



1
00:00:01,590 --> 00:00:02,260
>> Amiko Kauderer: Hi.

2
00:00:02,260 --> 00:00:04,800
Welcome to Mission
Control Houston.

3
00:00:04,800 --> 00:00:05,830
Joining us now here

4
00:00:05,830 --> 00:00:08,400
in the International Space
Station Flight Control Room,

5
00:00:08,400 --> 00:00:09,680
the doc is in.

6
00:00:09,680 --> 00:00:14,180
Today we have NASA flight
surgeon Steve Gilmore.

7
00:00:14,180 --> 00:00:14,780
Welcome, Steven.

8
00:00:14,780 --> 00:00:16,060
Thank you for coming.

9
00:00:16,060 --> 00:00:16,770
>> Dr. Steve Gilmore:
Thank you having me.

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00:00:16,770 --> 00:00:17,880
It's a pleasure to be here -

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00:00:17,880 --> 00:00:18,480
>> Amiko Kauderer: Great.

12
00:00:18,480 --> 00:00:21,980

Well, so we always hear
about a lot of things

13

00:00:21,980 --> 00:00:24,490

that the astronauts are
doing medical experiments

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00:00:24,490 --> 00:00:26,800

and all these kind of things.

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00:00:26,800 --> 00:00:28,920

Taking their own blood
and this kind of stuff.

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00:00:28,920 --> 00:00:30,310

We're going to get into
some of that, but, first,

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00:00:30,310 --> 00:00:31,980

I want to talk a
little about you -

18

00:00:31,980 --> 00:00:32,240

>> Dr. Steve Gilmore: OK -

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00:00:32,240 --> 00:00:32,720

>> Amiko Kauderer: So, first,

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00:00:32,720 --> 00:00:36,530

tell me how did you
make your way here?

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00:00:36,530 --> 00:00:39,600

>> Dr. Steve Gilmore: I had the
opportunity when I was training

22

00:00:39,600 --> 00:00:44,650

and in medical school to do a
rotation down at Cape Kennedy,

23

00:00:44,650 --> 00:00:47,690

or Kennedy Space Center,
and had the opportunity

24

00:00:47,690 --> 00:00:51,560

to see a few launches and couple
landings, and thought it looked

25

00:00:51,560 --> 00:00:56,070

like a really interesting field
to get into and just pursued

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00:00:56,070 --> 00:00:58,830

that interest through
getting here.

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00:00:58,830 --> 00:01:01,730

So I finished medical
school and did a residency

28

00:01:01,730 --> 00:01:03,600

in emergency medicine,
and then I went

29

00:01:03,600 --> 00:01:07,290

and did some specialized
training down at the University

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00:01:07,290 --> 00:01:12,210

of Texas in Galveston, and
ultimately got hired here.

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00:01:12,210 --> 00:01:13,970

>> Amiko Kauderer: Very,
very cool, and we're very,

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00:01:13,970 --> 00:01:14,870

very happy to have you here.

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00:01:14,870 --> 00:01:17,960

We know you do an awful lot
to support the crew aboard,

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00:01:17,960 --> 00:01:21,930

and I know they appreciate
it as well as we do.

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00:01:21,930 --> 00:01:24,750

Real quick, I want to
just, for you to just kind

36

00:01:24,750 --> 00:01:27,760

of explain what your role
is as a flight surgeon

37

00:01:27,760 --> 00:01:30,770

and when you get assigned
a crew, kind of take us

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00:01:30,770 --> 00:01:33,500

through that, what life is

39

00:01:33,500 --> 00:01:35,940

like once you're
assigned a crew member.

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00:01:35,940 --> 00:01:36,870

>> Dr. Steve Gilmore: OK.

41

00:01:36,870 --> 00:01:40,280

Well, essentially, there's
three phases of a mission,

42

00:01:40,280 --> 00:01:43,540

and so we typically get
paired up with crews

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00:01:43,540 --> 00:01:47,730

in the pre-flight phase,

and the primary activities

44

00:01:47,730 --> 00:01:49,060
that we're doing there

45

00:01:49,060 --> 00:01:52,200
in the pre-flight phase
is we will be involved

46

00:01:52,200 --> 00:01:55,240
in the medical exams
that the crews do.

47

00:01:55,240 --> 00:01:57,210
They have exams that are similar

48

00:01:57,210 --> 00:01:59,710
to what a commercial
pilot would have,

49

00:01:59,710 --> 00:02:02,850
and they have some
additional specialized testing,

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00:02:02,850 --> 00:02:07,040
and so we help walk them
through those processes,

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00:02:07,040 --> 00:02:10,670
and if there's any issues to
work out, we'll work those out.

52

00:02:10,670 --> 00:02:12,480
And then our other
primary responsibility

53

00:02:12,480 --> 00:02:16,300
in that time frame is to take
that information that we get

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00:02:16,300 --> 00:02:18,000

and take them to
our medical boards,

55

00:02:18,000 --> 00:02:23,140

which certify crew members as
medically cleared for flight.

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00:02:23,140 --> 00:02:25,230

And then the other
activities that we're doing

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00:02:25,230 --> 00:02:28,340

in the pre-flight time
frame are, we're involved

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00:02:28,340 --> 00:02:32,870

with the crew in terms of
their selection of the type

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00:02:32,870 --> 00:02:36,630

of experiments and stuff that
they are participating in,

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00:02:36,630 --> 00:02:41,170

and we have a, not just me, but
there's a large group of folks

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00:02:41,170 --> 00:02:44,930

in my division, and we put
together a schedule to make sure

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00:02:44,930 --> 00:02:47,070

that they can complete
all the science

63

00:02:47,070 --> 00:02:50,340

and research activities
that they're doing.

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00:02:50,340 --> 00:02:54,600

And then as we get close
to flight, we typically

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00:02:54,600 --> 00:02:57,430

for the launches from
Kazakhstan, we'll travel

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00:02:57,430 --> 00:03:00,720

over to Star City and then
to Kazakhstan with the crew,

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00:03:00,720 --> 00:03:02,580

and go into quarantine
with them,

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00:03:02,580 --> 00:03:07,620

and go through the launch
process, and get them all

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00:03:07,620 --> 00:03:09,610

to the point where they're
all suited up and ready to go.

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00:03:09,610 --> 00:03:11,970

And then after the
launch, we come back

71

00:03:11,970 --> 00:03:15,050

and support the mission
here in the control center -

72

00:03:15,050 --> 00:03:15,310

>> Amiko Kauderer: OK -

73

00:03:15,310 --> 00:03:16,810

>> Dr. Steve Gilmore:
And support meetings

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00:03:16,810 --> 00:03:20,490
and have frequent conference
with the crew and work

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00:03:20,490 --> 00:03:22,080
out any issues that
come up there -

76

00:03:22,080 --> 00:03:22,430
>> Amiko Kauderer: OK.

77

00:03:22,430 --> 00:03:24,010
So let's go back to
Kazakhstan when you go

78

00:03:24,010 --> 00:03:25,930
in there before they launch.

79

00:03:25,930 --> 00:03:29,610
What is, say, let's say you say
you go and stay in quarantine,

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00:03:29,610 --> 00:03:32,870
what is that week leading
up to launch like for you,

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00:03:32,870 --> 00:03:36,480
and what kinds of tests and
things that you are doing

82

00:03:36,480 --> 00:03:37,670
with the crew members?

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00:03:37,670 --> 00:03:39,380
>> Dr. Steve Gilmore:
That's a great question.

84

00:03:39,380 --> 00:03:43,740
So there's, one of the
primary things that we're there

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00:03:43,740 --> 00:03:47,840

for in Kazakhstan is
there's a quarantine process,

86

00:03:47,840 --> 00:03:51,620

and the rationale
behind that is you want

87

00:03:51,620 --> 00:03:54,920

to start limiting access to the
crew so that they don't pick

88

00:03:54,920 --> 00:03:57,590

up any type of illness

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00:03:57,590 --> 00:04:01,920

that might impact their
ability to launch into space.

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00:04:01,920 --> 00:04:03,490

And so we participate in that.

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00:04:03,490 --> 00:04:07,310

We help screen persons that
are going to be meeting

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00:04:07,310 --> 00:04:11,070

with the crew, and, typically,
that's not a, you know,

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00:04:11,070 --> 00:04:14,720

we make folks aware of
the importance of that,

94

00:04:14,720 --> 00:04:19,130

and that's not typically a
terribly involved process.

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00:04:19,130 --> 00:04:21,560

The other things that we're
doing in that time frame is,

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00:04:21,560 --> 00:04:25,690

you know, crew are
typically taking advantage

97

00:04:25,690 --> 00:04:29,360

of their last week or so on
the ground and want to get out

98

00:04:29,360 --> 00:04:32,700

and enjoy the fresh air
and some of the sights

99

00:04:32,700 --> 00:04:34,200

that you can see in Baikonur.

100

00:04:34,200 --> 00:04:34,610

And so -

101

00:04:34,610 --> 00:04:35,270

>> Amiko Kauderer:

Like the tree -

102

00:04:35,270 --> 00:04:35,840

>> Dr. Steve Gilmore: Yeah -

103

00:04:35,840 --> 00:04:36,900

>> Amiko Kauderer:

Their little stick.

104

00:04:36,900 --> 00:04:37,450

>> Dr. Steve Gilmore: Yeah.

105

00:04:37,450 --> 00:04:39,720

And so we'll do things like some

106

00:04:39,720 --> 00:04:41,190
of the crews really
like running.

107
00:04:41,190 --> 00:04:44,310
I can recall running
two or three times a day

108
00:04:44,310 --> 00:04:48,470
with various crews in the
week or so before launch.

109
00:04:48,470 --> 00:04:53,700
And then the other important
thing we're doing is we have a,

110
00:04:53,700 --> 00:04:58,210
we sort of organize some of
the crew's personal affects

111
00:04:58,210 --> 00:05:00,950
so that they have everything
that they need when they go

112
00:05:00,950 --> 00:05:03,480
out to get suited
up and are ready

113
00:05:03,480 --> 00:05:04,990
and prepared for the launch.

114
00:05:04,990 --> 00:05:06,400
Those are the primary things -

115
00:05:06,400 --> 00:05:07,460
>> Amiko Kauderer: So you
mentioned the running,

116
00:05:07,460 --> 00:05:09,970
and so I'm curious now.

117

00:05:09,970 --> 00:05:12,590

Is there ever any kind of
active, are there any sort

118

00:05:12,590 --> 00:05:15,820

of activities that you
try to limit the crew to

119

00:05:15,820 --> 00:05:18,420

or keep them saying, no, we
can't, you know, restrict them

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00:05:18,420 --> 00:05:19,420

from certain activities?

121

00:05:19,420 --> 00:05:22,580

I mean, obviously, I guess
sky jumping is not an optimal,

122

00:05:22,580 --> 00:05:25,340

something that they
could do, but -

123

00:05:25,340 --> 00:05:27,230

>> Dr. Steve Gilmore: Yeah.

124

00:05:27,230 --> 00:05:31,030

Thankfully, that, I
think those rules come

125

00:05:31,030 --> 00:05:32,710

from the crew office
themselves -

126

00:05:32,710 --> 00:05:32,920

>> Amiko Kauderer: Oh, OK -

127

00:05:32,920 --> 00:05:34,540

>> Dr. Steve Gilmore: So we don't really get involved.

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00:05:34,540 --> 00:05:36,040

I think they have some policies.

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00:05:36,040 --> 00:05:36,910

They don't want them doing -

130

00:05:36,910 --> 00:05:37,500

>> Amiko Kauderer: Sure -

131

00:05:37,500 --> 00:05:38,930

>> Dr. Steve Gilmore:

Something like downhill skiing

132

00:05:38,930 --> 00:05:41,300

or something to close to flight where they would have a risk

133

00:05:41,300 --> 00:05:44,730

of injuring themselves, but as far as when we're

134

00:05:44,730 --> 00:05:49,110

down in Baikonur, they have access to a gym

135

00:05:49,110 --> 00:05:52,620

with some weights and stuff like that, and then jogging.

136

00:05:52,620 --> 00:05:54,460

So the risks there are pretty minimal.

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00:05:54,460 --> 00:05:54,940

>> Amiko Kauderer: Right.

138

00:05:54,940 --> 00:05:57,830

And which, of course, as we know, fitness is essential

139

00:05:57,830 --> 00:06:00,200

to our health as well, and I'm sure you have some sort

140

00:06:00,200 --> 00:06:04,010

of involvement, I guess not with the physical fitness itself

141

00:06:04,010 --> 00:06:06,950

but overseeing their health, you know, overall -

142

00:06:06,950 --> 00:06:07,400

>> Dr. Steve Gilmore: Right.

143

00:06:07,400 --> 00:06:09,100

>> Amiko Kauderer: As you said, even during.

144

00:06:09,100 --> 00:06:12,520

So during their flight, how is it that you're maintaining

145

00:06:12,520 --> 00:06:13,370

that because I understand

146

00:06:13,370 --> 00:06:16,780

that these guys have their periodic health check,

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00:06:16,780 --> 00:06:17,440

and I don't know.

148

00:06:17,440 --> 00:06:19,580

Who was your last crew member?

149

00:06:19,580 --> 00:06:22,080

>> Dr. Steve Gilmore: The
last crew I had the privilege

150

00:06:22,080 --> 00:06:23,700

of working with was
Scott Kelly -

151

00:06:23,700 --> 00:06:23,940

>> Amiko Kauderer: OK -

152

00:06:23,940 --> 00:06:26,570

>> Dr. Steve Gilmore: So that
was two years ago or so -

153

00:06:26,570 --> 00:06:28,840

>> Amiko Kauderer:
Expedition 2060.

154

00:06:28,840 --> 00:06:31,490

And so real quick,
when he was in space.

155

00:06:31,490 --> 00:06:34,410

So we have these
periodic health exams.

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00:06:34,410 --> 00:06:37,670

Are they just like what we
kind of refer to as just going

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00:06:37,670 --> 00:06:39,160

to the doctor for
a regular checkup -

158

00:06:39,160 --> 00:06:39,890

>> Dr. Steve Gilmore: Right.

159

00:06:39,890 --> 00:06:42,590

>> Amiko Kauderer: So is it the similar types of exam.

160
00:06:42,590 --> 00:06:44,850
I mean, the same kind of things that we're looking at,

161
00:06:44,850 --> 00:06:48,640
or how is that data transferred to you so that you can review

162
00:06:48,640 --> 00:06:51,840
and see how the crew is actually doing?

163
00:06:51,840 --> 00:06:51,910
>> Dr. Steve Gilmore:

164
00:06:51,910 --> 00:06:54,570
So in terms of the periodic health tests itself,

165
00:06:54,570 --> 00:06:58,250
that happens every, you know, month or two on board,

166
00:06:58,250 --> 00:07:01,000
and it's a fairly basic thing.

167
00:07:01,000 --> 00:07:03,640
We have the crew take a set of vital signs.

168
00:07:03,640 --> 00:07:08,480
They'll collect their weight, and then, you know,

169
00:07:08,480 --> 00:07:11,680
if they have anything going on, they'll talk to us about it,

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00:07:11,680 --> 00:07:15,210

but most crews don't really
have significant problems while

171

00:07:15,210 --> 00:07:16,780

they're in flight.

172

00:07:16,780 --> 00:07:19,360

So we do that just
on a periodic basis,

173

00:07:19,360 --> 00:07:21,240

and then before big activities.

174

00:07:21,240 --> 00:07:24,740

Like, I know they just had a
space walk, and we would have a,

175

00:07:24,740 --> 00:07:27,230

you know, a medical
conference with the crew,

176

00:07:27,230 --> 00:07:30,180

and we'd also do an assessment
of their fitness level,

177

00:07:30,180 --> 00:07:35,930

their aerobic capacity so we can
be sure that when they're going

178

00:07:35,930 --> 00:07:38,940

out on the space walk that
they'll have the energy

179

00:07:38,940 --> 00:07:41,100

that they need to perform
all the tasks that are -

180

00:07:41,100 --> 00:07:41,240

>> Amiko Kauderer: Right -

181

00:07:41,240 --> 00:07:41,930

>> Dr. Steve Gilmore:

Expected of them -

182

00:07:41,930 --> 00:07:43,300

>> Amiko Kauderer: So

in addition to the exams

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00:07:43,300 --> 00:07:44,960

that you have, you also,

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00:07:44,960 --> 00:07:48,090

I'm aware that you have the
private medical conferences -

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00:07:48,090 --> 00:07:48,520

>> Dr. Steve Gilmore: Yeah -

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00:07:48,520 --> 00:07:49,750

>> Amiko Kauderer: And
so I guess that's just

187

00:07:49,750 --> 00:07:50,600

to talk one on one.

188

00:07:50,600 --> 00:07:52,640

I know Akapa had one yesterday -

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00:07:52,640 --> 00:07:53,120

>> Dr. Steve Gilmore: Yeah -

190

00:07:53,120 --> 00:07:56,270

>> Amiko Kauderer: And so I
guess that's just one on one

191

00:07:56,270 --> 00:07:57,620

to say, hey, how are you doing?

192

00:07:57,620 --> 00:08:00,460

Are there any issues
or that sort of thing.

193

00:08:00,460 --> 00:08:00,790

I mean, -

194

00:08:00,790 --> 00:08:01,270

>> Dr. Steve Gilmore: Yeah.

195

00:08:01,270 --> 00:08:04,730

So we, basically the
medical conferences,

196

00:08:04,730 --> 00:08:09,850

they occur about every day
for the first five days or so

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00:08:09,850 --> 00:08:13,300

when crew get on board, and then
after that, they occur weekly,

198

00:08:13,300 --> 00:08:16,430

and we're just touching
base with the crew

199

00:08:16,430 --> 00:08:20,000

on a personal level to see if
they have any medical things

200

00:08:20,000 --> 00:08:22,490

that have come up, but more
typically we're talking

201

00:08:22,490 --> 00:08:26,540

about is there exercise
program working for them.

202

00:08:26,540 --> 00:08:28,650

What is the work pace up there?

203

00:08:28,650 --> 00:08:30,640

Do we need to kind
of throttle back

204

00:08:30,640 --> 00:08:33,080

and let them get a little rest?

205

00:08:33,080 --> 00:08:35,070

Those type of issues -

206

00:08:35,070 --> 00:08:35,250

>> Amiko Kauderer: OK -

207

00:08:35,250 --> 00:08:35,970

>> Dr. Steve Gilmore: So -

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00:08:35,970 --> 00:08:38,660

>> Amiko Kauderer: And so you
mentioned collecting weight

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00:08:38,660 --> 00:08:41,280

as one of the thing, parts
of that exam, and so I know

210

00:08:41,280 --> 00:08:44,010

that people are going to
want to know about this.

211

00:08:44,010 --> 00:08:47,520

When you're in microgravity,
how do you collect your weight?

212

00:08:47,520 --> 00:08:51,820

I mean, do you get to
always say, yeah, I weigh 0.

213

00:08:51,820 --> 00:08:54,620

>> Dr. Steve Gilmore:

That's a good question.

214

00:08:54,620 --> 00:08:57,640

I knew the physics of
it once upon a time,

215

00:08:57,640 --> 00:09:01,580

but basically the crew
are sitting on a device

216

00:09:01,580 --> 00:09:05,950

or positioned on a device that
vibrates, and you can figure

217

00:09:05,950 --> 00:09:08,180

out their mass and, thus,
their weight from that.

218

00:09:08,180 --> 00:09:09,730

And the reason that
we're interested

219

00:09:09,730 --> 00:09:13,350

in that is just from
a high level.

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00:09:13,350 --> 00:09:17,770

If you keep your body weight
or mass about or close

221

00:09:17,770 --> 00:09:20,510

to what it was when you
left, it's a good predictor

222

00:09:20,510 --> 00:09:22,550

of how you're going
to do post-flight,

223

00:09:22,550 --> 00:09:23,950
and we typically see that people

224

00:09:23,950 --> 00:09:27,700
that maintain their body weight
close to what it was when they,

225

00:09:27,700 --> 00:09:31,340
before they launch do
very well when they get -

226

00:09:31,340 --> 00:09:32,310
>> Amiko Kauderer: And
that's good insight

227

00:09:32,310 --> 00:09:34,330
from a medical standpoint
because I think,

228

00:09:34,330 --> 00:09:37,270
I know that we want to be
sure we can also fit back

229

00:09:37,270 --> 00:09:39,580
into our seats when we
get back home as well.

230

00:09:39,580 --> 00:09:41,260
So that's all very good.

231

00:09:41,260 --> 00:09:46,290
So now I have another question,
and this is going to be on the,

232

00:09:46,290 --> 00:09:47,380
some of the things that they do.

233

00:09:47,380 --> 00:09:48,680
So they check their own blood.

234

00:09:48,680 --> 00:09:49,960

I guess they learn here.

235

00:09:49,960 --> 00:09:53,450

Are you involved in that
process at all, or, I mean,

236

00:09:53,450 --> 00:09:57,500

I understand the astronauts
actually get trained for,

237

00:09:57,500 --> 00:10:00,360

to perform those kinds of
things as well as the scans.

238

00:10:00,360 --> 00:10:02,540

So are you involved in
that process at all or -

239

00:10:02,540 --> 00:10:02,700

>> Dr. Steve Gilmore: Yeah.

240

00:10:02,700 --> 00:10:03,800

It's a great question.

241

00:10:03,800 --> 00:10:07,970

We're sort of secondarily
involved here.

242

00:10:07,970 --> 00:10:10,420

We've got a great
team of trainers here,

243

00:10:10,420 --> 00:10:15,570

and so we've got some nurses
here that help us train the crew

244

00:10:15,570 --> 00:10:18,070

about how to draw some
blood from themselves.

245

00:10:18,070 --> 00:10:21,840

And so they'll, and also on
other people, but they take them

246

00:10:21,840 --> 00:10:24,860

through a couple class
process where they practice

247

00:10:24,860 --> 00:10:28,480

on mannequins and learn the
techniques that you need

248

00:10:28,480 --> 00:10:30,320

to be successful
with drawing blood.

249

00:10:30,320 --> 00:10:35,410

So, and something, it's a task
that or skill that crew can pick

250

00:10:35,410 --> 00:10:38,500

up pretty quickly, and most
of them do really well at it.

251

00:10:38,500 --> 00:10:38,820

>> Amiko Kauderer: Sure.

252

00:10:38,820 --> 00:10:41,600

So, essentially, I
mean, not only are they

253

00:10:41,600 --> 00:10:45,000

up there doing science and
maintenance and, you know,

254

00:10:45,000 --> 00:10:47,350

all these other things,

but they're also somewhat

255

00:10:47,350 --> 00:10:50,710
of a medical officer up there
as well, and so this brings me

256

00:10:50,710 --> 00:10:53,840
to a question that
we have on Twitter.

257

00:10:53,840 --> 00:10:55,330
Actually I have a couple
questions on Twitter.

258

00:10:55,330 --> 00:10:55,840
So we -

259

00:10:55,840 --> 00:10:56,030
>> Dr. Steve Gilmore: OK -

260

00:10:56,030 --> 00:10:57,830
>> Amiko Kauderer: Had polled
Twitter and the public,

261

00:10:57,830 --> 00:10:59,320
and they do have
questions as well -

262

00:10:59,320 --> 00:10:59,550
>> Dr. Steve Gilmore: OK -

263

00:10:59,550 --> 00:11:01,170
>> Amiko Kauderer: So the first
one is actually talking about,

264

00:11:01,170 --> 00:11:03,380
and you can probably here
a little bit in my voice,

265

00:11:03,380 --> 00:11:07,810

fall has come into the United States, and with it allergies.

266

00:11:07,810 --> 00:11:10,530

This comes from Look at More 7.

267

00:11:10,530 --> 00:11:16,050

Do you get a break from the allergies when you're on ISS?

268

00:11:16,050 --> 00:11:18,330

>> Dr. Steve Gilmore: Well, the short answer to that is yes.

269

00:11:18,330 --> 00:11:21,320

They, you're not exposed, you know, the air up there,

270

00:11:21,320 --> 00:11:24,200

we do a lot of testing on, and it's very clean

271

00:11:24,200 --> 00:11:27,610

from the point of view of allergens.

272

00:11:27,610 --> 00:11:29,740

They have had in recent, some

273

00:11:29,740 --> 00:11:32,890

of the recent missions they've noticed some accumulation

274

00:11:32,890 --> 00:11:35,040

of dust and other particles like that.

275

00:11:35,040 --> 00:11:39,130

So some crew will experience

some similar type symptoms

276

00:11:39,130 --> 00:11:42,310
to allergies, but from the point
of view of is it the pollen

277

00:11:42,310 --> 00:11:43,800
in the air and that kind
of stuff that you get

278

00:11:43,800 --> 00:11:46,250
on the ground, you really don't
see that when they're on board.

279

00:11:46,250 --> 00:11:46,870
>> Amiko Kauderer: Sure.

280

00:11:46,870 --> 00:11:49,080
So this brings me to
the next question then -

281

00:11:49,080 --> 00:11:49,320
>> Dr. Steve Gilmore: OK.

282

00:11:49,320 --> 00:11:50,390
>> Amiko Kauderer:
It's not allergies.

283

00:11:50,390 --> 00:11:54,310
The next question we have on
Twitter comes from Josh Stern.

284

00:11:54,310 --> 00:11:58,150
What happens is an
astronaut gets sick in space?

285

00:11:58,150 --> 00:11:59,800
>> Dr. Steve Gilmore:
So there's a couple ways

286
00:11:59,800 --> 00:12:02,100
to answer that question.

287
00:12:02,100 --> 00:12:03,910
The first thing that
folks should know is

288
00:12:03,910 --> 00:12:08,610
that in the pre-flight
time period

289
00:12:08,610 --> 00:12:12,080
for these three-man crews, we
select two of the individuals

290
00:12:12,080 --> 00:12:15,260
on a three-man crew, and we
take them through a process

291
00:12:15,260 --> 00:12:19,770
of medical skills
training so that we know

292
00:12:19,770 --> 00:12:23,900
that everyone has a
defined set of capabilities,

293
00:12:23,900 --> 00:12:24,780
and this would be things

294
00:12:24,780 --> 00:12:29,130
like taking vital signs,
maybe giving a shot.

295
00:12:29,130 --> 00:12:35,400
Talking about giving medications
and other activities like that.

296
00:12:35,400 --> 00:12:42,050

Then in conjunction with that,
we've over time have built a set

297

00:12:42,050 --> 00:12:45,290
of procedures or a checklist
that the crew get trained on,

298

00:12:45,290 --> 00:12:48,650
and so they have some, they
have a stock set of procedures

299

00:12:48,650 --> 00:12:53,840
up there if I'm, you know,
having some nausea or, you know,

300

00:12:53,840 --> 00:12:56,060
it's related to the
medical type symptoms

301

00:12:56,060 --> 00:12:57,680
that you might expect
them to see up there.

302

00:12:57,680 --> 00:13:01,040
So they have some instructions
for how to use the equipment

303

00:13:01,040 --> 00:13:04,390
and the skills that we've
trained them on on the ground.

304

00:13:04,390 --> 00:13:08,880
And then, so then the third part
of that is if something were

305

00:13:08,880 --> 00:13:13,090
to come up, probably what we
would expect to happen is based

306

00:13:13,090 --> 00:13:15,900

on the severity of it or
their concern about it

307

00:13:15,900 --> 00:13:19,400

that most things, you know,
common things happen commonly.

308

00:13:19,400 --> 00:13:22,350

And so they have up there
something akin to, like,

309

00:13:22,350 --> 00:13:24,240

your medicine cabinet at home.

310

00:13:24,240 --> 00:13:26,820

It's got some vitamins,
you know, pain relievers,

311

00:13:26,820 --> 00:13:29,500

things like that, and so
they can take care of a lot

312

00:13:29,500 --> 00:13:32,170

of the things that come
up without talking to us.

313

00:13:32,170 --> 00:13:35,260

But if something were to come
up that was more concerning

314

00:13:35,260 --> 00:13:38,570

to them, then we'd probably
have a medical conference,

315

00:13:38,570 --> 00:13:41,630

one that wasn't scheduled versus
the ones that we already talked

316

00:13:41,630 --> 00:13:44,360

about that happen on a weekly

basis, and we just figure

317

00:13:44,360 --> 00:13:46,480
out from them what
their concerns were.

318

00:13:46,480 --> 00:13:47,430
What was going on?

319

00:13:47,430 --> 00:13:50,730
Maybe provide more direction
and instruction and point them

320

00:13:50,730 --> 00:13:52,630
to one of the particular
procedures

321

00:13:52,630 --> 00:13:55,080
about how to take care of it -

322

00:13:55,080 --> 00:13:55,350
>> Amiko Kauderer: Sure.

323

00:13:55,350 --> 00:13:59,120
So I think that the real
answer is define sick.

324

00:13:59,120 --> 00:14:01,130
It depends on what
level of sick you are -

325

00:14:01,130 --> 00:14:01,470
>> Dr. Steve Gilmore: Right -

326

00:14:01,470 --> 00:14:04,260
>> Amiko Kauderer: Now what
if they are terribly sick?

327

00:14:04,260 --> 00:14:05,240

What would happen -

328

00:14:05,240 --> 00:14:07,740

>> Dr. Steve Gilmore: Well,
you know, one of the things,

329

00:14:07,740 --> 00:14:11,770

the biggest thing that we do
in that regard is it falls

330

00:14:11,770 --> 00:14:15,810

into the ounce of prevention's
worth a pound of cure,

331

00:14:15,810 --> 00:14:20,200

and so we spend a lot of time,
as you're probably familiar

332

00:14:20,200 --> 00:14:24,320

in talking with crew and stuff,
there's a lot of time spent

333

00:14:24,320 --> 00:14:26,880

in terms of scrutinizing
the crew medically,

334

00:14:26,880 --> 00:14:30,030

and that actually
prohibits a number of people

335

00:14:30,030 --> 00:14:31,420

that apply from getting in.

336

00:14:31,420 --> 00:14:34,090

Because basically what
we want to try to do

337

00:14:34,090 --> 00:14:37,850

and spend our most effort
on is identifying things

338

00:14:37,850 --> 00:14:39,700

that could potentially
cause problems

339

00:14:39,700 --> 00:14:43,250

because what we don't want to
have happen is have events occur

340

00:14:43,250 --> 00:14:48,220

that results in having to
bring crew members home early.

341

00:14:48,220 --> 00:14:51,100

And so for that reason,
there's a number of things

342

00:14:51,100 --> 00:14:52,790

that if a person has

343

00:14:52,790 --> 00:14:55,470

in the medical history
it may prevent them

344

00:14:55,470 --> 00:14:57,220

from becoming an astronaut.

345

00:14:57,220 --> 00:15:00,870

And so that's really where
most of the emphasis is placed.

346

00:15:00,870 --> 00:15:05,310

We do have some ability
to take care

347

00:15:05,310 --> 00:15:08,340

of more severe medical
conditions,

348

00:15:08,340 --> 00:15:10,830
and we do spend some time,
as I talked about earlier,

349

00:15:10,830 --> 00:15:12,590
with the crew officers.

350

00:15:12,590 --> 00:15:16,950
Teaching them how to do
interventions for those types

351

00:15:16,950 --> 00:15:18,790
of situations, but
really where most

352

00:15:18,790 --> 00:15:20,720
of our effort is placed
is in the prevention.

353

00:15:20,720 --> 00:15:21,420
>> Amiko Kauderer: OK.

354

00:15:21,420 --> 00:15:24,340
So we're talking about
taking care of the crew

355

00:15:24,340 --> 00:15:25,690
as they're on the station.

356

00:15:25,690 --> 00:15:28,960
Meanwhile, they do
participate in some

357

00:15:28,960 --> 00:15:33,130
of these medical experiments,
one of which today looks

358

00:15:33,130 --> 00:15:35,190
at if the integrated
cardiovascular.

359

00:15:35,190 --> 00:15:37,390

So it looks at the
heart muscle atrophy.

360

00:15:37,390 --> 00:15:37,770

>> Dr. Steve Gilmore: Yeah.

361

00:15:37,770 --> 00:15:39,800

>> Amiko Kauderer: And so we
know space does some things

362

00:15:39,800 --> 00:15:43,460

to our bodies, and I guess this
is actually a part of trying

363

00:15:43,460 --> 00:15:46,020

to understand that as well.

364

00:15:46,020 --> 00:15:49,440

If you will explain, because I
think this morning Akapa took

365

00:15:49,440 --> 00:15:52,160

part of some ultrasound
scans with Aki -

366

00:15:52,160 --> 00:15:52,360

>> Dr. Steve Gilmore: Right -

367

00:15:52,360 --> 00:15:53,620

>> Amiko Kauderer: You know,
some assistance from Aki.

368

00:15:53,620 --> 00:15:56,120

So can you talk to me a
little bit about that?

369

00:15:56,120 --> 00:15:56,310

>> Dr. Steve Gilmore: Yeah.

370

00:15:56,310 --> 00:16:00,840

So I've had some crew members participate in that experiment

371

00:16:00,840 --> 00:16:03,560

in the past, and it's a very interesting

372

00:16:03,560 --> 00:16:05,580

and thorough experiment.

373

00:16:05,580 --> 00:16:08,870

And basically what we're trying to get a better understanding

374

00:16:08,870 --> 00:16:13,630

of is in the past, we've done experiments like this

375

00:16:13,630 --> 00:16:16,110

where you take snapshots of information,

376

00:16:16,110 --> 00:16:19,350

and what they're doing is they've put a whole complement

377

00:16:19,350 --> 00:16:21,910

of tests together to really get an understanding

378

00:16:21,910 --> 00:16:24,700

of what is happening to the cardiovascular system

379

00:16:24,700 --> 00:16:26,830

as a result of being in space.

380

00:16:26,830 --> 00:16:30,470

And so pre-flight, they do
some very sophisticated imaging

381

00:16:30,470 --> 00:16:34,640

tests, some MRI's so that they
can measure accurately volumes

382

00:16:34,640 --> 00:16:36,920

and function of the heart.

383

00:16:36,920 --> 00:16:38,950

And then in-flight,
we have access

384

00:16:38,950 --> 00:16:43,730

to a fairly sophisticated
ultrasound.

385

00:16:43,730 --> 00:16:47,190

And so what they're doing
with those tests is to look

386

00:16:47,190 --> 00:16:50,460

at the heart in someone that's
been in space for awhile,

387

00:16:50,460 --> 00:16:54,580

and try to understand has the
size of the heart changed.

388

00:16:54,580 --> 00:16:58,500

Has the volumes inside the
chambers of the heart changed?

389

00:16:58,500 --> 00:17:02,520

Can we measure any
differences as a result of being

390

00:17:02,520 --> 00:17:06,340
in this environment where your
cardiovascular system doesn't

391
00:17:06,340 --> 00:17:08,800
have to work as hard as
it normally does just

392
00:17:08,800 --> 00:17:10,960
on a day-to-day basis
here on the ground?

393
00:17:10,960 --> 00:17:14,680
And then when they get back,
they go through the similar set

394
00:17:14,680 --> 00:17:17,120
of imaging and function tests.

395
00:17:17,120 --> 00:17:21,590
So it's a very thorough
and good investigation.

396
00:17:21,590 --> 00:17:23,900
>> Amiko Kauderer: And I know
one of the other things, well,

397
00:17:23,900 --> 00:17:27,590
I guess, sorry, you can, maybe
you can talk to me a little

398
00:17:27,590 --> 00:17:32,030
about what are the most
common things or the things

399
00:17:32,030 --> 00:17:35,230
that you try to prevent
or maybe a problem.

400
00:17:35,230 --> 00:17:37,230

I think I understand
kidney stones is something

401
00:17:37,230 --> 00:17:37,930
that you definitely want

402
00:17:37,930 --> 00:17:40,710
to prevent before a crew
member goes up in space.

403
00:17:40,710 --> 00:17:43,190
There's the issue with
the vision, the eye,

404
00:17:43,190 --> 00:17:46,390
and I know they do eye
exams pretty periodically.

405
00:17:46,390 --> 00:17:48,100
So can you talk to me
a little about that?

406
00:17:48,100 --> 00:17:49,070
>> Dr. Steve Gilmore: Sure.

407
00:17:49,070 --> 00:17:54,890
I guess I sort of separate
that into a couple of things.

408
00:17:54,890 --> 00:17:58,810
First, there's, just
in terms of the process

409
00:17:58,810 --> 00:18:01,640
of when the crews
first go into space,

410
00:18:01,640 --> 00:18:04,730
one of the reasons we have a
medical conference for everyday

411

00:18:04,730 --> 00:18:09,580

for the first several
days is in our experience,

412

00:18:09,580 --> 00:18:12,950

crews experience some
problems, not problems,

413

00:18:12,950 --> 00:18:17,030

but there's an adaptation phase,
and we, what we typically expect

414

00:18:17,030 --> 00:18:20,210

out of that is some crews
will have some nausea,

415

00:18:20,210 --> 00:18:22,730

some occasional vomiting
as they're getting used

416

00:18:22,730 --> 00:18:24,440

to this new motion environment.

417

00:18:24,440 --> 00:18:28,100

And so we meet with them
on a regular basis just

418

00:18:28,100 --> 00:18:31,140

to see how those types of
things are progressing,

419

00:18:31,140 --> 00:18:35,570

and for the vast majority of
the crew, it's not something

420

00:18:35,570 --> 00:18:40,680

that significantly impacts
their ability to perform work

421
00:18:40,680 --> 00:18:44,760
and do those types of things.

422
00:18:44,760 --> 00:18:49,350
As you mention, you talked a
little bit about, we've noticed,

423
00:18:49,350 --> 00:18:53,580
as we've gotten better
medical equipment on board,

424
00:18:53,580 --> 00:18:59,050
we've been tracking a few,
or this process in some crew

425
00:18:59,050 --> 00:19:01,990
where we notice that they
have a little bit of change

426
00:19:01,990 --> 00:19:04,670
in how well they can
see, and what I mean

427
00:19:04,670 --> 00:19:08,490
by that is they might have
a change in a line or two.

428
00:19:08,490 --> 00:19:10,570
I'm sure your viewers have
been to the eye doctors,

429
00:19:10,570 --> 00:19:15,390
many of them, and they might not
read quite as well if you looked

430
00:19:15,390 --> 00:19:19,470
out at the eye chart that that
may change by a line or two,

431

00:19:19,470 --> 00:19:21,930
and we've noticed
this in the past,

432
00:19:21,930 --> 00:19:24,930
but now that we have better
equipment up there, we're trying

433
00:19:24,930 --> 00:19:29,440
to take and get a case, or
get a series of individuals

434
00:19:29,440 --> 00:19:32,690
where we have really high
quality images of the back

435
00:19:32,690 --> 00:19:37,550
of their eye and as well as
other ways to test the vision

436
00:19:37,550 --> 00:19:40,100
to see if we can
understand the process

437
00:19:40,100 --> 00:19:43,510
by which this is happening and -

438
00:19:43,510 --> 00:19:46,350
>> Amiko Kauderer: Sorry,
and that's really interesting

439
00:19:46,350 --> 00:19:50,570
that while we've been in space
for all this time, there's still

440
00:19:50,570 --> 00:19:52,340
so many things that
we don't know -

441
00:19:52,340 --> 00:19:53,020

>> Dr. Steve Gilmore: Right -

442

00:19:53,020 --> 00:19:56,270

>> Amiko Kauderer: How the effects of space on our bodies

443

00:19:56,270 --> 00:19:58,460

and especially when we're talking about our future

444

00:19:58,460 --> 00:20:00,990

and go further, you know, it's really important for us

445

00:20:00,990 --> 00:20:02,420

to understand these things -

446

00:20:02,420 --> 00:20:02,700

>> Dr. Steve Gilmore: Right.

447

00:20:02,700 --> 00:20:03,250

>> Amiko Kauderer:

448

00:20:03,250 --> 00:20:08,050

So we talked about you being the doctor pre-flight

449

00:20:08,050 --> 00:20:11,600

and just before they launch and traveling with them,

450

00:20:11,600 --> 00:20:14,090

and I guess, you know, staying pretty close

451

00:20:14,090 --> 00:20:17,360

with them throughout their, you know, until they launch.

452

00:20:17,360 --> 00:20:20,220
Staying very much in contact

453
00:20:20,220 --> 00:20:21,540
with them while they're
in space.

454
00:20:21,540 --> 00:20:24,770
So treating them while they're
in space, and let's talk

455
00:20:24,770 --> 00:20:29,890
about landing because Akapa
is going to be landing soon

456
00:20:29,890 --> 00:20:34,160
with [inaudible] in, gosh,
almost a week on the 16th.

457
00:20:34,160 --> 00:20:39,000
And so explain to me, do you
go back when they land, and,

458
00:20:39,000 --> 00:20:41,170
you know, what happens at that
time, and I guess you want

459
00:20:41,170 --> 00:20:42,990
to check out the crew
member when they -

460
00:20:42,990 --> 00:20:43,100
>> Dr. Steve Gilmore: Right -

461
00:20:43,100 --> 00:20:44,710
>> Amiko Kauderer:
As soon as they.

462
00:20:44,710 --> 00:20:46,430
>> Dr. Steve Gilmore: So

there's a couple of things that.

463

00:20:46,430 --> 00:20:49,740

There's, obviously,
an integrated team

464

00:20:49,740 --> 00:20:51,460

that goes over to support that.

465

00:20:51,460 --> 00:20:53,890

The crew surgeons
that are working

466

00:20:53,890 --> 00:20:58,390

with Dr. Akapa are doing
a couple of things.

467

00:20:58,390 --> 00:21:02,260

Now, they're doing a
little refresher and review.

468

00:21:02,260 --> 00:21:05,890

We take a medical kit out
with us to the landing sites,

469

00:21:05,890 --> 00:21:08,750

and they're just kind of
reviewing the contents of that

470

00:21:08,750 --> 00:21:10,680

at this point in time.

471

00:21:10,680 --> 00:21:15,170

The crew on board will do a
little bit of fitness testing,

472

00:21:15,170 --> 00:21:17,850

again, another fitness test
just to, so we understand

473

00:21:17,850 --> 00:21:21,960

where their fitness
level is, and can assure

474

00:21:21,960 --> 00:21:27,170

that they're prepared
to re-enter.

475

00:21:27,170 --> 00:21:30,920

And so our docs will
sort of take off

476

00:21:30,920 --> 00:21:32,310

from here over the weekend.

477

00:21:32,310 --> 00:21:35,510

So they usually go over about
a week before the landing,

478

00:21:35,510 --> 00:21:38,310

and they have a meeting in
Moscow that they support

479

00:21:38,310 --> 00:21:41,620

where there's folks
from the program office

480

00:21:41,620 --> 00:21:43,930

and the crew office, and
we talk about the plans

481

00:21:43,930 --> 00:21:47,050

and the contingency
plans and how we're going

482

00:21:47,050 --> 00:21:48,610

to support the operations.

483

00:21:48,610 --> 00:21:50,700

So we do that every time
that there's a landing.

484

00:21:50,700 --> 00:21:53,020

And then after that
meeting we'll deploy,

485

00:21:53,020 --> 00:21:58,180

we'll go to Star City and
deploy down to Kazakhstan

486

00:21:58,180 --> 00:22:00,310

with our colleagues from GCTC,

487

00:22:00,310 --> 00:22:03,120

and we have a good
working relationship

488

00:22:03,120 --> 00:22:07,450

with the medical group over
there, and they have a lot.

489

00:22:07,450 --> 00:22:12,350

They have a bit more training on
the specifics of their vehicle.

490

00:22:12,350 --> 00:22:16,930

Their docs are very involved
in terms of extracting the crew

491

00:22:16,930 --> 00:22:20,370

from the vehicle, and
once the crew are gotten

492

00:22:20,370 --> 00:22:23,640

out of the vehicle, we're
there doing medical checks

493

00:22:23,640 --> 00:22:27,220

and supporting the crew with

whatever they might need.

494

00:22:27,220 --> 00:22:29,580

And after they do a brief -

495

00:22:29,580 --> 00:22:31,010

>> Amiko Kauderer:

Right, because actually

496

00:22:31,010 --> 00:22:34,200

when they're landing, they're

landing in a, you know,

497

00:22:34,200 --> 00:22:35,740

desert, like, you know -

498

00:22:35,740 --> 00:22:36,200

>> Dr. Steve Gilmore: Right -

499

00:22:36,200 --> 00:22:36,270

>> Amiko Kauderer: [Inaudible]

500

00:22:36,270 --> 00:22:39,570

and so I think don't they erect

some sort of medic tent to kind

501

00:22:39,570 --> 00:22:42,410

of give them some privacy

and get out of their suits,

502

00:22:42,410 --> 00:22:45,130

and I guess that's where some

of the testing takes place -

503

00:22:45,130 --> 00:22:46,290

>> Dr. Steve Gilmore:

That's right, that's right.

504

00:22:46,290 --> 00:22:50,090

I may have skipped a step, but, typically,

505

00:22:50,090 --> 00:22:52,980

the way the operation works is once we get to Kazakhstan

506

00:22:52,980 --> 00:22:57,310

on the landing day, we all get in helicopters that are provided

507

00:22:57,310 --> 00:23:02,270

by our Russian colleagues, and we fly out to a very remote part

508

00:23:02,270 --> 00:23:07,980

of Kazakhstan, typically, and the capsule will land,

509

00:23:07,980 --> 00:23:09,790

and they'll get the crew out.

510

00:23:09,790 --> 00:23:14,760

And then we'll go through about an hour or so of time

511

00:23:14,760 --> 00:23:18,350

in the tent with them, just getting them ready to get back

512

00:23:18,350 --> 00:23:21,510

in the helicopters and go back to the airport

513

00:23:21,510 --> 00:23:23,190

where ultimately they'll return home

514

00:23:23,190 --> 00:23:25,580

to the States or

back to Moscow -

515

00:23:25,580 --> 00:23:26,870

>> Amiko Kauderer: And then you somewhat oversee their,

516

00:23:26,870 --> 00:23:33,060

once they get back here, you still oversee some of their,

517

00:23:33,060 --> 00:23:34,570

I guess, their wellness for when they get back -

518

00:23:34,570 --> 00:23:35,800

>> Dr. Steve Gilmore: That's correct.

519

00:23:35,800 --> 00:23:40,950

So on the airplane flight back, we call it the R plus 0 flight.

520

00:23:40,950 --> 00:23:46,520

So the crew, about four hours after landing, the crew will get

521

00:23:46,520 --> 00:23:49,880

on a NASA plane in Kazakhstan, and we'll fly all the way back

522

00:23:49,880 --> 00:23:54,340

to Houston, and it's typically a roughly 20-hour flight,

523

00:23:54,340 --> 00:23:56,330

and on the course of that flight, typically,

524

00:23:56,330 --> 00:23:57,500

the crew will be resting.

525

00:23:57,500 --> 00:23:59,680

We have a couple stops
where we'll get out

526

00:23:59,680 --> 00:24:01,980

and just walk around,
stretch our legs -

527

00:24:01,980 --> 00:24:03,320

>> Amiko Kauderer: Where they
can take their first shower

528

00:24:03,320 --> 00:24:03,580

and -

529

00:24:03,580 --> 00:24:05,140

>> Dr. Steve Gilmore: They
can take their first shower

530

00:24:05,140 --> 00:24:09,460

in months, and I'm always
surprised that, I mean,

531

00:24:09,460 --> 00:24:12,860

the station is a very
clean and sanitary place,

532

00:24:12,860 --> 00:24:15,940

but many of the crew
have commented, you know,

533

00:24:15,940 --> 00:24:18,150

you just don't miss it as
much as you think you might,

534

00:24:18,150 --> 00:24:19,830

which I find a little
bit hard to believe -

535

00:24:19,830 --> 00:24:20,100

>> Amiko Kauderer: Yeah, yeah -

536

00:24:20,100 --> 00:24:21,940

>> Dr. Steve Gilmore:

Obviously, they don't.

537

00:24:21,940 --> 00:24:26,110

But on that plane flight,

we'll be participating

538

00:24:26,110 --> 00:24:29,890

and helping them collect some

preliminary medical tests

539

00:24:29,890 --> 00:24:31,690

and research tests.

540

00:24:31,690 --> 00:24:34,360

And then once they

get back to Houston,

541

00:24:34,360 --> 00:24:38,420

the first two weeks is pretty

busy, but we have, in total,

542

00:24:38,420 --> 00:24:39,880

in terms of, for my perspective,

543

00:24:39,880 --> 00:24:45,230

we have roughly a 45-day what

we call a reconditioning period,

544

00:24:45,230 --> 00:24:48,370

and there's a great team

that we are lucky to work

545

00:24:48,370 --> 00:24:53,520

with call the Acers, and

these are basically trainers

546

00:24:53,520 --> 00:24:57,120

with a lot of experience with
the working with the astronauts

547

00:24:57,120 --> 00:24:58,550

when they return from space.

548

00:24:58,550 --> 00:25:01,800

And so the goal there is to
get them get their strength

549

00:25:01,800 --> 00:25:05,540

and all their functioning back
to their pre-flight baseline,

550

00:25:05,540 --> 00:25:10,410

and that, you know, 45 days
with folks working hard,

551

00:25:10,410 --> 00:25:14,050

typically we get folks
to where they were

552

00:25:14,050 --> 00:25:15,150

when they, before they launched.

553

00:25:15,150 --> 00:25:17,360

So it's a great program -

554

00:25:17,360 --> 00:25:18,150

>> Amiko Kauderer:
Well, I understand a lot

555

00:25:18,150 --> 00:25:21,460

of them come back healthier
and leaner and meaner than,

556

00:25:21,460 --> 00:25:22,450
you know, when they launched.

557

00:25:22,450 --> 00:25:24,440
So, obviously, you guys
are doing a great job.

558

00:25:24,440 --> 00:25:26,500
Dr. Gilmore, thank you so
much for coming out today.

559

00:25:26,500 --> 00:25:26,930
>> Dr. Steve Gilmore: Thank you.

560

00:25:26,930 --> 00:25:27,300
It's my pleasure.

561

00:25:27,300 --> 00:25:27,890
I appreciate you having me -