
NASA
EPISODE TWO:
THE SCIENTISTS

1
00:00:04,099 --> 00:00:02,270
these two things are from the spheres

2
00:00:07,460 --> 00:00:04,109
slosh experiment which we've been

3
00:00:09,770 --> 00:00:07,470
working on up here microgravity has a

4
00:00:12,110 --> 00:00:09,780
lot to teach us take these containers

5
00:00:14,180 --> 00:00:12,120
the green liquid inside is showing us

6
00:00:16,310 --> 00:00:14,190
how fuel swirls around in a tank while

7
00:00:18,320 --> 00:00:16,320
it moves through space what we learned

8
00:00:23,300 --> 00:00:18,330
could help us design safer more

9
00:00:25,519 --> 00:00:23,310
efficient spacecraft at any given time

10
00:00:27,259 --> 00:00:25,529
we are conducted close to 300 different

11
00:00:29,720 --> 00:00:27,269
experiments aboard the International

12
00:00:31,429 --> 00:00:29,730
Space Station research like this is

13
00:00:36,730 --> 00:00:31,439

preparing us for the future of space

14
00:01:02,469 --> 00:00:57,320
[Music]

15
00:01:04,060 --> 00:01:02,479
we really can't mimic the environment on

16
00:01:06,219 --> 00:01:04,070
the space station anywhere on this

17
00:01:08,350 --> 00:01:06,229
planet and it's what makes it such a

18
00:01:11,050 --> 00:01:08,360
special place and why scientists from

19
00:01:13,060 --> 00:01:11,060
many universities several companies like

20
00:01:15,609 --> 00:01:13,070
to send their science up because once

21
00:01:18,100 --> 00:01:15,619
you remove gravity many things like

22
00:01:20,770 --> 00:01:18,110
differently this season we're exploring

23
00:01:23,649 --> 00:01:20,780
why we sent science to space and what it

24
00:01:25,389 --> 00:01:23,659
takes to get it there spoiler alert you

25
00:01:28,240 --> 00:01:25,399
don't have to be a rocket scientist to

26
00:01:30,730 --> 00:01:28,250
conduct research in microgravity so this

27
00:01:32,380 --> 00:01:30,740
is our first project that's going up to

28
00:01:34,990 --> 00:01:32,390
the station and our first project

29
00:01:36,609 --> 00:01:35,000
working with you know anyone involved in

30
00:01:39,219 --> 00:01:36,619
the space burger so it's a very exciting

31
00:01:40,539 --> 00:01:39,229
time for us the transition from what am

32
00:01:44,370 --> 00:01:40,549
I to do with my life in the middle of

33
00:01:46,749 --> 00:01:44,380
graduate school to Here I am sitting in

34
00:01:48,130 --> 00:01:46,759
Houston getting ready for our launch I

35
00:01:48,639 --> 00:01:48,140
can't hardly believe that it's actually

36
00:01:51,399 --> 00:01:48,649
happening

37
00:01:53,679 --> 00:01:51,409
meet Elaine one of the cofounders of Tim

38
00:01:56,320 --> 00:01:53,689

Pantages a medical device startup based

39
00:01:57,609 --> 00:01:56,330
in Virginia her company is developing a

40
00:01:59,550 --> 00:01:57,619
gel patch that can serve as a

41
00:02:01,930 --> 00:01:59,560
replacement for eardrum repair surgery

42
00:02:04,300 --> 00:02:01,940
that could have huge benefits here on

43
00:02:07,469 --> 00:02:04,310
earth but launch that gel to space and

44
00:02:10,080 --> 00:02:07,479
the opportunities for use grow even more

45
00:02:12,400 --> 00:02:10,090
first we have to back up a few steps

46
00:02:15,009 --> 00:02:12,410
putting your life's work on top of a

47
00:02:16,300 --> 00:02:15,019
rocket may seem like a daunting task but

48
00:02:18,009 --> 00:02:16,310
there's a system in place to help

49
00:02:19,960 --> 00:02:18,019
scientists who know nothing about

50
00:02:22,360 --> 00:02:19,970
spaceflight get their research into

51
00:02:24,880 --> 00:02:22,370
orbit you see NASA and its international

52
00:02:27,640 --> 00:02:24,890
partners aren't the only source of

53
00:02:30,130 --> 00:02:27,650
science aboard the space station the ISS

54
00:02:33,130 --> 00:02:30,140
US National Laboratory creates pathways

55
00:02:35,979 --> 00:02:33,140
to space for companies universities and

56
00:02:37,839 --> 00:02:35,989
even young students if you're starting a

57
00:02:39,550 --> 00:02:37,849
journey into the unknown it helps to

58
00:02:41,470 --> 00:02:39,560
have an expert at your side to navigate

59
00:02:43,479 --> 00:02:41,480
the way the National Lab connects

60
00:02:45,729 --> 00:02:43,489
researchers with implementation partners

61
00:02:47,619 --> 00:02:45,739
who provide resources and guidance for

62
00:02:50,050 --> 00:02:47,629
taking an experiment from earth to

63
00:02:51,100 --> 00:02:50,060

microgravity Elaine and her team are

64
00:02:53,410 --> 00:02:51,110
working with NanoRacks

65
00:02:55,059 --> 00:02:53,420
they have the plate reader on the space

66
00:02:56,949 --> 00:02:55,069
station that's going to be used for our

67
00:02:58,330 --> 00:02:56,959
project and they're coordinating the

68
00:02:59,860 --> 00:02:58,340
launch and getting all the materials

69
00:03:01,000 --> 00:02:59,870
together for us we're glad that we're

70
00:03:06,180 --> 00:03:01,010
working with them because we're glad

71
00:03:10,119 --> 00:03:08,530
the project that we're sending to the

72
00:03:11,830 --> 00:03:10,129
space station is looking at how

73
00:03:13,839 --> 00:03:11,840
hydrogels behave in microgravity

74
00:03:16,210 --> 00:03:13,849
conditions and we're specifically

75
00:03:17,920 --> 00:03:16,220
looking at how the structure changes and

76
00:03:18,850 --> 00:03:17,930
how drug release profiles change in the

77
00:03:21,759 --> 00:03:18,860
absence of gravity

78
00:03:24,130 --> 00:03:21,769
my name is panis - I'm a co-founder & Co

79
00:03:25,570 --> 00:03:24,140
inventor of this technology and I've

80
00:03:29,440 --> 00:03:25,580
been with team management since they

81
00:03:32,949 --> 00:03:29,450
zero hydrogels are a very important

82
00:03:35,199 --> 00:03:32,959
materials they are high volume water

83
00:03:39,490 --> 00:03:35,209
that can very well mimic the

84
00:03:41,470 --> 00:03:39,500
extracellular matrix of our body so we

85
00:03:44,050 --> 00:03:41,480
really thought that answering this

86
00:03:47,470 --> 00:03:44,060
question can really help the scientific

87
00:03:48,220 --> 00:03:47,480
community confused don't worry we've got

88
00:03:50,470 --> 00:03:48,230

you covered

89
00:03:53,350 --> 00:03:50,480
think of hydrogels like a scoop of

90
00:03:55,809 --> 00:03:53,360
gelatin not quite a liquid not quite a

91
00:03:58,750 --> 00:03:55,819
solid definitely made up of mostly water

92
00:04:00,670 --> 00:03:58,760
we can use hydrogels to cover wounds and

93
00:04:03,069 --> 00:04:00,680
even deliver antibiotics to promote

94
00:04:04,600 --> 00:04:03,079
healing for that reason hydrogels are

95
00:04:06,720 --> 00:04:04,610
being studied for use for things like

96
00:04:09,550 --> 00:04:06,730
wound care for soldiers on battlefields

97
00:04:11,559 --> 00:04:09,560
if you are far away from a hospital or a

98
00:04:13,870 --> 00:04:11,569
clinic and you can't get good medical

99
00:04:16,330 --> 00:04:13,880
care right away and that soldier has a

100
00:04:18,550 --> 00:04:16,340
wound could you apply that hydrogel

101
00:04:20,140 --> 00:04:18,560
directly to the wound site and begin to

102
00:04:22,330 --> 00:04:20,150
treat any infection that might be coming

103
00:04:24,100 --> 00:04:22,340
on what about in space though what if we

104
00:04:26,200 --> 00:04:24,110
are far away from Earth's surface on our

105
00:04:28,330 --> 00:04:26,210
way towards Mars and we also have

106
00:04:29,800 --> 00:04:28,340
another wound on an arm or a leg and we

107
00:04:31,420 --> 00:04:29,810
need a better way to treat that wound

108
00:04:33,790 --> 00:04:31,430
and make sure it doesn't become infected

109
00:04:35,320 --> 00:04:33,800
so temp antigen the hydrogel itself is a

110
00:04:37,629 --> 00:04:35,330
great example of a dual-purpose

111
00:04:40,270 --> 00:04:37,639
technology it's something we can use not

112
00:04:42,070 --> 00:04:40,280
only on the earth but up in space this

113
00:04:44,320 --> 00:04:42,080

research could provide previously

114
00:04:46,540 --> 00:04:44,330
unknown foundations for future hydrogel

115
00:04:48,909 --> 00:04:46,550
studies it's a great example of how

116
00:04:51,440 --> 00:04:48,919
microgravity can offer new insights into

117
00:04:54,620 --> 00:04:51,450
systems we've already explored on earth

118
00:04:57,260 --> 00:04:54,630
the data that we're collecting is so so

119
00:04:59,270 --> 00:04:57,270
basic science that it's it's hard to

120
00:05:00,890 --> 00:04:59,280
find those sorts of projects at this

121
00:05:02,630 --> 00:05:00,900
stage as a research that's really

122
00:05:07,190 --> 00:05:02,640
exciting for us as well and it's in

123
00:05:08,990 --> 00:05:07,200
space and when it gets to space it goes

124
00:05:11,780 --> 00:05:09,000
into the hands of astronauts who will

125
00:05:13,580 --> 00:05:11,790
run the experiment in Ormond just like

126
00:05:15,890 --> 00:05:13,590
training for launch landing and

127
00:05:17,780 --> 00:05:15,900
spacewalks crew members participate in

128
00:05:19,490 --> 00:05:17,790
hours of scientific training to prepare

129
00:05:21,290 --> 00:05:19,500
them for running many of the hundreds of

130
00:05:23,750 --> 00:05:21,300
experiments that are ongoing aboard the

131
00:05:29,750 --> 00:05:23,760
space station ready to go to class with

132
00:05:32,480 --> 00:05:29,760
an astronaut we'll take you along well I

133
00:05:35,060 --> 00:05:32,490
had changed in 11 years since she was up

134
00:05:38,150 --> 00:05:35,070
there there was a new experiment so he

135
00:05:40,190 --> 00:05:38,160
hadn't seen that either they tell us you

136
00:05:41,300 --> 00:05:40,200
know hey this is a lot easier upside

137
00:05:43,590 --> 00:05:41,310
down you know you're gonna be in my