



063:14:15:164  
01:00:44  
01:01:44  
01:02:44  
01:03:44  
01:04:44



Mission Management Team



PAO



1  
00:00:05,430 --> 00:00:03,750  
this morning we have some news about

2  
00:00:07,829 --> 00:00:05,440  
developments resulting from a space

3  
00:00:10,150 --> 00:00:07,839  
station science experiment that began

4  
00:00:12,629 --> 00:00:10,160  
more than 11 years ago

5  
00:00:15,589 --> 00:00:12,639  
the micro encapsulation electrostatic

6  
00:00:17,349 --> 00:00:15,599  
processing system or meps was recently

7  
00:00:19,750 --> 00:00:17,359  
cited by international space station

8  
00:00:22,070 --> 00:00:19,760  
chief scientist dr julie robinson as

9  
00:00:23,750 --> 00:00:22,080  
number one on her list of the top 10

10  
00:00:26,710 --> 00:00:23,760  
research results on the space station

11  
00:00:28,630 --> 00:00:26,720  
during its first 15 years in space that

12  
00:00:31,509 --> 00:00:28,640  
was a space station science experiment

13  
00:00:33,590 --> 00:00:31,519

that flew during expedition 5.

14

00:00:35,670 --> 00:00:33,600

well today the company that licensed the

15

00:00:37,830 --> 00:00:35,680

meps technology for use in cancer

16

00:00:39,750 --> 00:00:37,840

treatments is moving toward human

17

00:00:42,150 --> 00:00:39,760

clinical trials in the treatment of

18

00:00:44,950 --> 00:00:42,160

breast cancer joining us today is dr

19

00:00:47,029 --> 00:00:44,960

dennis morrison a former jsc scientist

20

00:00:49,750 --> 00:00:47,039

who is the principal investigator on the

21

00:00:52,389 --> 00:00:49,760

meps he is uh now a vice president with

22

00:00:53,830 --> 00:00:52,399

new view therapeutics the company that i

23

00:00:56,150 --> 00:00:53,840

referred to

24

00:00:58,150 --> 00:00:56,160

start by telling us what it was you were

25

00:01:01,270 --> 00:00:58,160

looking to achieve when you started the

26

00:01:03,029 --> 00:01:01,280

meps research on the station in 2002

27

00:01:05,670 --> 00:01:03,039

sure perhaps

28

00:01:07,750 --> 00:01:05,680

the tendency for therapy

29

00:01:09,910 --> 00:01:07,760

in cancer treatment now is to go to

30

00:01:12,870 --> 00:01:09,920

what's called focal therapy to try to

31

00:01:15,030 --> 00:01:12,880

put a focus on the tumor itself instead

32

00:01:17,270 --> 00:01:15,040

of having to expose the body to all the

33

00:01:19,190 --> 00:01:17,280

treatment therapies so for radiation

34

00:01:21,510 --> 00:01:19,200

it's a matter of focusing the radiation

35

00:01:24,149 --> 00:01:21,520

for chemotherapy it's a techniques to be

36

00:01:25,990 --> 00:01:24,159

able to deliver the chemotherapy drugs

37

00:01:28,630 --> 00:01:26,000

directly into the tumor instead of

38

00:01:31,109 --> 00:01:28,640

having to give so much all systemically

39

00:01:33,270 --> 00:01:31,119

our approach to this was to make liquid

40

00:01:35,749 --> 00:01:33,280

filled micro balloons these are like a

41

00:01:38,069 --> 00:01:35,759

children's water balloon

42

00:01:39,990 --> 00:01:38,079

full of a cancer drug

43

00:01:42,870 --> 00:01:40,000

and a contrast agent so that you can

44

00:01:45,590 --> 00:01:42,880

actually visualize them in real time as

45

00:01:47,590 --> 00:01:45,600

they're being deposited in the tumor

46

00:01:50,230 --> 00:01:47,600

and then the outside skin rather than

47

00:01:52,630 --> 00:01:50,240

being a rubber component is made of

48

00:01:54,310 --> 00:01:52,640

biocompatible polymers that lets the

49

00:01:56,310 --> 00:01:54,320

drug slowly be released or slowly

50

00:01:59,030 --> 00:01:56,320

disintegrates over time so it disappears

51  
00:02:01,109 --> 00:01:59,040  
after a while a release system exactly

52  
00:02:03,109 --> 00:02:01,119  
so the approach was to make these unique

53  
00:02:05,030 --> 00:02:03,119  
micro balloons in precisely the right

54  
00:02:07,350 --> 00:02:05,040  
kind of quality conditions

55  
00:02:09,029 --> 00:02:07,360  
the difficulty was is that the way we

56  
00:02:10,710 --> 00:02:09,039  
elected to make them

57  
00:02:13,750 --> 00:02:10,720  
the different liquids three different

58  
00:02:16,390 --> 00:02:13,760  
liquids are different densities so on an

59  
00:02:18,070 --> 00:02:16,400  
earth they stratify into layers

60  
00:02:19,670 --> 00:02:18,080  
as a result it's hard to get them to

61  
00:02:21,910 --> 00:02:19,680  
come together to form little micro

62  
00:02:23,270 --> 00:02:21,920  
balloons and form a skin in the right

63  
00:02:25,270 --> 00:02:23,280

proportions

64

00:02:27,350 --> 00:02:25,280

when we go to microgravity surface

65

00:02:29,589 --> 00:02:27,360

tension takes over and all liquids go

66

00:02:32,070 --> 00:02:29,599

spherical so it makes it much easier to

67

00:02:34,150 --> 00:02:32,080

put a sphere with another sphere and

68

00:02:36,390 --> 00:02:34,160

form a skin around the outside

69

00:02:38,390 --> 00:02:36,400

and the trick was is to be able to learn

70

00:02:40,470 --> 00:02:38,400

how to control those conditions so that

71

00:02:42,630 --> 00:02:40,480

eventually we can make them on earth and

72

00:02:44,070 --> 00:02:42,640

that was what the space interference did

73

00:02:45,670 --> 00:02:44,080

and in the space station that was the

74

00:02:47,750 --> 00:02:45,680

definitive experiments when we did eight

75

00:02:49,190 --> 00:02:47,760

experiments encapsulated seven different

76

00:02:50,390 --> 00:02:49,200

kind of drugs and a genetically

77

00:02:52,150 --> 00:02:50,400

engineered dna

78

00:02:54,309 --> 00:02:52,160

we have to have a picture that we can

79

00:02:57,030 --> 00:02:54,319

show of what that looks like

80

00:02:58,869 --> 00:02:57,040

yes on the left there are microcapsules

81

00:03:02,390 --> 00:02:58,879

that were formed in space

82

00:03:04,229 --> 00:03:02,400

containing a photodynamic therapy drug

83

00:03:06,470 --> 00:03:04,239

this is a drug that is activated after

84

00:03:07,910 --> 00:03:06,480

it's been absorbed by tumor cells on the

85

00:03:09,430 --> 00:03:07,920

right is an example with the

86

00:03:11,270 --> 00:03:09,440

fluorescence showing that those

87

00:03:13,750 --> 00:03:11,280

microcapsules are

88

00:03:16,869 --> 00:03:13,760

full of the and evenly distributed of

89

00:03:18,790 --> 00:03:16,879

the anti-cancer drug contained inside

90

00:03:20,390 --> 00:03:18,800

now it's one thing to be able to make

91

00:03:22,309 --> 00:03:20,400

that in space

92

00:03:24,470 --> 00:03:22,319

i guess the next step is how do you make

93

00:03:27,430 --> 00:03:24,480

it on earth and make enough of it so

94

00:03:29,270 --> 00:03:27,440

that it's it's it can be useful yes

95

00:03:31,190 --> 00:03:29,280

and the trick was is we had to learn how

96

00:03:32,470 --> 00:03:31,200

to control the conditions to bring these

97

00:03:34,149 --> 00:03:32,480

different liquids

98

00:03:35,830 --> 00:03:34,159

faces into

99

00:03:37,190 --> 00:03:35,840

interaction where the spontaneous would

100

00:03:39,350 --> 00:03:37,200

form the capsule

101  
00:03:42,630 --> 00:03:39,360  
and the microgravity experiments with a

102  
00:03:44,869 --> 00:03:42,640  
very variety of different conditions and

103  
00:03:47,589 --> 00:03:44,879  
real-time video of the capsules being

104  
00:03:49,350 --> 00:03:47,599  
formed in the meps device gave us the

105  
00:03:51,030 --> 00:03:49,360  
information to be able to develop a

106  
00:03:53,110 --> 00:03:51,040  
system called the pulse flow

107  
00:03:54,869 --> 00:03:53,120  
microcapsule system that we use on the

108  
00:03:56,550 --> 00:03:54,879  
ground now today and we no longer have

109  
00:03:57,830 --> 00:03:56,560  
to go to space in order to be able to

110  
00:04:00,149 --> 00:03:57,840  
make the capsules

111  
00:04:02,630 --> 00:04:00,159  
with the right proportions of content

112  
00:04:03,830 --> 00:04:02,640  
and in large quantities enough so that

113  
00:04:06,470 --> 00:04:03,840

they would

114

00:04:08,869 --> 00:04:06,480

you can do uh experiments to and find

115

00:04:11,270 --> 00:04:08,879

out just how they work that's true and

116

00:04:12,710 --> 00:04:11,280

that led us to the capabilities to be

117

00:04:15,350 --> 00:04:12,720

able to explore several different

118

00:04:17,030 --> 00:04:15,360

applications for commercial use

119

00:04:18,629 --> 00:04:17,040

and we did studies with the

120

00:04:20,629 --> 00:04:18,639

microcapsules that were made and now

121

00:04:22,790 --> 00:04:20,639

made on the ground to be able to treat

122

00:04:24,070 --> 00:04:22,800

human prostate and human

123

00:04:26,390 --> 00:04:24,080

lung tumors

124

00:04:29,189 --> 00:04:26,400

in animals to define the dose the

125

00:04:30,710 --> 00:04:29,199

quantity and the sequence of how often

126  
00:04:32,950 --> 00:04:30,720  
you need to give these capsules because

127  
00:04:34,870 --> 00:04:32,960  
they actually act as a sustained release

128  
00:04:37,830 --> 00:04:34,880  
form releasing the drug over a period of

129  
00:04:40,390 --> 00:04:37,840  
10 to 12 days you brought us a little

130  
00:04:41,990 --> 00:04:40,400  
clip of animation that demonstrates

131  
00:04:43,350 --> 00:04:42,000  
shows us what this looks like when you

132  
00:04:45,590 --> 00:04:43,360  
when you uh

133  
00:04:48,070 --> 00:04:45,600  
give the drug uh yes that's that's

134  
00:04:49,670 --> 00:04:48,080  
correct uh let me suggest that there is

135  
00:04:52,070 --> 00:04:49,680  
two steps to this uh without the

136  
00:04:54,550 --> 00:04:52,080  
animation this is the uh

137  
00:04:57,430 --> 00:04:54,560  
imitation of a growing tumor with the

138  
00:04:59,510 --> 00:04:57,440

small deposits those as 1 20th of one

139

00:05:02,150 --> 00:04:59,520

drop of microcapsules being deposited in

140

00:05:05,029 --> 00:05:02,160

the tumor and when it's exposed to

141

00:05:07,270 --> 00:05:05,039

near-infrared radiation light

142

00:05:08,710 --> 00:05:07,280

then the the drug is activated which

143

00:05:10,710 --> 00:05:08,720

kills the tumor

144

00:05:13,029 --> 00:05:10,720

and that particular

145

00:05:15,749 --> 00:05:13,039

technology is such those drugs are

146

00:05:17,909 --> 00:05:15,759

absorbed only by the tumor cells not by

147

00:05:18,710 --> 00:05:17,919

the human but the normal cells

148

00:05:20,629 --> 00:05:18,720

and

149

00:05:22,790 --> 00:05:20,639

the drug is totally inactive until the

150

00:05:24,629 --> 00:05:22,800

near infrared light reaches them

151  
00:05:26,950 --> 00:05:24,639  
now we got into that because we were

152  
00:05:29,430 --> 00:05:26,960  
studying the use of near-infrared light

153  
00:05:31,029 --> 00:05:29,440  
to stimulate uh bone cell and stimulate

154  
00:05:32,629 --> 00:05:31,039  
wound healing for astronaut use in

155  
00:05:34,629 --> 00:05:32,639  
during the station

156  
00:05:36,150 --> 00:05:34,639  
and that kind of a dice was developed

157  
00:05:38,230 --> 00:05:36,160  
here i have an example this was

158  
00:05:40,469 --> 00:05:38,240  
developed for nasa under a small

159  
00:05:42,790 --> 00:05:40,479  
business innovative research grant years

160  
00:05:45,029 --> 00:05:42,800  
ago and this light is set up with a

161  
00:05:47,350 --> 00:05:45,039  
near-infrared light same wavelength as a

162  
00:05:50,150 --> 00:05:47,360  
laser pointer but it penetrates deep

163  
00:05:51,909 --> 00:05:50,160

into tissue as you can see

164

00:05:54,230 --> 00:05:51,919

this will actually penetrate in adequate

165

00:05:55,189 --> 00:05:54,240

quantities to be able to

166

00:05:57,430 --> 00:05:55,199

go

167

00:05:58,950 --> 00:05:57,440

five to seven inches deep in the tissue

168

00:06:01,189 --> 00:05:58,960

so it's suitable to be able to use it

169

00:06:02,950 --> 00:06:01,199

for a handheld device like this or be

170

00:06:04,469 --> 00:06:02,960

able to use it for fiber optics to

171

00:06:06,469 --> 00:06:04,479

deliver the light

172

00:06:07,990 --> 00:06:06,479

near the tumor and irradiate the our

173

00:06:09,670 --> 00:06:08,000

microcapsules that have been deposited

174

00:06:11,590 --> 00:06:09,680

there you've gone from an experiment in

175

00:06:15,029 --> 00:06:11,600

space to learning how to make the same

176

00:06:16,710 --> 00:06:15,039

product on earth in in 1g

177

00:06:18,870 --> 00:06:16,720

i understand that last week you were

178

00:06:21,270 --> 00:06:18,880

also in washington dc trying to get

179

00:06:23,670 --> 00:06:21,280

approval from the government agencies

180

00:06:26,390 --> 00:06:23,680

for the next step to try to to test

181

00:06:29,189 --> 00:06:26,400

these products in human beings that's

182

00:06:31,189 --> 00:06:29,199

correct yes and um we were with the food

183

00:06:33,110 --> 00:06:31,199

and drug administration last week and

184

00:06:34,550 --> 00:06:33,120

our initial step was to

185

00:06:37,029 --> 00:06:34,560

be proposed

186

00:06:38,390 --> 00:06:37,039

to the fda a plan to do the testing

187

00:06:41,110 --> 00:06:38,400

required

188

00:06:42,710 --> 00:06:41,120

to be able to use these microcapsules as

189

00:06:45,990 --> 00:06:42,720

a marker

190

00:06:48,550 --> 00:06:46,000

in breast biopsy sites when some breast

191

00:06:51,589 --> 00:06:48,560

tissue has been removed make a small

192

00:06:53,589 --> 00:06:51,599

deposit of a tiny quantity of our micro

193

00:06:55,670 --> 00:06:53,599

capsules when you do that we have a

194

00:06:57,830 --> 00:06:55,680

picture that sort of illustrates it um

195

00:07:00,150 --> 00:06:57,840

in a tumor tissue oh i think that's the

196

00:07:01,830 --> 00:07:00,160

next slide there that one uh yes

197

00:07:03,430 --> 00:07:01,840

in the upper left corner i don't have a

198

00:07:05,350 --> 00:07:03,440

pointer up on the corner

199

00:07:07,510 --> 00:07:05,360

um there is a

200

00:07:09,350 --> 00:07:07,520

oblong tumor there and there is a center

201  
00:07:11,350 --> 00:07:09,360  
in the that shows that there's

202  
00:07:13,270 --> 00:07:11,360  
microcapsules being deposited that was

203  
00:07:15,589 --> 00:07:13,280  
one twentieth of one drop and that was

204  
00:07:17,110 --> 00:07:15,599  
done in real time you could see when the

205  
00:07:19,749 --> 00:07:17,120  
microcapsules actually come out of the

206  
00:07:21,430 --> 00:07:19,759  
fine gauge needle wow so you can exactly

207  
00:07:23,589 --> 00:07:21,440  
position that

208  
00:07:24,950 --> 00:07:23,599  
the use there is to have it as a

209  
00:07:27,909 --> 00:07:24,960  
reference marker

210  
00:07:29,270 --> 00:07:27,919  
for future tumor biopsies in case that

211  
00:07:31,189 --> 00:07:29,280  
they're needed you can see with

212  
00:07:33,670 --> 00:07:31,199  
ultrasound imaging you can see where you

213  
00:07:34,710 --> 00:07:33,680

took the first biopsy and carefully

214

00:07:37,189 --> 00:07:34,720

position where you're going to take the

215

00:07:39,270 --> 00:07:37,199

next biopsy or as an aide to the surgeon

216

00:07:40,790 --> 00:07:39,280

just before he goes ahead and excises

217

00:07:42,150 --> 00:07:40,800

and removes that tumor

218

00:07:43,670 --> 00:07:42,160

and that's the first step that we've

219

00:07:45,589 --> 00:07:43,680

approached the food drug administration

220

00:07:47,909 --> 00:07:45,599

about being able to use this in in

221

00:07:50,150 --> 00:07:47,919

patients to treat as a diagnostic tool

222

00:07:51,909 --> 00:07:50,160

for human breast cancer

223

00:07:53,830 --> 00:07:51,919

the next step of course is that the only

224

00:07:55,830 --> 00:07:53,840

difference between these marker

225

00:07:57,990 --> 00:07:55,840

microcapsules and a drug delivery one is

226

00:07:59,990 --> 00:07:58,000

we put the drug inside in the water

227

00:08:01,510 --> 00:08:00,000

content so the next step is we're doing

228

00:08:04,309 --> 00:08:01,520

this we'll be developing the same kind

229

00:08:06,629 --> 00:08:04,319

of test to show that the capsules are

230

00:08:08,469 --> 00:08:06,639

compatible with the body they're safe

231

00:08:10,629 --> 00:08:08,479

and they're effective for both imaging

232

00:08:12,550 --> 00:08:10,639

but also effective as a delivery device

233

00:08:14,070 --> 00:08:12,560

to be able to treat the tumors and our

234

00:08:15,110 --> 00:08:14,080

previous animal studies have shown that

235

00:08:16,790 --> 00:08:15,120

that's

236

00:08:19,189 --> 00:08:16,800

quite efficient

237

00:08:21,029 --> 00:08:19,199

in treating human

238

00:08:22,710 --> 00:08:21,039

lung and prostate tumors and now this

239

00:08:25,270 --> 00:08:22,720

application will be for treating human

240

00:08:27,189 --> 00:08:25,280

breast tumors be very very exciting to

241

00:08:29,510 --> 00:08:27,199

see how that progresses thank you for uh

242

00:08:31,589 --> 00:08:29,520

for for getting us up to date on this uh

243

00:08:33,670 --> 00:08:31,599

old station experiment ah thank you fat

244

00:08:35,350 --> 00:08:33,680

it's really exciting dr dennis morrison