are are part of that

86
00:02:48,830 --> 00:02:46,319
effort now we have a kind of a dual

87
00:02:50,949 --> 00:02:48,840
approach to this we we do an operational

88
00:02:53,589 --> 00:02:50,959

monitoring profile where we're looking

89
00:02:55,509 --> 00:02:53,599
at everybody as just a good medical

90
00:02:57,750 --> 00:02:55,519
metric to see how people do

91
00:02:59,670 --> 00:02:57,760
so we look at onboard ultrasound to look

92
00:03:02,390 --> 00:02:59,680
at the eye shape change to look at the

93
00:03:04,390 --> 00:03:02,400
optic nerve we do visual acuity tests to

94
00:03:06,630 --> 00:03:04,400
see if there's any shift in people from

95
00:03:08,710 --> 00:03:06,640
the the near to the far side

96
00:03:10,790 --> 00:03:08,720
and we have a very special device called

97
00:03:13,350 --> 00:03:10,800
an optical coherence tomograph or

98
00:03:15,830 --> 00:03:13,360
optical coherence tomography which

99
00:03:17,750 --> 00:03:15,840
essentially takes the layers of the eye

100
00:03:20,070 --> 00:03:17,760
and shows you their structure in very my

101
00:03:21,350 --> 00:03:20,080
new detail it's it's a fantastic device

102
00:03:22,550 --> 00:03:21,360
and that's what the crew this week was

103
00:03:24,309 --> 00:03:22,560
working with and that's what the crew is

104
00:03:26,149 --> 00:03:24,319
doing and that's that's a new device on

105
00:03:28,390 --> 00:03:26,159
orbit for us but it helps us to

106
00:03:30,630 --> 00:03:28,400
characterize this this set of findings

107
00:03:32,869 --> 00:03:30,640
in a way that is very detailed and

108
00:03:34,869 --> 00:03:32,879
something that we need a big detail or a

109
00:03:36,789 --> 00:03:34,879
a well-equipped laboratory to perform

110
00:03:38,789 --> 00:03:36,799
and of course we do imagery of of the

111
00:03:41,830 --> 00:03:38,799
back of the eye as well well let me ask

112
00:03:43,190 --> 00:03:41,840
a really simple question does it hurt

113
00:03:45,110 --> 00:03:43,200

well no

114
00:03:47,190 --> 00:03:45,120
that's a good question

115
00:03:48,630 --> 00:03:47,200
no it's just uh you're you're staring at

116
00:03:50,070 --> 00:03:48,640
a bright light and you're staring at a

117
00:03:52,470 --> 00:03:50,080
target and there's a little bit of a

118
00:03:55,270 --> 00:03:52,480
laser scan and it's it's not not bad at

119
00:03:57,429 --> 00:03:55,280
all i guess i was really referring to

120
00:03:59,030 --> 00:03:57,439
the changes in your eye shape and and

121
00:04:00,949 --> 00:03:59,040
these things that you're looking for do

122
00:04:02,070 --> 00:04:00,959
the symptoms are there painful symptoms

123
00:04:03,190 --> 00:04:02,080
you get headaches or anything like that

124
00:04:04,630 --> 00:04:03,200
that are associated with that i know

125
00:04:06,229 --> 00:04:04,640
when i have eye problems sometimes i'll

126
00:04:08,550 --> 00:04:06,239
have a headache so that's a great

127
00:04:10,070 --> 00:04:08,560
question and i think it's a truism that

128
00:04:11,830 --> 00:04:10,080
one of the reasons we've missed this so

129
00:04:13,990 --> 00:04:11,840
long is that it really doesn't have a

130
00:04:15,750 --> 00:04:14,000
lot of symptoms and one of the

131
00:04:18,469 --> 00:04:15,760
fascinating aspects of it is if you look

132
00:04:20,069 --> 00:04:18,479
at a ground population where people have

133
00:04:22,069 --> 00:04:20,079
increased intracranial pressure to the

134
00:04:24,390 --> 00:04:22,079
point where you see these anatomical

135
00:04:26,629 --> 00:04:24,400
changes they're they are sick they do

136
00:04:27,830 --> 00:04:26,639
hurt they have headaches nausea vomiting

137
00:04:29,350 --> 00:04:27,840
they can't walk straight there's all

138
00:04:30,550 --> 00:04:29,360

sorts of things that cause them to come

139
00:04:33,270 --> 00:04:30,560
to the doctor

140
00:04:35,430 --> 00:04:33,280
the only symptom we have is a

141
00:04:37,350 --> 00:04:35,440
far-sighted shift in some people

142
00:04:39,590 --> 00:04:37,360
otherwise we're fully correctable and

143
00:04:41,510 --> 00:04:39,600
we're fully functional afterwards during

144
00:04:43,030 --> 00:04:41,520
flight and after flight

145
00:04:44,950 --> 00:04:43,040
there's many reasons to have headaches

146
00:04:46,629 --> 00:04:44,960
in space and so we we do think about

147
00:04:49,350 --> 00:04:46,639
that quite a bit but they don't seem to

148
00:04:51,430 --> 00:04:49,360
be coupled necessarily to this set of

149
00:04:52,870 --> 00:04:51,440
findings and i think it's fair to use

150
00:04:54,550 --> 00:04:52,880
the word syndrome because it is a

151
00:04:56,629 --> 00:04:54,560
constellation of findings which we see

152
00:04:58,629 --> 00:04:56,639
consistently so really the only symptom

153
00:05:00,070 --> 00:04:58,639
is division shift okay and i guess this

154
00:05:02,390 --> 00:05:00,080
would be really important for future

155
00:05:03,830 --> 00:05:02,400
exploration missions because if you get

156
00:05:06,230 --> 00:05:03,840
farther and farther away from the earth

157
00:05:07,430 --> 00:05:06,240
you don't have any way to to get new

158
00:05:08,710 --> 00:05:07,440
lenses

159
00:05:10,469 --> 00:05:08,720
you're going to run into problems doing

160
00:05:12,070 --> 00:05:10,479
your job if you can't see well well

161
00:05:13,590 --> 00:05:12,080
absolutely and and this is one of the

162
00:05:15,350 --> 00:05:13,600
new problems that we've just discovered

163
00:05:16,950 --> 00:05:15,360

but it's it's critically important that

164
00:05:19,430 --> 00:05:16,960
we understand the mechanism and how to

165
00:05:21,029 --> 00:05:19,440
mitigate it or how to treat it and that

166
00:05:23,430 --> 00:05:21,039
is absolutely something that we need to

167
00:05:24,950 --> 00:05:23,440
have in place before we go exploring so

168
00:05:26,629 --> 00:05:24,960
with the the space station what we're

169
00:05:29,270 --> 00:05:26,639
hoping to find is the time course does

170
00:05:31,029 --> 00:05:29,280
this plateau over time and not get worse

171
00:05:32,950 --> 00:05:31,039
or does it progressively get worse with

172
00:05:34,550 --> 00:05:32,960
time and zero gravity uh those are

173
00:05:36,550 --> 00:05:34,560
things that we absolutely need to know

174
00:05:37,830 --> 00:05:36,560
coming out of the station program okay i

175
00:05:39,350 --> 00:05:37,840
know when you came in today and you saw

176
00:05:42,070 --> 00:05:39,360
everybody on the screen you were pretty

177
00:05:44,550 --> 00:05:42,080
jealous uh at uh what they were doing up

178
00:05:45,830 --> 00:05:44,560
on orbit uh the last time we had this

179
00:05:47,990 --> 00:05:45,840
many people on the station without a

180
00:05:49,270 --> 00:05:48,000
shuttle president was in october 2009 i

181
00:05:51,350 --> 00:05:49,280
think you were on board then what's it

182
00:05:53,110 --> 00:05:51,360
like being in such a crowd upstairs yeah

183
00:05:55,670 --> 00:05:53,120
absolutely that was a very special time

184
00:05:56,950 --> 00:05:55,680
for a lot of reasons but uh october 2009

185
00:05:58,150 --> 00:05:56,960
i had been up there for six months

186
00:05:59,029 --> 00:05:58,160
already and was getting ready to come

187
00:06:01,909 --> 00:05:59,039
home

188
00:06:03,749 --> 00:06:01,919

and uh we did the first uh mixed hand or

189
00:06:06,309 --> 00:06:03,759
a direct handover where we had three

190
00:06:08,469 --> 00:06:06,319
soyuz worth of crew members up there so

191
00:06:09,990 --> 00:06:08,479
nine crew members on station uh the

192
00:06:12,230 --> 00:06:10,000
interesting thing is we've had visiting

193
00:06:14,309 --> 00:06:12,240
shuttle crews where we could swell the

194
00:06:16,390 --> 00:06:14,319
population to 12 or 13.

195
00:06:18,629 --> 00:06:16,400
but you have the added volume of the

196
00:06:19,990 --> 00:06:18,639
space shuttle which is quite large

197
00:06:22,550 --> 00:06:20,000
and everybody sort of has their own

198
00:06:24,790 --> 00:06:22,560
quarters uh there on the shuttle whereas

199
00:06:26,390 --> 00:06:24,800
uh with the soyuz

200
00:06:27,909 --> 00:06:26,400
you have a bunch of folks you got three

201
00:06:29,909 --> 00:06:27,919
deposed individuals without crew

202
00:06:31,990 --> 00:06:29,919
quarters and a lot of activity

203
00:06:33,430 --> 00:06:32,000
concentrated into the russian segment so

204
00:06:35,270 --> 00:06:33,440
it actually seemed quite a bit more

205
00:06:37,270 --> 00:06:35,280
crowded and busy when we had nine than

206
00:06:38,870 --> 00:06:37,280
when we had 12 or 13.

207
00:06:40,710 --> 00:06:38,880
but it's a it's a good time because a

208
00:06:42,230 --> 00:06:40,720
lot of dynamic flight activities are

209
00:06:44,070 --> 00:06:42,240
happening and these are the things that

210
00:06:46,230 --> 00:06:44,080
make space flight exciting make

211
00:06:49,749 --> 00:06:46,240
astronauts happy so during this time

212
00:06:51,510 --> 00:06:49,759
period that will include packing to go

213
00:06:53,270 --> 00:06:51,520

readying the new soyuz to return

214
00:06:54,870 --> 00:06:53,280
spacewalk

215
00:06:56,469 --> 00:06:54,880
all the experiments are coming to a head

216
00:06:58,790 --> 00:06:56,479
and of course people are winding down a

217
00:07:00,950 --> 00:06:58,800
six-month shift up there so it's a it's

218
00:07:03,510 --> 00:07:00,960
a wonderful time but it is quite busy

219
00:07:04,870 --> 00:07:03,520
all right well mike barrett astronaut

220
00:07:06,230 --> 00:07:04,880
physician

221
00:07:07,670 --> 00:07:06,240
veteran of the international space