

THE INVISIBLE EXTINCTION - AD CHANGE LIST

1	00:00:08:01	00:00:10:01	02:00	(WATER BOILING)
2	00:00:22:05	00:00:24:06	02:01	NARRATOR: <i>Germs, bugs, thousands of organisms</i>
3	00:00:24:08	00:00:25:23	01:15	<i>are all around you, all the time.</i>
4	00:00:26:12	00:00:27:23	01:11	<i>That remote control you're holding,</i>
5	00:00:28:08	00:00:29:10	01:02	<i>it's teaming with life,</i>
6	00:00:29:23	00:00:31:23	02:00	<i>bacteria and other organisms.</i>
7	00:00:32:06	00:00:34:08	02:02	Yuck! NARRATOR: <i>Your microbiome.</i>
8	00:00:35:06	00:00:37:10	02:04	(POP MUSIC PLAYING)
9	00:00:40:23	00:00:42:19	01:20	I have no idea what a microbe is.
10	00:00:42:23	00:00:44:11	01:12	Something small. (LAUGHS)
11	00:00:45:03	00:00:46:03	01:00	It's micro.
12	00:00:50:11	00:00:53:15	03:04	I'm a man with a huge worldview. I'm surrounded by microbes.
13	00:00:53:21	00:00:56:15	02:18	What am I? You're the helicobacter pylori bacteria.
14	00:01:01:05	00:01:03:09	02:04	I want you to smell yourselves.
15	00:01:04:02	00:01:05:02	01:00	Noses in armpits.
16	00:01:05:04	00:01:08:07	03:03	That is the smell of your microbiome.
17	00:01:08:16	00:01:10:07	01:15	Microbiome?

18	00:01:10:10	00:01:11:20	01:10	Like a hotel for microbes?
19	00:01:11:22	00:01:13:09	01:11	Everybody, head for the colon!
20	00:01:14:19	00:01:16:22	02:03	Then we get to the large intestine!
21	00:01:17:00	00:01:18:06	01:06	MAN: <i>They could be good, they could be bad.</i>
22	00:01:18:22	00:01:20:15	01:17	They're good. And bad.
23	00:01:20:17	00:01:22:17	02:00	It all depends on which one it is.
24	00:01:22:20	00:01:25:00	02:04	Well, young man, the truth is we still don't know
25	00:01:25:02	00:01:26:13	01:11	a lot about the microbiome,
26	00:01:26:22	00:01:28:16	01:18	but you shouldn't let it freak you out.
27	00:01:47:12	00:01:49:13	02:01	(UNLOCKS AND CLOSSES THE DOOR)
28	00:02:01:10	00:02:03:03	01:17	<i>My name is Maria Gloria Dominguez-Bello.</i> <i>Maria Gloria Dominguez-Bello, ok, https://dbm.rutgers.edu/personnel/maria-gloria-dominguez-bello.html</i>
29	00:02:03:05	00:02:04:09	01:04	Maria Gloria Dominguez-Bello,PhD MICROBIOLOGIST
30	00:02:04:11	00:02:05:16	01:05	<i>People call me Gloria.</i> <i>Gloria, ok, script</i>
31	00:02:06:20	00:02:08:03	01:07	<i>I'm a microbiologist.</i>
32	00:02:08:23	00:02:10:20	01:21	<i>And my job is to study microbes,</i>
33	00:02:11:10	00:02:13:23	02:13	<i>the tiny organisms that live inside us.</i>

34	00:02:17:14	00:02:20:19	03:05	<i>People hate germs, another word for microbes.</i>
35	00:02:22:00	00:02:24:09	02:09	<i>But all life evolved from them,</i>
36	00:02:24:23	00:02:26:18	01:19	<i>and most are actually good for us.</i>
37	00:02:28:10	00:02:32:04	03:18	<i>We call the ones living inside us, our microbiome,</i>
38	00:02:32:22	00:02:35:21	02:23	<i>a collection of bacteria, viruses and fungi.</i>
39	00:02:40:00	00:02:43:10	03:10	<i>They are involved in almost everything our bodies do.</i>
40	00:02:45:18	00:02:48:22	03:04	<i>Microbes help us digest food and make vitamins.</i>
41	00:02:53:16	00:02:57:04	03:12	<i>They train the immune system to protect us against invaders.</i>
42	00:03:01:12	00:03:03:19	02:07	<i>They also determine, to some extent,</i>
43	00:03:03:21	00:03:06:18	02:21	<i>our response to pain and our mood.</i>
44	00:03:11:00	00:03:14:15	03:15	<i>These discoveries have started a scientific revolution.</i>
45	00:03:16:07	00:03:19:07	03:00	<i>But just as we are learning how important they are,</i>
46	00:03:20:06	00:03:22:08	02:02	<i>our microbes are disappearing.</i>
47	00:03:25:19	00:03:27:18	01:23	BLASER: We have lost maybe as much as 50 percent <i>Martin, ok, script</i>
48	00:03:27:23	00:03:30:02	02:03	of our internal biodiversity
49	00:03:30:14	00:03:32:04	01:14	and this has consequences.
50	00:03:33:10	00:03:34:15	01:05	<i>My name is Martin Blaser.</i>

51	00:03:34:18	00:03:35:19	01:01	Martin Blaser, MD MICROBIOLOGIST
52	00:03:35:22	00:03:38:09	02:11	<i>I'm a professor of medicine and microbiology.</i>
53	00:03:38:16	00:03:39:16	01:00	Can I get a paperback? Yeah.
54	00:03:40:18	00:03:42:02	01:08	BLASER: <i>Over these last 20 years,</i>
55	00:03:42:04	00:03:43:09	01:05	I've been thinking about this idea
56	00:03:43:11	00:03:46:21	03:10	which I call "the theory of disappearing microbiota."
57	00:03:47:11	00:03:50:01	02:14	I wrote <i>Missing Microbes</i> to sound an alarm. <i>Missing Microbes, ok, https://www.goodreads.com/en/book/show/17910121-missing-microbes</i>
58	00:03:50:10	00:03:52:23	02:13	TV ANCHOR: <i>Dr. Martin Blaser is the author of Missing Microbes.</i>
59	00:03:53:01	00:03:54:22	01:21	Please welcome to the program, Martin Blaser, sir!
60	00:03:55:02	00:03:57:02	02:00	(AUDIENCE CHEERING, CLAPPING)
61	00:03:58:04	00:03:59:04	01:00	(CHUCKLES)
62	00:03:59:08	00:04:00:15	01:07	(AUDIENCE LAUGHS)
63	00:04:02:13	00:04:04:16	02:03	BLASER: <i>What's happening to our internal ecology</i>
64	00:04:04:21	00:04:07:21	03:00	<i>is very similar to what's happening to our climate.</i>
65	00:04:08:17	00:04:11:18	03:01	<i>But unfortunately, this is happening even faster.</i>

66	00:04:14:02	00:04:17:02	03:00	<i>For decades now, we have seen many diseases rising,</i>
67	00:04:18:08	00:04:21:05	02:21	<i>and it's happening just as we are losing our microbes.</i>
68	00:04:23:06	00:04:26:20	03:14	MAN 1: <i>Nearly 26 million people in the U.S. are living with diabetes.</i> U.S., ok, https://www.britannica.com/place/United-States
69	00:04:26:23	00:04:29:07	02:08	MAN 2: <i>Why so many food allergies?</i>
70	00:04:29:19	00:04:31:17	01:22	Asthma rates rising dramatically.
71	00:04:31:19	00:04:35:12	03:17	FEMALE REPORTER: <i>More than two-thirds of Americans are overweight or obese.</i>
72	00:04:40:01	00:04:41:22	01:21	BLASER: <i>We're in the middle of an extinction crisis.</i>
73	00:04:43:02	00:04:45:07	02:05	<i>It's invisible, it's deadly,</i>
74	00:04:46:11	00:04:48:12	02:01	<i>and it's happening in all of us right now.</i>
75	00:05:01:14	00:05:04:07	02:17	<i>People have been worried about disease since the beginning of time.</i>
76	00:05:12:18	00:05:14:18	02:00	(WATER FLOWS)
77	00:05:15:08	00:05:18:11	03:03	<i>One of the most important advances in human health</i>
78	00:05:18:16	00:05:19:20	01:04	<i>is having clean water.</i>
79	00:05:22:06	00:05:24:04	01:22	<i>And that has been amazing,</i>
80	00:05:24:06	00:05:26:12	02:06	<i>because we have less typhoid fever,</i>
81	00:05:26:14	00:05:27:18	01:04	<i>we have less cholera...</i>

82	00:05:28:19	00:05:30:14	01:19	Many other infections.
83	00:05:32:10	00:05:35:13	03:03	<i>It was part of a revolution that started about 200 years ago.</i>
84	00:05:35:23	00:05:40:06	04:07	<i>Scientists like Pasteur discovered that many diseases are caused by germs.</i> Pasteur, ok, https://www.britannica.com/biography/Louis-Pasteur
85	00:05:41:07	00:05:42:17	01:10	<i>That was a tremendous breakthrough.</i>
86	00:05:46:05	00:05:48:08	02:03	<i>We found ways that we could fight these germs</i>
87	00:05:48:15	00:05:50:12	01:21	<i>through sanitation, vaccines,</i>
88	00:05:50:18	00:05:52:08	01:14	<i>and through antibiotics.</i>
89	00:05:52:19	00:05:55:14	02:19	<i>And those were remarkable victories.</i>
90	00:05:56:03	00:05:59:04	03:01	<i>Instead of knowing that if you had five children,</i>
91	00:05:59:13	00:06:01:07	01:18	<i>two of them were going to die in childhood,</i>
92	00:06:01:16	00:06:04:12	02:20	<i>uh, you had the chance that all your children were going to survive.</i>
93	00:06:05:04	00:06:06:09	01:05	I went down to the library to
94	00:06:06:15	00:06:09:00	02:09	find out something else about this field of antibiotics.
95	00:06:09:15	00:06:13:15	04:00	BLASER: Antibiotics reached the general public

				<i>around 1945,</i>
96	00:06:13:23	00:06:17:10	03:11	<i>starting with penicillin, and then expanding from there.</i>
97	00:06:17:14	00:06:20:10	02:20	MALE REPORTER: <i>America is continually increasing its output of penicillin,</i>
98	00:06:20:20	00:06:23:07	02:11	<i>a new drug that affects almost miraculous cures.</i>
99	00:06:24:13	00:06:26:06	01:17	BLASER: <i>It was the era of Superman.</i> <i>Superman, ok, https://www.britannica.com/topic/Superman-fictional-character</i>
100	00:06:27:14	00:06:31:17	04:03	<i>During World War II, when we beat our enemies, we were invincible.</i> <i>World War 2, ok, https://www.britannica.com/event/World-War-II</i>
101	00:06:31:19	00:06:33:01	01:06	It's Superman!
102	00:06:33:12	00:06:35:16	02:04	MALE REPORTER: <i>These invaluable products have been responsible</i>
103	00:06:35:18	00:06:37:18	02:00	<i>for saving millions of human lives.</i>
104	00:06:38:12	00:06:41:10	02:22	But we didn't understand that there could be costs as well.
105	00:06:41:19	00:06:43:19	02:00	(HELICOPTER WHIRRING)
106	00:06:44:00	00:06:48:00	04:00	VENEZUELAN AMAZON
107	00:06:59:14	00:07:01:23	02:09	(SPEAKING INDISTINCTLY)
108	00:07:04:10	00:07:06:19	02:09	(SPEAKING SPANISH)

109	00:07:09:12	00:07:13:04	03:16	<i>GLORIA: Why are so many chronic diseases increasing so fast?</i>
110	00:07:17:05	00:07:18:05	01:00	<i>We seek answers</i>
111	00:07:19:06	00:07:22:04	02:22	<i>in places where the problem hasn't yet begun.</i>
112	00:07:24:19	00:07:28:12	03:17	<i>Where we work with people who live more like our ancestors did.</i>
113	00:07:33:01	00:07:35:07	02:06	<i>Venezuela is my country of birth.</i> <i>Venezuela, ok,</i> <i>https://www.britannica.com/place/Venezuela</i>
114	00:07:37:20	00:07:40:08	02:12	<i>For over 20 years, I've been returning there</i>
115	00:07:40:13	00:07:43:04	02:15	<i>and making trips to villages deep in the jungle.</i>
116	00:07:48:04	00:07:50:12	02:08	<i>Push over there.</i>
117	00:07:52:13	00:07:53:13	01:00	<i>Help her!</i>
118	00:07:56:23	00:07:59:10	02:11	<i>GLORIA: Sometimes, we are the first Western doctors</i>
119	00:07:59:12	00:08:01:09	01:21	<i>and scientists they've ever met.</i>
120	00:08:02:16	00:08:05:09	02:17	<i>And we take that responsibility very seriously,</i>
121	00:08:06:04	00:08:09:07	03:03	<i>because we are aware of the history of exploitation.</i>
122	00:08:15:02	00:08:17:15	02:13	<i>The villagers' traditional lifestyle</i>
123	00:08:17:17	00:08:20:09	02:16	<i>is a safe place</i>

				<i>for their microbes.</i>
124	00:08:21:15	00:08:23:19	02:04	<i>They don't have chlorinated water,</i>
125	00:08:24:06	00:08:25:20	01:14	<i>or pasteurized milk.</i>
126	00:08:26:23	00:08:28:17	01:18	<i>Their foods are never processed.</i>
127	00:08:30:13	00:08:33:17	03:04	<i>They have low exposure to chemicals and antibiotics.</i>
128	00:08:36:14	00:08:40:12	03:22	<i>All of this keeps their microbiome healthy and rich.</i>
129	00:08:42:17	00:08:44:00	01:07	Everyone's eating fruit.
130	00:08:44:23	00:08:47:16	02:17	Our kids grew up eating what I plant.
131	00:08:50:22	00:08:52:12	01:14	GLORIA: <i>We explain to the villagers</i>
132	00:08:52:14	00:08:55:14	03:00	<i>that they have more microbial diversity than us,</i>
133	00:08:56:17	00:08:58:20	02:03	<i>and there is much we can learn from them.</i>
134	00:09:00:07	00:09:02:00	01:17	(WOMEN SPEAKING IN NATIVE DIALECT)
135	00:09:02:13	00:09:03:13	01:00	Karawasoma?
136	00:09:03:15	00:09:05:02	01:11	They're not here.
137	00:09:05:11	00:09:06:11	01:00	Calme?
138	00:09:06:22	00:09:08:14	01:16	She's here. Carmen.
139	00:09:08:16	00:09:10:15	01:23	Ah, Carmen, Carmen.
140	00:09:11:04	00:09:16:12	05:08	They will take samples from your mouth.

141	00:09:17:05	00:09:19:03	01:22	GLORIA: <i>When we ask them for stool samples...</i>
142	00:09:19:07	00:09:21:10	02:03	Can you put your poop in here?
143	00:09:21:16	00:09:22:17	01:01	GLORIA: <i>...sometimes they laugh,</i>
144	00:09:23:01	00:09:26:13	03:12	and they say, "Did you come all this way just to see my poop?"
145	00:09:27:15	00:09:29:02	01:11	And we say, "Yes."
146	00:09:30:21	00:09:35:06	04:09	<i>Because your poop contains trillions of tiny organisms</i>
147	00:09:36:03	00:09:38:01	01:22	<i>that may help us find the answers</i>
148	00:09:38:10	00:09:41:07	02:21	to some of the world's biggest health problems.
149	00:09:44:08	00:09:46:04	01:20	<i>This is also important for them,</i>
150	00:09:46:19	00:09:48:22	02:03	<i>because they are integrating very fast.</i>
151	00:09:49:06	00:09:52:13	03:07	(MAN SPEAKS INDISTINCTLY ON RADIO)
152	00:09:53:03	00:09:54:17	01:14	<i>So, studying their microbes</i>
153	00:09:55:03	00:09:56:14	01:11	<i>before they lose them,</i>
154	00:09:57:07	00:09:59:00	01:17	<i>is a race against time.</i>
155	00:10:03:19	00:10:05:22	02:03	(WOMEN SPEAKING SPANISH)
156	00:10:10:15	00:10:13:07	02:16	GLORIA: <i>The samples are kept at minus 80 degrees,</i>
157	00:10:13:11	00:10:15:15	02:04	<i>and transported to Caracas,</i>

				<i>Caracas, ok,</i> <i>https://www.britannica.com/place/Caracas</i>
158	00:10:15:18	00:10:17:20	02:02	<i>until they can be sent to the U.S.</i>
159	00:10:18:20	00:10:20:18	01:22	<i>Then we study them in the lab,</i>
160	00:10:20:23	00:10:23:16	02:17	<i>and store them safely for the future.</i>
161	00:10:25:09	00:10:29:23	04:14	(SINGING IN SPANISH)
162	00:10:32:11	00:10:35:19	03:08	(CONTINUES SINGING IN SPANISH)
163	00:10:49:00	00:10:54:08	05:08	(ALL SINGING TOGETHER)
164	00:11:01:04	00:11:07:18	06:14	(SINGING CONTINUES)
165	00:11:11:07	00:11:13:13	02:06	NEW YORK CITY
166	00:11:21:18	00:11:23:11	01:17	Hi, Ian and Shane. Hi, Antonia. <i>Antonia, ok, script</i>
167	00:11:23:13	00:11:24:19	01:06	MAN: Good morning. WOMAN: Good morning.
168	00:11:31:16	00:11:36:08	04:16	These are all of one site in the Amazon. <i>Amazon, ok,</i> <i>https://www.britannica.com/place/Amazon-Rainforest</i>
169	00:11:38:01	00:11:41:10	03:09	<i>Ever since I was a little kid, I wanted to be a scientist.</i>
170	00:11:46:02	00:11:49:02	03:00	<i>My childhood in Venezuela was a happy life,</i>
171	00:11:49:09	00:11:50:10	01:01	<i>close to nature,</i>

172	00:11:51:01	00:11:52:08	01:07	<i>with farm animals,</i>
173	00:11:52:20	00:11:54:16	01:20	<i>fruits and trees.</i>
174	00:11:56:07	00:11:58:22	02:15	<i>One year, my parents gave me a chemistry set.</i>
175	00:12:00:03	00:12:03:16	03:13	<i>I loved the colorful powders and smelly liquids.</i>
176	00:12:05:05	00:12:07:08	02:03	<i>Our second bathroom was my lab,</i>
177	00:12:07:10	00:12:08:18	01:08	<i>and nobody could enter there.</i>
178	00:12:12:18	00:12:14:15	01:21	<i>I went to University in Caracas.</i>
179	00:12:16:12	00:12:18:05	01:17	<i>In grad school, I studied</i>
180	00:12:18:08	00:12:21:13	03:05	<i>how cows can eat toxic plants and survive.</i>
181	00:12:21:15	00:12:22:15	01:00	(COW MOOS)
182	00:12:22:17	00:12:26:02	03:09	<i>And that's when I got interested in how microbes affect us.</i>
183	00:12:30:13	00:12:34:02	03:13	In Venezuela, I had Adriana in 1991. <i>Adriana, ok, script</i>
184	00:12:34:07	00:12:36:01	01:18	Presenting Adriana.
185	00:12:36:05	00:12:37:14	01:09	(PEOPLE CHUCKLE)
186	00:12:37:16	00:12:40:22	03:06	(IN ENGLISH) Then I moved to New York in 2012. <i>New York, ok, https://www.britannica.com/place/New-York-state</i>
187	00:12:41:07	00:12:42:07	01:00	(POLICE SIREN WAILS)

188	00:12:46:10	00:12:48:10	02:00	This is not the traditional way, of course.
189	00:12:50:01	00:12:51:02	01:01	Want to try?
190	00:12:52:20	00:12:53:23	01:03	I'm making more.
191	00:12:54:19	00:12:55:23	01:04	Mm, that's delicious.
192	00:12:57:00	00:12:59:00	02:00	GLORIA: <i>We met through work.</i>
193	00:12:59:07	00:13:01:09	02:02	I worked with his colleagues.
194	00:13:01:11	00:13:03:11	02:00	On her last day, I had just come back
195	00:13:03:13	00:13:05:22	02:09	and we met really for 10 minutes.
196	00:13:06:15	00:13:08:09	01:18	And then we actually started doing work together.
197	00:13:08:14	00:13:09:20	01:06	<i>We collaborated together.</i>
198	00:13:10:05	00:13:11:19	01:14	Are you leaving? No, you are.
199	00:13:11:21	00:13:13:17	01:20	I'm leaving in one minute.
200	00:13:14:05	00:13:15:05	01:00	GLORIA: <i>I was divorced,</i>
201	00:13:15:15	00:13:18:09	02:18	and we started a friendship that...
202	00:13:19:04	00:13:21:10	02:06	ended in a deeper relation.
203	00:13:22:13	00:13:24:11	01:22	MALE REPORTER: <i>NYU Hospital here in Manhattan</i> <i>NYU Hospital, ok, https://nyulangone.org/ Manhattan, ok,</i>

				<i>https://www.britannica.com/place/Manhattan-New-York-City</i>
204	00:13:24:13	00:13:26:20	02:07	<i>was plunged into darkness, its generators failing.</i>
205	00:13:26:22	00:13:28:11	01:13	BLASER: <i>We were getting very close.</i>
206	00:13:28:15	00:13:30:09	01:18	<i>And then came Hurricane Sandy.</i> <i>Hurricane Sandy, ok,</i> <i>https://www.britannica.com/event/Superstorm-Sandy</i>
207	00:13:31:10	00:13:33:16	02:06	<i>I was the chief of medicine at NYU.</i>
208	00:13:34:12	00:13:37:08	02:20	<i>I got a phone call that said, we have to evacuate the hospital.</i>
209	00:13:38:11	00:13:40:14	02:03	And she said, well if you're going, I'm going with you.
210	00:13:42:03	00:13:44:16	02:13	<i>We came home. It was early in the morning.</i>
211	00:13:44:18	00:13:46:05	01:11	And I thought to myself,
212	00:13:47:00	00:13:49:13	02:13	uh, who would I rather spend my life with?
213	00:13:49:23	00:13:51:15	01:16	So, that's when I proposed to Gloria.
214	00:13:52:14	00:13:54:15	02:01	I didn't ask him to go on his knee.
215	00:13:54:17	00:13:55:19	01:02	(BOTH LAUGH)
216	00:13:56:02	00:13:57:02	01:00	But I said yes.
217	00:13:59:01	00:14:01:04	02:03	Don't touch my hand in public, Marty. Why not?

				<i>Marty = Martin</i>
218	00:14:04:04	00:14:05:04	01:00	BLASER: <i>I was a city kid.</i>
219	00:14:05:19	00:14:06:19	01:00	<i>I grew up in Queens.</i> <i>Queens, ok,</i> <i>https://www.britannica.com/place/Queens-New-York</i>
220	00:14:08:06	00:14:10:04	01:22	<i>I've kind of been exploring all my life.</i>
221	00:14:12:03	00:14:14:21	02:18	<i>I rode on freight trains, in boxcars.</i>
222	00:14:15:20	00:14:18:02	02:06	They say that the first time
223	00:14:18:04	00:14:20:14	02:10	you pee off the side of a boxcar, you're hooked.
224	00:14:21:03	00:14:23:00	01:21	(TRAIN HORN BLOWING)
225	00:14:23:02	00:14:25:01	01:23	<i>Actually, I wanted to become an architect.</i>
226	00:14:26:17	00:14:28:22	02:05	<i>But I discovered at a very early age</i>
227	00:14:29:00	00:14:30:14	01:14	that I had no talent for that.
228	00:14:31:11	00:14:34:20	03:09	<i>I went into the specialty of infectious diseases,</i>
229	00:14:35:09	00:14:37:10	02:01	<i>trying to solve very complex problems,</i>
230	00:14:37:12	00:14:39:06	01:18	<i>patients who were very ill.</i>
231	00:14:40:17	00:14:43:18	03:01	<i>I was really interested in questioning why.</i>

232	00:14:45:05	00:14:47:08	02:03	And at a certain point, I found out
233	00:14:47:10	00:14:49:18	02:08	that I could answer some of my own questions,
234	00:14:50:06	00:14:52:17	02:11	and that... that was very exciting.
235	00:14:54:08	00:14:56:06	01:22	Uh, so are you going to the VA first, <i>VA, ok, https://www.va.gov/</i>
236	00:14:56:08	00:14:57:22	01:14	or Bellevue? Bellevue. <i>Bellevue, ok, https://www.nychealthandhospitals.org/bellevue/</i>
237	00:15:05:12	00:15:07:11	01:23	BLASER: <i>I believe the hypothesis is correct.</i>
238	00:15:07:15	00:15:09:11	01:20	<i>That antibiotics are contributing</i>
239	00:15:09:18	00:15:12:02	02:08	<i>to the rise of all these diseases.</i>
240	00:15:13:06	00:15:15:08	02:02	<i>But not everybody believes that's correct.</i>
241	00:15:15:11	00:15:18:21	03:10	<i>And so, the job of a scientist is to examine questions</i>
242	00:15:19:03	00:15:21:19	02:16	and see if we can find more evidence that it's true
243	00:15:21:21	00:15:23:17	01:20	and try to understand the details.
244	00:15:24:15	00:15:27:10	02:19	Maybe it's true for some diseases, but not others.
245	00:15:29:00	00:15:31:08	02:08	MARTY AND GLORIA'S LAB NEW YORK UNIVERSITY

246	00:15:31:10	00:15:33:13	02:03	<i>And that's why we do experiments in the lab</i>
247	00:15:33:16	00:15:36:15	02:23	<i>to try to understand, how does it work, what are the mechanisms?</i>
248	00:15:37:15	00:15:39:14	01:23	What's the percent difference in weight there?
249	00:15:40:06	00:15:42:21	02:15	These guys got the antibiotics and then the bacteria.
250	00:15:43:01	00:15:44:01	01:00	WOMAN: Yeah. And these guys
251	00:15:44:03	00:15:45:18	01:15	got the bacteria with no antibiotic?
252	00:15:46:11	00:15:49:15	03:04	When I compare the oral and nasal microbiome
253	00:15:49:18	00:15:52:21	03:03	of Amerindians to westernized subjects <i>Amerindians, ok,</i> <i>https://www.britannica.com/topic/Native-American</i>
254	00:15:53:02	00:15:56:11	03:09	there's a clear distinction between the microbiomes.
255	00:15:56:18	00:15:57:22	01:04	GLORIA: And I don't think that has
256	00:15:58:07	00:16:00:06	01:23	ever been shown before. WOMAN: True. Yeah.
257	00:16:01:21	00:16:03:08	01:11	BLASER: <i>We've been studying metabolism,</i>
258	00:16:03:15	00:16:05:00	01:09	<i>we've been studying immunity,</i>
259	00:16:05:07	00:16:06:22	01:15	<i>and propensity for asthma.</i>

260	00:16:08:21	00:16:11:12	02:15	And the two next are feces.
261	00:16:11:15	00:16:13:03	01:12	Poop? Yes, poop.
262	00:16:13:16	00:16:14:16	01:00	I'm going to wash my hands.
263	00:16:15:19	00:16:17:13	01:18	So the papers were accepted
264	00:16:18:02	00:16:19:14	01:12	and they were published yesterday.
265	00:16:20:08	00:16:21:13	01:05	(CORK POPS)
266	00:16:21:16	00:16:23:00	01:08	(ALL CHEERING, WHOOPING)
267	00:16:25:07	00:16:27:07	02:00	<i>But our two main topics in the lab</i>
268	00:16:27:15	00:16:29:11	01:20	<i>are obesity and diabetes.</i>
269	00:16:31:12	00:16:33:17	02:05	<i>If you compare people with Type 2 diabetes</i>
270	00:16:33:22	00:16:36:12	02:14	<i>to people who don't have type 2 diabetes,</i>
271	00:16:36:22	00:16:39:03	02:05	<i>who had been more exposed to antibiotics?</i>
272	00:16:39:14	00:16:41:18	02:04	<i>And the answer is, people with diabetes.</i>
273	00:16:42:07	00:16:43:09	01:02	<i>Significantly more.</i>
274	00:16:43:21	00:16:46:20	02:23	<i>And to me, these numbers are not just a coincidence.</i>
275	00:16:47:23	00:16:51:05	03:06	<i>Diabetes is a disease in which there's too much sugar in the blood.</i>
276	00:16:51:15	00:16:53:17	02:02	<i>And a lot of that has to do with obesity.</i>

277	00:16:54:08	00:16:56:14	02:06	<i>In societies, whenever there's more obesity,</i>
278	00:16:56:20	00:16:58:11	01:15	<i>there's more type 2 diabetes.</i>
279	00:16:58:17	00:17:00:17	02:00	(SCALE BEEPING)
280	00:17:01:00	00:17:02:20	01:20	Obesity is such a huge problem
281	00:17:02:22	00:17:05:00	02:02	and it has been growing dramatically.
282	00:17:05:13	00:17:07:13	02:00	OBESITY IN U.S.A
283	00:17:07:17	00:17:10:12	02:19	<i>And the current hypothesis about obesity,</i>
284	00:17:10:19	00:17:13:08	02:13	about calories, etc... are important,
285	00:17:13:10	00:17:16:10	03:00	but they're not sufficient to explain why this has occurred.
286	00:17:16:15	00:17:18:22	02:07	(CHICKENS CLUCKING)
287	00:17:19:00	00:17:21:18	02:18	<i>It's now been 70 years since farmers discovered</i>
288	00:17:21:20	00:17:25:05	03:09	<i>that if they gave antibiotics to their farm animals, they would fatten them up.</i>
289	00:17:25:15	00:17:28:02	02:11	<i>And, the earlier in life they started it,</i>
290	00:17:28:06	00:17:29:16	01:10	<i>the more profound the effect.</i>
291	00:17:30:08	00:17:31:12	01:04	MALE REPORTER: <i>Some antibiotics,</i>
292	00:17:31:14	00:17:33:05	01:15	<i>added to the feed of young animals</i>
293	00:17:33:10	00:17:34:16	01:06	<i>promote more rapid growth.</i>
294	00:17:35:15	00:17:38:12	02:21	<i>The larger pig</i>

				<i>was raised on feed containing an antibiotic.</i>
295	00:17:38:22	00:17:41:07	02:09	<i>The other, from the same litter, was not.</i>
296	00:17:42:14	00:17:44:02	01:12	All of a sudden, it occurred to me,
297	00:17:44:13	00:17:48:17	04:04	maybe the use of antibiotics early in life in our children,
298	00:17:48:19	00:17:50:04	01:09	is fattening up our kids.
299	00:17:50:17	00:17:51:17	01:00	(MOUSE SQUEAKS)
300	00:17:51:19	00:17:53:19	02:00	<i>And so, we began to do studies in mice.</i>
301	00:17:54:14	00:17:56:14	02:00	<i>And our results were quite consistent.</i>
302	00:17:57:03	00:17:59:22	02:19	<i>That if we give antibiotics to mice, they become fat.</i>
303	00:18:01:02	00:18:04:03	03:01	<i>If we put mice on a high calorie diet they become fat.</i>
304	00:18:04:22	00:18:08:12	03:14	<i>And if we put them on both together, they become very fat.</i>
305	00:18:11:05	00:18:12:18	01:13	<i>And so, all this made me ask,</i>
306	00:18:13:03	00:18:15:20	02:17	<i>How else could antibiotics be affecting our kids?</i>
307	00:18:17:17	00:18:18:18	01:01	(DOOR OPENS)
308	00:18:19:00	00:18:20:00	01:00	Hi, Pops. How are you? BLASER: How you doing?
309	00:18:20:03	00:18:21:03	01:00	Genia MARTY'S DAUGHTER

310	00:18:21:05	00:18:22:05	01:00	Good, hi. (KISSES)
311	00:18:22:10	00:18:24:08	01:22	You want some coffee? Yes, please.
312	00:18:25:16	00:18:26:21	01:05	BLASER: <i>When she was in her 20s,</i>
313	00:18:27:01	00:18:29:18	02:17	<i>my daughter, Genia, picked up a parasitic infection.</i> <i>Genia, ok, script</i>
314	00:18:30:09	00:18:31:15	01:06	GENIA: <i>I was in Peru.</i> <i>Peru, ok, https://www.britannica.com/place/Peru</i>
315	00:18:32:01	00:18:33:07	01:06	I had some ceviche.
316	00:18:33:11	00:18:36:11	03:00	And then, when I returned to the US a couple days later,
317	00:18:36:20	00:18:38:11	01:15	I was having digestive symptoms.
318	00:18:39:21	00:18:43:09	03:12	<i>And I was prescribed a dosage of a powerful antibiotic</i>
319	00:18:43:11	00:18:45:23	02:12	<i>that basically just clears out your system.</i>
320	00:18:49:15	00:18:51:15	02:00	<i>And then, over the following two years,</i>
321	00:18:51:19	00:18:53:21	02:02	<i>five or six other prescriptions,</i>
322	00:18:53:23	00:18:56:08	02:09	<i>as I continued to have stomach symptoms.</i>
323	00:18:57:20	00:19:00:14	02:18	That's when we were able to figure out

				that I had Celiac,
324	00:19:00:17	00:19:03:08	02:15	that I, you know, had this gluten allergy.
325	00:19:04:04	00:19:06:16	02:12	<i>BLASER: To understand my ideas about what happened to Genia,</i>
326	00:19:06:19	00:19:09:16	02:21	<i>we have to go back years before she ever went to Peru.</i>
327	00:19:10:13	00:19:13:05	02:16	<i>When she was a young girl, she had many ear infections.</i>
328	00:19:13:15	00:19:16:09	02:18	<i>And like millions of parents, we took her to the doctor,</i>
329	00:19:16:21	00:19:19:16	02:19	<i>and each time, the doctor prescribed antibiotics.</i>
330	00:19:21:16	00:19:23:15	01:23	And to me, that combination
331	00:19:23:17	00:19:25:20	02:03	of those early childhood antibiotics
332	00:19:26:04	00:19:27:14	01:10	and those later antibiotics,
333	00:19:28:05	00:19:30:18	02:13	that's kind of what led you to this problem,
334	00:19:31:03	00:19:32:22	01:19	which, of course, I feel terrible about.
335	00:19:34:10	00:19:36:11	02:01	<i>Early life, that's when they're developing.</i>
336	00:19:37:05	00:19:38:12	01:07	<i>They're developing their immunity.</i>
337	00:19:38:22	00:19:40:08	01:10	<i>They're developing their metabolism.</i>
338	00:19:40:17	00:19:42:08	01:15	They're developing their brain function.
339	00:19:43:05	00:19:44:09	01:04	That's the critical time.

340	00:19:44:11	00:19:46:21	02:10	And that's the time when kids are getting the most antibiotics.
341	00:19:47:21	00:19:49:18	01:21	You know, we thought we were doing you a favor.
342	00:19:50:07	00:19:52:04	01:21	Uh, I remember thinking,
343	00:19:52:17	00:19:55:19	03:02	you know, we put you on antibiotics, you wouldn't have to have tubes in your ears.
344	00:19:56:03	00:19:57:22	01:19	But in retrospect, it would have been better.
345	00:19:58:12	00:19:59:12	01:00	But we didn't know it.
346	00:20:00:20	00:20:04:07	03:11	<i>There's a conversation going on between our microbes and our immune system,</i>
347	00:20:04:20	00:20:06:04	01:08	<i>especially in young children,</i>
348	00:20:06:23	00:20:08:22	01:23	<i>where the microbes train the immune system</i>
349	00:20:09:10	00:20:11:03	01:17	<i>to distinguish friend from foe.</i>
350	00:20:13:00	00:20:15:15	02:15	<i>We believe that antibiotics disrupt that communication.</i>
351	00:20:17:02	00:20:21:15	04:13	<i>And that's what opened the door to Janye developing celiac disease later in life.</i>
352	00:20:24:07	00:20:27:15	03:08	And then I remember that I hated taking antibiotics.
353	00:20:27:22	00:20:30:18	02:20	And you and Mom basically bribed me
354	00:20:31:05	00:20:34:12	03:07	that if I would take it without complaining for, like, a week or so,
355	00:20:34:14	00:20:35:14	01:00	I could get my ears pierced.

356	00:20:35:20	00:20:38:21	03:01	Bribing you to take your antibiotic, uh...
357	00:20:40:12	00:20:42:17	02:05	I know. Mom apologized to me for it.
358	00:20:42:19	00:20:43:22	01:03	(BOTH CHUCKLE)
359	00:20:45:21	00:20:48:19	02:22	<i>BLASER: About half of all pregnant women are receiving antibiotics</i>
360	00:20:48:21	00:20:50:20	01:23	<i>at some time during their pregnancy.</i>
361	00:20:52:00	00:20:54:17	02:17	<i>And for kids in the United States, by the time they're two,</i>
362	00:20:55:02	00:20:57:17	02:15	<i>they've had, on average, about three courses of antibiotics.</i>
363	00:20:58:18	00:20:59:22	01:04	<i>By the time they're ten,</i>
364	00:21:00:08	00:21:01:23	01:15	<i>about ten courses of antibiotics.</i>
365	00:21:03:17	00:21:06:16	02:23	<i>So, many of these chronic diseases began in childhood.</i>
366	00:21:07:20	00:21:09:22	02:02	<i>That's why it's become a focus of our work.</i>
367	00:21:10:18	00:21:15:07	04:13	<i>But an out-of-balance microbiome can have repercussions at any point in life.</i>
368	00:21:18:23	00:21:21:09	02:10	Theresa NORTH PROVIDENCE, RHODE ISLAND
369	00:21:21:11	00:21:25:09	03:22	THERESA: <i>In 2010, I ended up getting C.diff,</i>
370	00:21:26:18	00:21:28:01	01:07	and it was horrible.
371	00:21:29:06	00:21:32:10	03:04	C. difficile is a bacteria that is resistant to

				most antibiotics.
372	00:21:32:23	00:21:35:19	02:20	And some experts say, overprescribing the medications
373	00:21:35:22	00:21:38:21	02:23	is causing the bacteria to become even more deadly.
374	00:21:39:15	00:21:40:16	01:01	MALE REPORTER: <i>It's called C. diff.</i>
375	00:21:41:04	00:21:43:04	02:00	<i>500,000 Americans have it in their bodies</i>
376	00:21:43:07	00:21:45:18	02:11	<i>15,000 people die from it every year.</i>
377	00:21:47:04	00:21:51:07	04:03	I was constantly sick, um... I would be afraid to eat,
378	00:21:51:09	00:21:55:06	03:21	because anything I would eat would just come right out. Um...
379	00:21:56:02	00:21:59:04	03:02	So it would limit what I wanted to do, where I would go.
380	00:22:00:12	00:22:01:22	01:10	<i>I was very, very fatigued.</i>
381	00:22:04:15	00:22:08:20	04:05	<i>I ended up going to, uh, a G.I. specialist out here in Rhode Island.</i>
382	00:22:10:19	00:22:15:18	04:23	And she said that she was starting to do these, uh, fecal transplants.
383	00:22:16:15	00:22:20:00	03:09	BLASER: <i>FMT stands for Fecal Microbiota Transplant.</i>
384	00:22:21:08	00:22:24:06	02:22	<i>It means taking the microbes from someone who's healthy</i>
385	00:22:24:16	00:22:27:00	02:08	<i>and transferring them over to someone who's sick.</i>
386	00:22:28:10	00:22:32:00	03:14	<i>Right now, the only way to do this is by using their poop.</i>

387	00:22:33:23	00:22:38:09	04:10	The idea that giving somebody poop could cure their illness is a pretty amazing thought.
388	00:22:41:09	00:22:44:06	02:21	<i>But more than half of poop is actually living microbes.</i>
389	00:22:46:04	00:22:49:17	03:13	<i>So fecal transplant provides the patient a wide range of microbes</i>
390	00:22:50:03	00:22:52:08	02:05	<i>intended to restore balance in the gut,</i>
391	00:22:52:23	00:22:54:21	01:22	<i>and to cure the C.diff infection.</i>
392	00:22:57:14	00:22:59:03	01:13	THERESA: <i>I used my daughter as the donor.</i>
393	00:22:59:05	00:23:00:08	01:03	Tatyana THERESA'S DAUGHTER
394	00:23:00:12	00:23:03:02	02:14	She was 15. "Ew! Mom, ew!"
395	00:23:04:06	00:23:06:04	01:22	<i>The day of the procedure, I was so afraid</i>
396	00:23:06:06	00:23:07:21	01:15	<i>she wouldn't be able to use the bathroom.</i>
397	00:23:08:06	00:23:10:17	02:11	<i>So I, like, loaded her up with milk of magnesia.</i>
398	00:23:11:12	00:23:14:01	02:13	So she came home from school, right, and she's like,
399	00:23:14:06	00:23:20:20	06:14	"Mom, I was in the bathroom all day." So she was not happy.
400	00:23:22:11	00:23:25:04	02:17	And then I would go in and I would do a, kinda like a colonoscopy.
401	00:23:25:13	00:23:27:12	01:23	<i>So they would liquefy the feces</i>
402	00:23:28:03	00:23:30:01	01:22	and go up through, you know, the anus

403	00:23:30:03	00:23:31:16	01:13	and into the intestinal tract,
404	00:23:31:21	00:23:34:13	02:16	<i>and, kinda just, with a syringe, push all that fluid in.</i>
405	00:23:36:10	00:23:39:19	03:09	And, like this, it was instant relief.
406	00:23:42:01	00:23:44:11	02:10	BLASER: <i>FMT is a complex mixture.</i>
407	00:23:44:13	00:23:46:20	02:07	<i>And we don't even know what all the components are.</i>
408	00:23:47:12	00:23:50:21	03:09	<i>It's FDA approved only to treat C.diff infections.</i>
409	00:23:51:00	00:23:53:04	02:04	<i>But for that, it's very effective.</i>
410	00:23:54:10	00:23:57:11	03:01	The benefit of it is much greater than the risk.
411	00:23:58:14	00:23:59:21	01:07	MAN: Hi, honey. Hi, babe.
412	00:24:00:00	00:24:01:01	01:01	Roger THERESA'S HUSBAND
413	00:24:01:03	00:24:02:12	01:09	Muah! (CHUCKLES)
414	00:24:04:23	00:24:07:08	02:09	Honey, you didn't have to do this on your day off.
415	00:24:08:20	00:24:10:04	01:08	Oh, I love it.
416	00:24:11:17	00:24:17:01	05:08	About six months after I had the procedure I started noticing a weight gain.
417	00:24:17:23	00:24:21:03	03:04	So this one here was 2005.

418	00:24:21:22	00:24:25:17	03:19	And then, this one was me in 2006.
419	00:24:26:12	00:24:28:13	02:01	That's the best one. Yeah, that's his favorite.
420	00:24:29:08	00:24:32:01	02:17	So this is me, literally,
421	00:24:32:12	00:24:35:02	02:14	like, right before the, uh, FMT.
422	00:24:35:12	00:24:39:01	03:13	And then, this is me, it was, like, six months later.
423	00:24:40:05	00:24:43:19	03:14	<i>So I went from being 120 pounds, like, my whole life</i>
424	00:24:44:13	00:24:46:22	02:09	<i>to, at my highest, I was 183.</i>
425	00:24:47:00	00:24:50:01	03:01	<i>So I put on 60 pounds within, like, a year.</i>
426	00:24:50:18	00:24:52:22	02:04	<i>And nothing had changed in my life, so,</i>
427	00:24:53:06	00:24:57:04	03:22	<i>for me, I'm like, why was this increase and weight gain happening?</i>
428	00:24:59:00	00:25:01:09	02:09	The only thing that made sense to me was,
429	00:25:02:03	00:25:04:02	01:23	the FMT procedure caused it.
430	00:25:06:12	00:25:08:11	01:23	Okay. More mice.
431	00:25:10:12	00:25:11:22	01:10	BLASER: <i>We did another experiment</i>
432	00:25:12:00	00:25:14:18	02:18	<i>where we took mice that we made fat with antibiotics</i>
433	00:25:15:14	00:25:19:04	03:14	<i>and we gave their microbes</i>

				<i>to mice that had no microbes of their own.</i>
434	00:25:20:13	00:25:22:08	01:19	<i>And those mice got fat, too.</i>
435	00:25:23:22	00:25:27:03	03:05	<i>And that showed us that the altered microbes were causing the weight gain.</i>
436	00:25:28:11	00:25:31:23	03:12	My daughter, um, she is obese.
437	00:25:32:09	00:25:35:16	03:07	Um, she's shaped, we're shaped just like each other, you know, round.
438	00:25:36:13	00:25:40:13	04:00	<i>Um, so looking at my daughter's body and my body</i>
439	00:25:41:02	00:25:43:01	01:23	<i>had to have been from the FMT.</i>
440	00:25:44:01	00:25:45:06	01:05	How was school?
441	00:25:46:02	00:25:48:12	02:10	Where's my love? Gimme my love.
442	00:25:49:09	00:25:53:02	03:17	<i>I've done Weight Watchers. I did a liquid diet</i>
443	00:25:53:04	00:25:56:23	03:19	<i>that's done through Miriam Hospital so it's, like, medically done with doctors.</i> <i>Miriam Hospital ok, https://www.lifespan.org/locations/miriam-hospital</i>
444	00:25:57:13	00:25:59:09	01:20	<i>I've tried so many diets.</i>
445	00:26:00:03	00:26:01:16	01:13	I'm active, um...
446	00:26:04:01	00:26:08:08	04:07	I don't, you know, binge eat. So for me, it's frustrating
447	00:26:08:10	00:26:11:01	02:15	when I'm doing everything I can to try to lose the weight,

448	00:26:11:03	00:26:12:22	01:19	and I still can't lose the weight.
449	00:26:18:23	00:26:22:12	03:13	ERAN SEGAL: Several years ago, the first project that we did was on artificial sweeteners.
450	00:26:22:14	00:26:24:04	01:14	And, uh, to make a long story short, what we showed
451	00:26:24:06	00:26:25:06	01:00	Eran Segal, PhD
452	00:26:25:08	00:26:26:11	01:03	COMPUTATIONAL BIOLOGIST WEIZMANN INSTITUTE OF SCIENCE
453	00:26:26:13	00:26:27:21	01:08	is that consumption of artificial sweeteners
454	00:26:28:02	00:26:30:22	02:20	can alter the microbiome in a detrimental way.
455	00:26:31:10	00:26:36:00	04:14	That's the big massive weld... Uh-huh. Oh, okay.
456	00:26:36:10	00:26:38:12	02:02	BLASER: <i>So, microbiome and diet.</i> SEGAL: <i>Yeah.</i>
457	00:26:38:20	00:26:41:01	02:05	How did you first get involved in this field?
458	00:26:41:04	00:26:45:04	04:00	I got into reading about diet for marathon running.
459	00:26:46:00	00:26:50:03	04:03	<i>And then, I realized that a lot of the things that people tell us</i>
460	00:26:50:05	00:26:53:12	03:07	<i>you should eat for training have no scientific basis.</i>
461	00:26:54:15	00:26:57:20	03:05	RAMATH HASHARON, ISRAEL
462	00:27:02:22	00:27:04:18	01:20	<i>When I started reading about nutrition</i>

463	00:27:04:20	00:27:07:20	03:00	<i>and thinking about differences between people, I realized</i>
464	00:27:07:22	00:27:11:08	03:10	<i>that everything you put in your body has an effect on your gut bacteria.</i>
465	00:27:13:04	00:27:15:23	02:19	<i>And that our gut bacteria may really have a dominant role</i>
466	00:27:16:01	00:27:17:18	01:17	<i>in all these big questions I was asking.</i>
467	00:27:19:06	00:27:20:20	01:14	<i>like why some of us become obese,</i>
468	00:27:20:22	00:27:23:12	02:14	<i>or develop diabetes, while others don't.</i>
469	00:27:33:15	00:27:34:18	01:03	Eran Elinav, MD MICROBIOLOGIST & IMMUNOLOGIST
470	00:27:34:20	00:27:36:19	01:23	ELINAV: <i>I was performing colonoscopies and endoscopies, you know,</i>
471	00:27:36:21	00:27:38:13	01:16	<i>every day of the week.</i>
472	00:27:39:07	00:27:42:11	03:04	I was meeting the microbiome on a daily basis.
473	00:27:42:13	00:27:45:19	03:06	But at that time, we all thought that this was a waste product.
474	00:27:45:22	00:27:48:14	02:16	That it was just something that we had to live with,
475	00:27:48:16	00:27:52:09	03:17	but was not really important to our physiology, or to our health.
476	00:27:54:03	00:27:55:07	01:04	(SPEAKS INDISTINCTLY)
477	00:27:55:21	00:28:01:00	05:03	<i>But as we matured as a field, we realized that the functions</i>
478	00:28:01:02	00:28:03:13	02:11	<i>these microbes provide are important.</i>

479	00:28:04:19	00:28:07:19	03:00	<i>And this... this was a conceptual change in the field.</i>
480	00:28:09:16	00:28:13:13	03:21	You know, I do microbiome research while my wife
481	00:28:13:15	00:28:15:20	02:05	is, um, an infectious disease specialist.
482	00:28:16:02	00:28:20:11	04:09	<i>Uh, so there are many discussions over dinner related to human excretions</i>
483	00:28:20:13	00:28:24:02	03:13	that are not entirely you know, uh, proper.
484	00:28:24:11	00:28:26:16	02:05	I brought you a new sample for the study.
485	00:28:27:02	00:28:30:16	03:14	ELINAV: <i>In many cases, my kids tell me, "We don't want to hear</i>
486	00:28:30:18	00:28:33:14	02:20	"any more about your work, your science, and about poop."
487	00:28:36:19	00:28:41:21	05:02	We thought that working together, it could lead to something very fruitful.
488	00:28:42:05	00:28:44:17	02:12	(VENDOR SHOUTING)
489	00:28:44:19	00:28:47:08	02:13	ELINAV: <i>The first idea was related to nutrition.</i>
490	00:28:48:02	00:28:50:19	02:17	I often met patients suffering of obesity,
491	00:28:50:21	00:28:52:07	01:10	of Type 2 diabetes.
492	00:28:53:13	00:28:56:13	03:00	<i>I always gave the Gold Standard Recommendations,</i>
493	00:28:57:04	00:29:00:00	02:20	<i>the American Heart Association, American Diabetes Association</i>

				<i>diet.</i>
494	00:29:00:15	00:29:02:22	02:07	<i>But the nutritional recommendations, in reality,</i>
495	00:29:03:10	00:29:06:04	02:18	<i>never really worked for most of these individuals.</i>
496	00:29:07:22	00:29:11:11	03:13	<i>SEGAL: We began to wonder if these diets failed, because they were ignoring</i>
497	00:29:11:13	00:29:14:14	03:01	<i>the role gut microbes play in how we digest our food.</i>
498	00:29:16:02	00:29:18:20	02:18	<i>And how every person has different microbes inside them.</i>
499	00:29:22:11	00:29:26:07	03:20	<i>ELINAV: We'd asked 1,000 individuals to give us a week of his or her life.</i>
500	00:29:27:12	00:29:29:15	02:03	<i>We collected lots of information.</i>
501	00:29:31:01	00:29:32:08	01:07	<i>Are you sure you want that arm?</i>
502	00:29:32:15	00:29:33:21	01:06	<i>(IN ENGLISH) They were giving us blood tests</i>
503	00:29:33:23	00:29:35:18	01:19	<i>in which we measured many different parameters.</i>
504	00:29:37:13	00:29:41:06	03:17	<i>SEGAL: For dozens of different small and large meals, you log everything that you eat.</i>
505	00:29:42:12	00:29:44:20	02:08	<i>ELINAV: And we took stool samples from each of these individuals</i>
506	00:29:44:22	00:29:47:12	02:14	<i>in order to characterize their gut microbes.</i>
507	00:29:48:05	00:29:51:00	02:19	<i>Their composition, their function,</i>
508	00:29:51:08	00:29:53:16	02:08	<i>their genomic content and many other features.</i>

509	00:29:55:01	00:29:56:14	01:13	Hi. What's this?
510	00:29:57:10	00:29:58:10	01:00	SEGAL: (IN ENGLISH) <i>Crunching all this data,</i>
511	00:29:58:12	00:30:01:05	02:17	<i>we created a program that could identify</i>
512	00:30:01:07	00:30:04:09	03:02	<i>which foods made each person's blood sugar levels rise</i>
513	00:30:04:17	00:30:06:10	01:17	<i>and which brought them back to normal.</i>
514	00:30:08:08	00:30:10:19	02:11	<i>We also learned that the way foods are paired</i>
515	00:30:10:22	00:30:13:03	02:05	<i>is very important for avoiding sugar spikes.</i>
516	00:30:13:23	00:30:16:07	02:08	<i>For instance, bread may be bad for someone,</i>
517	00:30:16:10	00:30:18:06	01:20	<i>but not when they combine it with butter.</i>
518	00:30:18:22	00:30:22:21	03:23	<i>Or an apple may cause sugar spikes, but not when they eat it with walnuts.</i>
519	00:30:24:23	00:30:27:16	02:17	<i>We then designed personalized diets for participants</i>
520	00:30:27:18	00:30:30:03	02:09	<i>with pre diabetes based on their gut microbes.</i>
521	00:30:31:14	00:30:34:04	02:14	And the results were actually quite remarkable.
522	00:30:34:08	00:30:36:13	02:05	We were able, for almost all of these participants,
523	00:30:36:15	00:30:39:05	02:14	to fully normalize to perfectly healthy
524	00:30:39:10	00:30:40:17	01:07	<i>their blood glucose levels.</i>
525	00:30:41:09	00:30:42:20	01:11	<i>And as a happy side effect,</i>

526	00:30:43:07	00:30:46:20	03:13	<i>They also lost about 10 pounds on average over six months.</i>
527	00:30:48:11	00:30:51:07	02:20	<i>And when we analyzed the changes in the gut bacteria,</i>
528	00:30:51:20	00:30:55:19	03:23	<i>we were able to detect shifts in the microbiome following these dietary interventions.</i>
529	00:30:56:21	00:31:00:06	03:09	<i>Bacteria associated with diabetes tended,</i>
530	00:31:00:12	00:31:03:14	03:02	on average, to go down in their levels. In most participants.
531	00:31:04:17	00:31:09:08	04:15	<i>Perhaps their gut bacteria may be changing to a more beneficial composition.</i>
532	00:31:10:08	00:31:14:00	03:16	That, of course, uh, needs to be verified in longer term trials,
533	00:31:14:02	00:31:15:20	01:18	which we are actually engaged in today.
534	00:31:17:19	00:31:21:13	03:18	And now we have a great opportunity to pinpoint which are the bacteria
535	00:31:21:15	00:31:25:02	03:11	inside this huge neighborhood of bacteria that resides within us
536	00:31:25:07	00:31:27:07	02:00	that are actually doing the good stuff.
537	00:31:28:15	00:31:33:14	04:23	<i>And this, in the future, could actually mean that we may have a capability</i>
538	00:31:33:21	00:31:38:08	04:11	<i>in complimenting the dietary approach with next generation probiotics</i>
539	00:31:38:20	00:31:41:20	03:00	that are actually able to drive
540	00:31:42:01	00:31:44:23	02:22	normalizing blood sugar levels

				and even reducing weight.
541	00:31:46:10	00:31:49:02	02:16	That's an important goal, because many of the probiotics
542	00:31:49:04	00:31:53:12	04:08	that are actually in use today haven't really been vetted by science.
543	00:31:54:10	00:31:58:02	03:16	<i>Some people experience real benefits, but most are untested.</i>
544	00:31:59:09	00:32:03:06	03:21	What Eran Elinav calls next generation probiotics, <i>Eran ... = Please check</i>
545	00:32:03:08	00:32:05:04	01:20	<i>I call targeted probiotics.</i>
546	00:32:05:10	00:32:09:19	04:09	<i>The idea that we could use specific bacteria for specific purposes.</i>
547	00:32:10:15	00:32:13:20	03:05	<i>Such bacteria could provide answers for other health issues</i>
548	00:32:13:23	00:32:16:19	02:20	<i>that currently don't have great treatment options.</i>
549	00:32:20:04	00:32:24:13	04:09	Cameron, age 11 MEDFIELD, MASSACHUSETTS
550	00:32:28:00	00:32:33:10	05:10	BOY: <i>I remember having to go to birthday parties and having to miss out on pizza,</i>
551	00:32:33:13	00:32:37:09	03:20	<i>the cake, maybe ice cream, and I would have to, like, bring my own things.</i>
552	00:32:39:02	00:32:40:02	01:00	Libby CAMERON'S MOTHER
553	00:32:40:04	00:32:44:09	04:05	<i>He was having a difficult time eating, even right at birth in the hospital.</i>
554	00:32:45:22	00:32:50:01	04:03	<i>It was tough to keep anything down, and he would</i>

				<i>just projectile vomit.</i>
555	00:32:50:19	00:32:52:09	01:14	And his face almost completely swelled up.
556	00:32:52:12	00:32:53:12	01:00	Brian CAMERON'S FATHER
557	00:32:53:14	00:32:55:00	01:10	His eyes swelled shut.
558	00:32:55:04	00:32:57:18	02:14	He would have tears rolling down his eyes.
559	00:32:57:20	00:32:59:11	01:15	But that was before we knew
560	00:33:00:09	00:33:01:20	01:11	<i>that he was a truly allergic kid.</i>
561	00:33:03:14	00:33:09:05	05:15	Nuts, milk, wheat, soy, sesame... Pretty much, like, everything it feels like.
562	00:33:10:01	00:33:11:19	01:18	<i>My mouth starts to tingle.</i>
563	00:33:12:11	00:33:16:20	04:09	And, like, feels really bad and then your body starts getting all lumpy
564	00:33:17:03	00:33:20:00	02:21	and starts bleeding from, like all that bumpy hives.
565	00:33:20:02	00:33:22:09	02:07	It's not very not a good, pretty sight at all.
566	00:33:24:03	00:33:25:19	01:16	(SIREN WAILING)
567	00:33:27:14	00:33:30:22	03:08	The first time I got the call, they were in the ambulance.
568	00:33:31:21	00:33:32:21	01:00	That was hard.
569	00:33:33:16	00:33:34:16	01:00	Stuck at work.
570	00:33:38:19	00:33:40:10	01:15	LIBBY: <i>I'll never forget this. I remembered this the other day.</i>
571	00:33:40:13	00:33:42:16	02:03	It was probably, like,

				one of the worst days.
572	00:33:43:00	00:33:44:01	01:01	Um...
573	00:33:44:12	00:33:46:14	02:02	<i>He was about five or six.</i>
574	00:33:47:08	00:33:48:12	01:04	<i>And he was crying.</i>
575	00:33:48:23	00:33:51:22	02:23	And you can just, kind of, see this light bulb go off in his head.
576	00:33:52:05	00:33:56:05	04:00	And he said, um, "You know, I'm never going to get better.
577	00:33:56:10	00:33:59:08	02:22	"Like, this is how I am, and it's never going to get better.
578	00:33:59:10	00:34:02:19	03:09	"I'm never going to be like, like everybody else."
579	00:34:03:00	00:34:05:01	02:01	And, um, he was just crying and he said, you know,
580	00:34:05:05	00:34:07:12	02:07	"Why... Why did God do this to me?"
581	00:34:11:12	00:34:13:05	01:17	<i>There was nothing. There was nothing for him.</i>
582	00:34:13:07	00:34:16:04	02:21	<i>And every day he seemed to get worse.</i>
583	00:34:19:05	00:34:21:05	02:00	Food allergy is a condition in which there's a change
584	00:34:21:08	00:34:22:16	01:08	Talal Chatila, MD - IMMUNOLOGIST HARVARD MEDICAL SCHOOL
585	00:34:22:18	00:34:26:11	03:17	in the immune system in the gut, and also a change in the microbiome.
586	00:34:27:15	00:34:30:08	02:17	<i>My lab has shown that children with food allergy</i>
587	00:34:30:12	00:34:34:20	04:08	<i>have bacterial microbes that are different from those</i>

				<i>of healthy children.</i>
588	00:34:35:11	00:34:40:22	05:11	<i>We found that one bacterium in particular, called <i>Subdoligranulum variabile</i>,</i>
589	00:34:41:05	00:34:45:20	04:15	<i>was either severely depleted, or missing in children with food allergies.</i>
590	00:34:46:05	00:34:49:07	03:02	<i>And that this bacterium protects against food allergy.</i>
591	00:34:51:18	00:34:56:04	04:10	<i>So in mice, treatment with this bacterium cures food allergy.</i>
592	00:35:00:05	00:35:05:03	04:22	<i>We should be able to translate these results to therapies for people with food allergy.</i>
593	00:35:07:06	00:35:08:21	01:15	<i>Can this happen in the next decade?</i>
594	00:35:09:07	00:35:10:07	01:00	Absolutely.
595	00:35:11:02	00:35:12:04	01:02	Here you go, bud.
596	00:35:12:11	00:35:13:22	01:11	Okay. Thank you.
597	00:35:15:10	00:35:18:12	03:02	<i>Right now, the magnitude of the problem is so huge</i>
598	00:35:18:19	00:35:22:19	04:00	<i>that we have to investigate alternative approaches to therapy,</i>
599	00:35:23:11	00:35:28:08	04:21	such as giving small amounts of the allergic foods, to build up tolerance.
600	00:35:33:13	00:35:34:19	01:06	CAMERON: Hello. WOMAN: Hi, guys.
601	00:35:34:21	00:35:36:01	01:04	LIBBY: Hi, Amy.
602	00:35:36:03	00:35:37:19	01:16	How was your week?

				Good.
603	00:35:37:22	00:35:38:22	01:00	Come on in.
604	00:35:39:07	00:35:43:20	04:13	I'm Amy Thieringer, and I am a integrative nutritionist and health coach.
605	00:35:43:23	00:35:45:00	01:01	Amy Thieringer NUTRITIONIST
606	00:35:46:03	00:35:50:02	03:23	<i>My goal and my mission is to help as many kids as I can.</i>
607	00:35:51:09	00:35:52:09	01:00	Pick a movie.
608	00:35:53:11	00:35:56:00	02:13	Any environmental stuff this week, maybe?
609	00:35:56:06	00:35:58:10	02:04	He just needs a couple of times, mostly just sniffy.
610	00:35:58:13	00:36:00:01	01:12	THIERINGER: Okay.
611	00:36:00:03	00:36:02:18	02:15	THIERINGER: <i>You know, it's... it's really difficult preparing yourself</i>
612	00:36:02:20	00:36:04:20	02:00	<i>to start having exposure to the food.</i>
613	00:36:05:18	00:36:08:14	02:20	<i>And they watch a video, because I don't want them thinking about what I'm doing.</i>
614	00:36:09:00	00:36:12:04	03:04	<i>And I put a poppy seed size speck on their chin.</i>
615	00:36:12:22	00:36:16:03	03:05	And I leave it on there for two minutes, and all is well.
616	00:36:16:05	00:36:18:19	02:14	The next time they come in, I put it on the middle of their lip,
617	00:36:19:15	00:36:20:16	01:01	and then they will lick it.

618	00:36:21:02	00:36:23:06	02:04	<i>And they do it at home every day.</i>
619	00:36:23:12	00:36:26:07	02:19	<i>And they increase the amount very slowly.</i>
620	00:36:29:11	00:36:31:18	02:07	LIBBY: We're going to do three tabs of the cashews.
621	00:36:32:22	00:36:39:06	06:08	They are so anxious about these foods that they go into this heightened state
622	00:36:39:15	00:36:41:21	02:06	and they can have a full blown anaphylactic reaction.
623	00:36:42:02	00:36:46:12	04:10	So we give them tools to help calm that anxiety response.
624	00:36:48:02	00:36:50:19	02:17	LIBBY: Okay. And if he gets a little nervous,
625	00:36:50:21	00:36:52:16	01:19	we do our tapping and say our mantra.
626	00:36:53:07	00:36:54:22	01:15	Remember, Amy taught you a new mantra?
627	00:36:55:02	00:36:56:13	01:11	Oh, yeah.
628	00:36:57:09	00:36:59:17	02:08	I am safe. I am happy. I am free.
629	00:37:00:00	00:37:01:13	01:13	I am safe. I am happy. I am free.
630	00:37:02:09	00:37:04:12	02:03	I am safe. I am happy. I am free.
631	00:37:04:15	00:37:06:09	01:18	I am safe. I am happy. I am free.
632	00:37:10:15	00:37:11:15	01:00	Here you go.

633	00:37:20:08	00:37:21:23	01:15	I mean, it's... it's really difficult.
634	00:37:22:02	00:37:23:13	01:11	Um...
635	00:37:24:07	00:37:28:20	04:13	But, I mean, just to... to see where he started and where he is right now.
636	00:37:29:01	00:37:32:07	03:06	What was it? Five months ago, you had cashews and we ended up in the hospital.
637	00:37:33:08	00:37:34:08	01:00	Now look at him.
638	00:37:34:16	00:37:35:18	01:02	He's had three cashews.
639	00:37:38:02	00:37:41:12	03:10	<i>CHATILA: Using small amounts of allergic foods to build up tolerance</i>
640	00:37:41:14	00:37:44:11	02:21	is effective in decreasing allergic reactions.
641	00:37:45:02	00:37:47:20	02:18	But in most cases it's not a cure.
642	00:37:49:09	00:37:52:10	03:01	<i>But the important thing is that we can use the gut microbes</i>
643	00:37:52:12	00:37:56:12	04:00	<i>to retrain the immune system of patients with food allergies.</i>
644	00:38:00:06	00:38:03:03	02:21	(SPEAKING SPANISH)
645	00:38:03:07	00:38:04:20	01:13	Adriana GLORIA'S DAUGHTER
646	00:38:04:22	00:38:08:08	03:10	GLORIA: <i>Adriana was quite an allergic kid and still is.</i>
647	00:38:08:14	00:38:09:17	01:03	(WHISTLING)
648	00:38:09:19	00:38:11:04	01:09	Yeah, yeah.
649	00:38:11:19	00:38:15:13	03:18	GLORIA: <i>I brought Adriana to my office</i>

				<i>when she was three weeks.</i>
650	00:38:15:15	00:38:19:02	03:11	<i>I couldn't stand being at home, watching her sleep.</i>
651	00:38:19:04	00:38:22:06	03:02	<i>But I couldn't leave her either, because I couldn't concentrate.</i>
652	00:38:22:12	00:38:24:13	02:01	(GLORIA HUMMING)
653	00:38:26:18	00:38:30:11	03:17	I grew up with her in in the lab. When I was little,
654	00:38:30:13	00:38:33:23	03:10	I used to play with her leftover dolphin stomachs
655	00:38:35:01	00:38:36:15	01:14	and pretend I was a scientist.
656	00:38:37:13	00:38:40:01	02:12	(SINGING IN FOREIGN LANGUAGE)
657	00:38:42:14	00:38:46:04	03:14	ADRIANA: <i>I still get allergies to dust...</i> GLORIA: <i>Mmm-hmm.</i>
658	00:38:46:09	00:38:48:00	01:15	ADRIANA: <i>...and, uh, season changes.</i>
659	00:38:49:21	00:38:51:21	02:00	And you had reflux. And I had reflux.
660	00:38:52:15	00:38:53:15	01:00	Pretty bad one.
661	00:38:54:06	00:38:55:20	01:14	(PLAYING UPBEAT TUNE)
662	00:38:56:10	00:39:00:15	04:05	GLORIA: <i>My daughter was born by C-section, and C-section are very useful.</i>
663	00:39:01:07	00:39:02:09	01:02	<i>They save lives.</i>
664	00:39:03:07	00:39:07:20	04:13	In the U. S., about a third of the babies are born

				by C-section.
665	00:39:08:06	00:39:12:07	04:01	But we know in many cases they are not medically indicated.
666	00:39:14:12	00:39:17:18	03:06	<i>There is a difference between babies born vaginally</i>
667	00:39:18:02	00:39:19:23	01:21	<i>and babies born by C-section.</i>
668	00:39:20:20	00:39:23:14	02:18	<i>C-section babies have higher rates of asthma,</i>
669	00:39:23:21	00:39:28:01	04:04	<i>allergies, diabetes, obesity, and many other illnesses.</i>
670	00:39:28:17	00:39:29:21	01:04	<i>The question is why.</i>
671	00:39:34:00	00:39:36:16	02:16	<i>The womb is mostly free of microbes.</i>
672	00:39:37:11	00:39:39:16	02:05	<i>So when the babies are born vaginally,</i>
673	00:39:40:09	00:39:43:01	02:16	<i>they first get covered with the mothers microbes</i>
674	00:39:43:12	00:39:45:12	02:00	<i>as they move down the birth canal.</i>
675	00:39:46:15	00:39:50:11	03:20	<i>These bugs become the starter of their own microbiome.</i>
676	00:39:52:08	00:39:54:05	01:21	<i>But babies born by C-section</i>
677	00:39:54:19	00:39:57:14	02:19	<i>only get their first microbes from the operating room.</i>
678	00:39:57:23	00:39:59:14	01:15	(BABY CRYING) <i>CS not available //</i> <i>Gloria AKA Maria Gloria Dominguez Bello, ok verified from End credits</i>
679	00:39:59:16	00:40:03:08	03:16	<i>My hypothesis is that this puts them</i>

680	00:40:03:10	00:40:05:19	02:09	<i>at a disadvantage from day one.</i>
681	00:40:06:09	00:40:08:09	02:00	(GLORIA SINGING IN SPANISH TO ADRIANNA) <i>Adrianna, Gloria's daughter, ok verified, OS at 00:38:03:16</i>
682	00:40:15:22	00:40:18:00	02:02	(GUITAR PLAYING)
683	00:40:18:04	00:40:21:00	02:20	(SINGING IN SPANISH)
684	00:40:25:16	00:40:26:16	01:00	ADRIANA: <i>Correct me if I'm wrong,</i>
685	00:40:26:18	00:40:29:22	03:04	but you started delving into this field,
686	00:40:30:00	00:40:34:03	04:03	and then there was this moment of looking back and saying,
687	00:40:34:10	00:40:37:06	02:20	"What if I didn't need that C-section?" <i>C-section = cesarean section, ok verified, https://www.webmd.com/baby/what-happens- during-c-section</i>
688	00:40:37:08	00:40:41:13	04:05	You know I was a victim of, you know,
689	00:40:41:15	00:40:44:03	02:12	the persuasion by the doctor
690	00:40:44:05	00:40:47:20	03:15	that I was too narrow, that the baby's head was big.
691	00:40:47:22	00:40:51:16	03:18	And, you know, in the end she wasn't big. She was normal.
692	00:40:51:18	00:40:54:02	02:08	Her head was normal and I'm not narrow.
693	00:40:54:04	00:40:56:04	02:00	(SINGING TOGETHER)
694	00:40:59:13	00:41:04:10	04:21	And then I found out that, you know, in my hospital,

695	00:41:04:13	00:41:08:01	03:12	uh, 50% of the women had C-sections.
696	00:41:08:05	00:41:10:05	02:00	(SINGING TOGETHER)
697	00:41:15:22	00:41:18:01	02:03	GLORIA: <i>I mean, they simply don't know</i>
698	00:41:18:03	00:41:21:14	03:11	<i>that the kids born by C-section are not the same.</i>
699	00:41:21:16	00:41:23:08	01:16	I think this guy... (SNEEZES)
700	00:41:23:10	00:41:25:02	01:16	...truly-- Bless you. Allergies.
701	00:41:25:08	00:41:27:21	02:13	(BOTH HUMMING)
702	00:41:30:11	00:41:32:04	01:17	(SONG ENDS)
703	00:41:32:06	00:41:33:15	01:09	(STRUMS SINGLE NOTE)
704	00:41:33:17	00:41:35:12	01:19	(ELEVATOR DINGS) (SPEAKING INDISTINCTLY)
705	00:41:35:14	00:41:37:13	01:23	GLORIA: <i>An important question is,</i>
706	00:41:37:15	00:41:40:00	02:09	<i>can we restore the microbial diversity</i>
707	00:41:40:02	00:41:42:13	02:11	<i>that is lost in C-section births?</i>
708	00:41:42:15	00:41:45:11	02:20	<i>And if so, will that lower the risks</i>
709	00:41:45:13	00:41:47:12	01:23	<i>of these chronic diseases?</i>
710	00:41:48:12	00:41:51:04	02:16	NYU LANGONE HOSPITAL

711	00:41:51:12	00:41:53:16	02:04	Nice to see you again.
712	00:41:53:18	00:41:54:23	01:05	So, ready?
713	00:41:55:01	00:41:56:10	01:09	Yes. GLORIA: Great.
714	00:41:56:12	00:41:59:21	03:09	GLORIA: <i>We began a study of C-sections</i>
715	00:41:59:23	00:42:04:06	04:07	<i>where we cover babies with their mom's vaginal fluid.</i>
716	00:42:04:08	00:42:06:10	02:02	(MACHINE HUMMING)
717	00:42:07:03	00:42:09:00	01:21	<i>An hour before the operation,</i>
718	00:42:09:02	00:42:12:21	03:19	<i>we fold a sterile gauze like a tampon,</i>
719	00:42:12:23	00:42:15:06	02:07	<i>and insert it in the vaginal canal.</i>
720	00:42:15:08	00:42:17:01	01:17	GLORIA: This ain't a tampon.
721	00:42:19:13	00:42:22:10	02:21	You have the gauze? The gauze is the most important.
722	00:42:23:05	00:42:24:05	01:00	What gauze?
723	00:42:24:07	00:42:26:02	01:19	Yeah, this is... Here is the gauze.
724	00:42:27:06	00:42:30:09	03:03	(UPBEAT MUSIC PLAYING)
725	00:42:30:11	00:42:32:16	02:05	(SPEAKING INDISTINCTLY)
726	00:42:34:09	00:42:35:09	01:00	(DIGITAL BEEPING)
727	00:42:35:15	00:42:38:08	02:17	So the gauze is first, then we will examine.
728	00:42:38:10	00:42:39:22	01:12	Then swab a little more.

729	00:42:51:02	00:42:53:01	01:23	(SPEAKING INDISTINCTLY)
730	00:42:58:00	00:42:59:00	01:00	MAN: It's a girl.
731	00:42:59:05	00:43:01:12	02:07	(WOMEN EXCLAIMING) Girl! (BABY CRYING)
732	00:43:07:02	00:43:10:15	03:13	GLORIA: <i>Later, when we examined their poop,</i>
733	00:43:10:17	00:43:13:14	02:21	<i>we found that their microbiomes looked more like</i>
734	00:43:13:16	00:43:16:06	02:14	<i>in those babies born vaginally.</i>
735	00:43:17:11	00:43:19:04	01:17	(INDISTINCT CHATTER)
736	00:43:22:10	00:43:23:10	01:00	Okay, Mommy.
737	00:43:24:02	00:43:25:23	01:21	You made such a beautiful baby.
738	00:43:26:01	00:43:27:04	01:03	(MAN CHUCKLING)
739	00:43:28:14	00:43:30:10	01:20	Bye! I hope you got everything you needed.
740	00:43:30:12	00:43:31:17	01:05	I hope it all went well.
741	00:43:31:19	00:43:33:09	01:14	GLORIA: Perfect. Thank you so much.
742	00:43:33:11	00:43:34:18	01:07	NURSE: Good. Have a great day.
743	00:43:34:20	00:43:35:20	01:00	GLORIA: Thank you.
744	00:43:41:09	00:43:45:00	03:15	GLORIA: <i>There are many ways to boost good microbes in babies,</i>
745	00:43:45:02	00:43:49:02	04:00	<i>but the most important one is breastfeeding.</i>
746	00:43:49:04	00:43:52:02	02:22	<i>No matter how they are born, it's associated with</i>

747	00:43:52:04	00:43:55:07	03:03	<i>a decrease in those diseases.</i> (BABY GURGLING)
748	00:43:58:17	00:44:02:18	04:01	<i>Swabbing can help restore C-section babies' microbes.</i>
749	00:44:02:20	00:44:05:01	02:05	(MAKING PLAYFUL NOISES)
750	00:44:05:03	00:44:09:23	04:20	<i>But right now it's not safe outside clinical trials,</i>
751	00:44:10:01	00:44:12:17	02:16	<i>so it's going to take years before we know</i>
752	00:44:12:19	00:44:15:00	02:05	<i>if it reduces disease rates.</i>
753	00:44:15:06	00:44:18:06	03:00	<i>And by then, we may already have better ways</i>
754	00:44:18:08	00:44:19:19	01:11	<i>to restore microbiomes.</i>
755	00:44:19:21	00:44:22:05	02:08	(COOING)
756	00:44:22:07	00:44:23:14	01:07	(CHUCKLING)
757	00:44:28:19	00:44:33:14	04:19	MASSACHUSETTS GENERAL HOSPITAL
758	00:44:37:19	00:44:38:20	01:01	(KEYCARD BEEPS)
759	00:44:38:22	00:44:42:16	03:18	My doctor called and said, "Wow, a colleague of mine
760	00:44:42:18	00:44:45:20	03:02	"is doing this clinical trial in Boston at Mass General
761	00:44:45:22	00:44:50:03	04:05	"and they're doing FMTs, but they're doing this to see
762	00:44:50:05	00:44:52:21	02:16	"if there's a correlation between the gut flora
763	00:44:52:23	00:44:56:03	03:04	"and obesity, and how it affects the whole system."

764	00:44:56:05	00:44:57:10	01:05	(SCALE CREAKING)
765	00:44:57:12	00:44:58:19	01:07	All right. What do you think? <i>Libby, ok verified from end credits.</i>
766	00:44:58:21	00:45:00:15	01:18	Two hundred, yeah. <i>Theresa, ok verified from End Credits.</i>
767	00:45:01:01	00:45:02:22	01:21	Oh, way less than that.
768	00:45:03:09	00:45:05:15	02:06	(METAL SCRAPING)
769	00:45:09:13	00:45:11:02	01:13	So, 199.
770	00:45:11:04	00:45:12:16	01:12	Any fevers at all? THERESA: No.
771	00:45:12:19	00:45:14:03	01:08	Elizabeth Hohmann, MD INFECTIOUS DISEASE SPECIALIST
772	00:45:14:05	00:45:17:00	02:19	HOHMANN: <i>The microbiome is still an unexplored space</i>
773	00:45:17:02	00:45:19:11	02:09	that we know so little about.
774	00:45:20:06	00:45:23:21	03:15	YU: <i>We are conducting a trial in 24 obese subjects</i> <i>Yu AKA Elaine Yu, ok verified from End Credits</i>
775	00:45:23:23	00:45:24:23	01:00	Elaine Yu, MD ENDOCRINOLOGIST
776	00:45:25:13	00:45:28:07	02:18	to determine whether changing the type
777	00:45:28:09	00:45:32:21	04:12	of gut bacteria that the obese study subjects have

778	00:45:32:23	00:45:34:08	01:09	can potentially change
779	00:45:34:10	00:45:38:08	03:22	their body weight and also their metabolism.
780	00:45:38:21	00:45:40:11	01:14	Okay, so you ready? THERESA: I'm ready.
781	00:45:40:13	00:45:43:01	02:12	All right. I'm just going to warm them up a little bit.
782	00:45:43:03	00:45:44:06	01:03	And... Uh-huh.
783	00:45:44:08	00:45:47:12	03:04	Each one with a big... big gulp of water.
784	00:45:47:14	00:45:50:01	02:11	<i>YU: The participant will be receiving capsules</i>
785	00:45:50:03	00:45:52:01	01:22	<i>that are created with donor material.</i>
786	00:45:52:03	00:45:53:14	01:11	Stool samples, essentially,
787	00:45:53:16	00:45:56:03	02:11	from lean, metabolically healthy donors.
788	00:45:57:00	00:46:00:10	03:10	<i>Whenever you propose giving someone a capsule</i>
789	00:46:00:12	00:46:02:15	02:03	which contains stool material.
790	00:46:02:17	00:46:04:14	01:21	There could be potentially a yuck factor
791	00:46:04:16	00:46:06:16	02:00	associated with that and some hesitation.
792	00:46:07:07	00:46:09:06	01:23	HOHMANN: Oh, you're doing two at a time, wow. THERESA: Yeah.

793	00:46:10:23	00:46:13:10	02:11	THERESA: <i>Fifteen pills is a lot of pills.</i> (CHUCKLES) HOHMANN: Yeah.
794	00:46:13:12	00:46:15:14	02:02	So if I can do two at a time, I will.
795	00:46:15:17	00:46:17:02	01:09	I told my husband, I said, "Honey,
796	00:46:17:04	00:46:18:23	01:19	"you can actually see it's brown.
797	00:46:19:01	00:46:22:02	03:01	(CHUCKLING) "It's like you're literally swallowing shit."
798	00:46:22:04	00:46:25:01	02:21	(CHUCKLES) HOHMANN: <i>I've heard every poop joke there is.</i>
799	00:46:25:12	00:46:28:00	02:12	<i>Crapsules is the most common one.</i>
800	00:46:28:02	00:46:29:22	01:20	<i>It just sort of rolls off the tongue.</i>
801	00:46:30:12	00:46:33:00	02:12	The trial is designed so that 12 subjects
802	00:46:33:02	00:46:35:09	02:07	will be receiving the active capsules,
803	00:46:35:11	00:46:37:04	01:17	and the other 12 will be receiving
804	00:46:37:06	00:46:40:07	03:01	a placebo capsule with an inert substance.
805	00:46:40:09	00:46:41:11	01:02	(LID POPS)
806	00:46:42:16	00:46:44:16	02:00	HOHMANN: <i>Our goal was to make the placebo pills</i>
807	00:46:44:18	00:46:48:03	03:09	look as close to the real capsules as possible.
808	00:46:48:19	00:46:52:19	04:00	<i>And we ended up finding that just regular old cocoa powder</i>

809	00:46:52:21	00:46:55:23	03:02	<i>with some gelatin added was the best.</i>
810	00:46:58:18	00:46:59:21	01:03	<i>They're very good placebos.</i>
811	00:46:59:23	00:47:02:12	02:13	Honestly, I cannot tell the difference.
812	00:47:02:14	00:47:03:14	01:00	(BABY EXCLAIMS)
813	00:47:03:16	00:47:07:16	04:00	(CHUCKLING) I love you. Mommy missed you today.
814	00:47:08:19	00:47:11:03	02:08	THERESA: <i>I am very productive and very busy.</i>
815	00:47:11:05	00:47:16:10	05:05	<i>So the weight affects that, too, because I'm doing 12 hour shifts</i>
816	00:47:16:12	00:47:21:13	05:01	<i>on my feet as a nurse, I feel it on my feet, my calves,</i>
817	00:47:22:17	00:47:26:17	04:00	chub rub, (CHUCKLES) you know, the thighs rub.
818	00:47:30:01	00:47:33:11	03:10	<i>This clinical trial is something that could be so huge</i>
819	00:47:33:13	00:47:36:02	02:13	<i>for so many people, not just obesity.</i>
820	00:47:36:04	00:47:40:00	03:20	<i>You know, people with Crohn's, colitis, diabetes,</i>
821	00:47:40:02	00:47:42:11	02:09	<i>and high blood pressure and cholesterol.</i>
822	00:47:42:13	00:47:46:10	03:21	But for me personally, it's hoping to get back down to
823	00:47:46:12	00:47:47:13	01:01	my normal weight.
824	00:47:51:22	00:47:54:17	02:19	BLASER: <i>Theresa's medical issues began when she developed</i>

				Marty AKA Martin Blaser, ok verified from End Credits.
825	00:47:54:19	00:47:56:23	02:04	<i>a C. Diff. infection that couldn't be treated</i> C. Diff. infection, ok verified, https://www.webmd.com/digestive-disorders/clostridium-difficile-colitis
826	00:47:57:01	00:47:58:10	01:09	<i>with antibiotics.</i> Marty AKA Martin Blaser, ok verified from End Credits.
827	00:47:58:12	00:47:59:20	01:08	<i>And this brings up another threat,</i>
828	00:47:59:22	00:48:02:19	02:21	<i>that comes from the overuse of antibiotics,</i>
829	00:48:02:21	00:48:04:20	01:23	<i>antibiotic resistant bacteria.</i>
830	00:48:06:08	00:48:10:11	04:03	<i>A healthy microbiome is one with a wide variety of microbes,</i>
831	00:48:10:13	00:48:12:05	01:16	<i>all balancing each other.</i>
832	00:48:13:18	00:48:16:16	02:22	<i>But, after we carpet bomb our microbes,</i>
833	00:48:16:18	00:48:18:15	01:21	<i>some that are resistant to the antibiotic</i>
834	00:48:18:17	00:48:20:12	01:19	<i>survive and they multiply.</i>
835	00:48:21:18	00:48:25:02	03:08	<i>And this can make the antibiotic less likely to work next time.</i>
836	00:48:30:01	00:48:33:05	03:04	<i>70-80% of all antibiotics used in the United States</i>
837	00:48:33:07	00:48:35:12	02:05	<i>are used on the farm...</i> (PIGS SQUEALING)

838	00:48:35:14	00:48:38:19	03:05	<i>...and our meat is a little cheaper as a result.</i>
839	00:48:38:21	00:48:40:09	01:12	<i>But there's a disadvantage.</i>
840	00:48:40:11	00:48:43:10	02:23	<i>Those animals are carrying resistant bacteria.</i>
841	00:48:43:22	00:48:45:21	01:23	<i>And there's a lot of evidence</i>
842	00:48:45:23	00:48:48:14	02:15	<i>that these now are being transferred over to people.</i>
843	00:48:49:02	00:48:53:16	04:14	Drug resistant diseases claim the lives of around 700,000 people each year.
844	00:48:53:18	00:48:57:21	04:03	Now that's expected to leap to 10 million by 2050.
845	00:48:57:23	00:48:59:23	02:00	Compare that with today's deaths from cancer,
846	00:49:00:01	00:49:01:19	01:18	8.2 million each year.
847	00:49:01:21	00:49:05:14	03:17	Antibiotic resistance is one of the biggest health threats
848	00:49:05:16	00:49:06:23	01:07	we have around the world.
849	00:49:09:02	00:49:11:04	02:02	BLASER: <i>The Covid pandemic has been devastating.</i>
850	00:49:12:19	00:49:15:04	02:09	<i>But a pandemic of drug-resistant bacteria</i>
851	00:49:15:06	00:49:16:18	01:12	<i>could be even worse.</i>
852	00:49:16:20	00:49:18:17	01:21	<i>It could sweep through the population</i>
853	00:49:18:19	00:49:20:17	01:22	<i>just like COVID-19.</i>
854	00:49:20:19	00:49:23:03	02:08	<i>It's what I've called antibiotic winter.</i>

855	00:49:24:12	00:49:26:19	02:07	You remember those roadrunner cartoons
856	00:49:26:21	00:49:29:00	02:03	<i>where they're racing along the plateau</i>
857	00:49:29:02	00:49:31:05	02:03	and you can see that there's a cliff ahead,
858	00:49:31:07	00:49:33:06	01:23	<i>and you're wondering, when are they going to slow down,</i>
859	00:49:33:08	00:49:35:05	01:21	<i>or are they going to go over the cliff?</i>
860	00:49:35:07	00:49:37:23	02:16	(WILE E. COYOTE CRASHES) <i>WILE E. COYOTE, cartoon character, ok verified, https://chuckjones.com/characters/wile-e-coyote/</i>
861	00:49:43:13	00:49:46:08	02:19	U.S. DEPT. OF HEALTH AND HUMAN SERVICES
862	00:49:46:10	00:49:48:05	01:19	WASHINGTON, D.C.
863	00:49:48:09	00:49:51:21	03:12	BLASER: <i>I was appointed to chair the president's advisory council</i>
864	00:49:51:23	00:49:54:23	03:00	<i>to combat antibiotic resistant bacteria.</i>
865	00:49:55:01	00:49:57:14	02:13	<i>And our mandate is to provide advice</i>
866	00:49:57:16	00:49:59:20	02:04	<i>to the secretary of Health and Human Services,</i>
867	00:49:59:22	00:50:01:16	01:18	<i>to the president of the United States,</i>
868	00:50:01:18	00:50:04:22	03:04	<i>about how to control antibiotic resistance.</i>
869	00:50:05:00	00:50:07:07	02:07	(GAVEL BANGS) It's an opportunity

870	00:50:07:09	00:50:10:18	03:09	to tackle a big problem that is big now
871	00:50:10:20	00:50:12:23	02:03	and threatens to become much worse
872	00:50:13:01	00:50:15:00	01:23	unless we can do something about it.
873	00:50:15:02	00:50:17:07	02:05	Good morning. My name is Alicia Cole, <i>Alicia Cole, ok verified from End Credits.</i>
874	00:50:17:09	00:50:21:00	03:15	and I'm a survivor of sepsis pseudomonas, MRSA,
875	00:50:21:02	00:50:24:01	02:23	VRE, and necrotizing fasciitis.
876	00:50:24:03	00:50:26:18	02:15	BLASER: Alicia contracted those deadly bacteria,
877	00:50:26:20	00:50:29:18	02:22	<i>as so many people do, in the hospital.</i>
878	00:50:29:20	00:50:31:06	01:10	<i>After the infection started,</i>
879	00:50:31:08	00:50:34:10	03:02	<i>the antibiotics they gave her couldn't stop its spread.</i>
880	00:50:34:12	00:50:37:21	03:09	The infection was spreading about an inch every hour.
881	00:50:39:20	00:50:42:11	02:15	<i>I've never felt that kind of pain</i>
882	00:50:42:23	00:50:44:21	01:22	ever in my life.
883	00:50:45:22	00:50:48:06	02:08	<i>Many people don't survive</i>
884	00:50:48:08	00:50:51:00	02:16	<i>battles with antibiotic-resistant bugs.</i>
885	00:50:51:23	00:50:54:00	02:01	<i>I'm so lucky.</i>
886	00:50:54:21	00:50:57:15	02:18	(THRILLING INSTRUMENTAL MUSIC PLAYING)
887	00:50:57:17	00:50:58:19	01:02	BLASER:

				<i>All of modern medicine</i>
888	00:50:58:21	00:51:01:11	02:14	<i>is based on having antibiotics that work.</i>
889	00:51:01:13	00:51:03:16	02:03	<i>If we don't have antibiotics that work,</i>
890	00:51:03:18	00:51:05:17	01:23	<i>surgery becomes too risky,</i>
891	00:51:05:19	00:51:08:11	02:16	<i>transplantation becomes too risky,</i>
892	00:51:08:13	00:51:10:21	02:08	<i>chemotherapy becomes too risky.</i>
893	00:51:10:23	00:51:13:15	02:16	<i>And if they stop working because of resistance,</i>
894	00:51:13:17	00:51:15:21	02:04	<i>all these things go away.</i>
895	00:51:15:23	00:51:20:02	04:03	<i>The solution is that we have to steward our antibiotics better.</i>
896	00:51:20:17	00:51:23:13	02:20	<i>We have to use them only when they are needed,</i>
897	00:51:23:15	00:51:26:03	02:12	<i>and not when they're not.</i>
898	00:51:27:17	00:51:29:14	01:21	50% of antibiotics are medically useless
899	00:51:29:16	00:51:30:21	01:05	Inappropriate antibiotic use may approach
900	00:51:30:23	00:51:31:23	01:00	50% of all outpatient use -CDC <i>Narrative adjusted due to time constriction</i>
901	00:51:32:01	00:51:33:03	01:02	BLASER: <i>You know, we have to devote</i>
902	00:51:33:06	00:51:35:15	02:09	<i>sufficient resources to deal with this problem,</i>
903	00:51:35:17	00:51:38:14	02:21	<i>not just in the US, but everywhere in the world.</i>

904	00:51:38:16	00:51:41:01	02:09	That's one of the goals of the advisory council.
905	00:51:41:03	00:51:43:04	02:01	I remind everybody
906	00:51:43:06	00:51:47:01	03:19	that microbes do not respect political boundaries.
907	00:51:48:00	00:51:51:04	03:04	NEWS ANCHOR: <i>60,000 newborns a year in India</i>
908	00:51:51:06	00:51:54:00	02:18	<i>die from drug resistant infections,</i>
909	00:51:54:02	00:51:57:13	03:11	<i>as one antibiotic after another has failed.</i>
910	00:51:57:15	00:52:01:01	03:10	Drug resistant forms of diseases are on the rise in China,
911	00:52:01:03	00:52:03:07	02:04	because of the overuse of antibiotics.
912	00:52:04:01	00:52:07:12	03:11	BLASER: <i>As much as we're using antibiotics in the US,</i>
913	00:52:07:14	00:52:11:22	04:08	<i>in China, they are using them about five times more per person.</i>
914	00:52:12:00	00:52:13:01	01:01	<i>That's scary.</i>
915	00:52:14:21	00:52:17:18	02:21	Okay, here we go. You got your bag?
916	00:52:18:20	00:52:21:01	02:05	(DOOR CREAKS)
917	00:52:21:03	00:52:22:23	01:20	(WHEELS SQUEAKING)
918	00:52:25:00	00:52:26:21	01:21	(ENGINE WHIRRING)
919	00:52:26:23	00:52:29:12	02:13	BLASER: <i>If we got all of our ducks in a row,</i>
920	00:52:29:14	00:52:32:06	02:16	<i>and we really cut down on antibiotic use...</i>
921	00:52:32:08	00:52:35:21	03:13	<i>Because of the enormous use in other countries,</i>

922	00:52:35:23	00:52:37:10	01:11	<i>especially in Asia,</i>
923	00:52:38:04	00:52:40:21	02:17	<i>we'd still be vulnerable to superbugs.</i>
924	00:52:43:02	00:52:46:18	03:16	SHANGHAI
925	00:52:47:20	00:52:49:03	01:07	Nice to see you. I'm Mr. Gut. <i>Mr. Gut AKA Lan Canhui, ok verified from End Credits</i>
926	00:52:49:08	00:52:50:19	01:11	So nice to meet you. (PEOPLE LAUGHING)
927	00:52:50:21	00:52:52:12	01:15	Lan Canhui, aka Mr. Gut- BLOGGER /PODCASTER ON DIGESTIVE HEALTH
928	00:52:52:23	00:52:54:14	01:15	When Marty's book arrived in China,
929	00:52:54:16	00:52:55:20	01:04	I was shocked.
930	00:52:55:22	00:52:58:17	02:19	I felt the need to raise awareness
931	00:52:58:19	00:53:01:08	02:13	about our disappearing microbes.
932	00:53:02:08	00:53:05:04	02:20	Doctors are starting to accept this theory
933	00:53:05:06	00:53:08:00	02:18	and understand the consequences.
934	00:53:08:22	00:53:10:01	01:03	MR. GUT: (IN ENGLISH) Professor Martin Blaser.
935	00:53:10:04	00:53:11:04	01:00	MR. GUT'S LIVESTREAM EVENT
936	00:53:11:06	00:53:12:07	01:01	(CROWD CLAPPING)
937	00:53:12:09	00:53:13:18	01:09	BLASER: Thank you very much,

				Mr. Gut.
938	00:53:13:20	00:53:15:17	01:21	I'm very happy to be here in China. <i>China, country, ok verified,</i> <i>https://www.britannica.com/place/China</i>
939	00:53:16:04	00:53:19:18	03:14	So today, I talk about our missing microbes.
940	00:53:19:20	00:53:22:10	02:14	I think there are many causes.
941	00:53:22:12	00:53:24:09	01:21	But I'm going to highlight just one,
942	00:53:24:11	00:53:25:12	01:01	and that's antibiotics.
943	00:53:25:14	00:53:27:11	01:21	BLASER: <i>Colleagues of mine from China</i>
944	00:53:27:13	00:53:29:04	01:15	<i>tell me that when they were growing up</i>
945	00:53:29:06	00:53:30:06	01:00	and they had a headache,
946	00:53:30:08	00:53:32:03	01:19	their mom would take them to the pharmacy
947	00:53:32:05	00:53:34:01	01:20	and they would get an antibiotic,
948	00:53:34:03	00:53:37:16	03:13	because the idea was that an antibiotic could treat anything.
949	00:53:38:16	00:53:40:18	02:02	<i>This overuse of antibiotics in China</i>
950	00:53:40:20	00:53:43:17	02:21	<i>came at a time of other big impacts to our bugs,</i>
951	00:53:43:19	00:53:47:05	03:10	<i>like eating rich and fatty food, more meat.</i>

952	00:53:47:07	00:53:50:10	03:03	<i>And moving off of farms and into cities.</i>
953	00:53:50:12	00:53:52:23	02:11	<i>And just like what happened in the U.S. some decades earlier,</i>
954	00:53:53:02	00:53:54:02	01:00	RISING DISEASE RATES IN CHINA
955	00:53:54:04	00:53:58:23	04:19	<i>China soon had dramatic increases in obesity and other chronic illnesses.</i>
956	00:54:00:10	00:54:02:10	02:00	So when the mother takes antibiotics,
957	00:54:02:12	00:54:04:18	02:06	she's changing her microbiota.
958	00:54:04:20	00:54:06:16	01:20	And she might be affecting the fetus.
959	00:54:06:18	00:54:07:23	01:05	Because of the changes.
960	00:54:08:01	00:54:12:06	04:05	<i>GLORIA: The C-section rate in China is about 50 percent.</i>
961	00:54:12:08	00:54:15:16	03:08	<i>That's very high. And could be another factor</i>
962	00:54:15:18	00:54:18:10	02:16	<i>in their skyrocketing disease rates.</i> (INDISTINCT CONVERSATION)
963	00:54:19:23	00:54:23:23	04:00	You've written about using vaginal swabs after C-sections.
964	00:54:24:01	00:54:25:22	01:21	What percentage of U.S. hospitals
965	00:54:26:00	00:54:28:03	02:03	are using this practice?
966	00:54:28:05	00:54:30:12	02:07	(IN ENGLISH) No hospitals are doing it,
967	00:54:31:06	00:54:35:08	04:02	because we don't know if it protects the babies
968	00:54:35:10	00:54:39:03	03:17	against the risks

				associated with C-sections.
969	00:54:39:11	00:54:41:15	02:04	(ELECTRONIC MUSIC PLAYING)
970	00:54:45:05	00:54:47:09	02:04	BLASER: <i>We've been running, running, running the whole time.</i>
971	00:54:49:19	00:54:52:08	02:13	I've never repeated my talk so many times.
972	00:54:52:10	00:54:56:18	04:08	Vaginally, vaginally, vaginally vaginal birth, vagina.
973	00:55:02:04	00:55:04:07	02:03	BLASER: Our idea is that these microbes
974	00:55:04:09	00:55:06:06	01:21	know how to talk to us,
975	00:55:06:08	00:55:08:21	02:13	and to receive conversation back.
976	00:55:08:23	00:55:11:08	02:09	And now, something has changed.
977	00:55:11:10	00:55:12:16	01:06	(ELECTRONIC MUSIC CONTINUES PLAYING)
978	00:55:23:02	00:55:24:02	01:00	(SIGHS WEARILY)
979	00:55:27:06	00:55:28:20	01:14	(BOTH CHUCKLE)
980	00:55:29:12	00:55:30:20	01:08	Is this a good shot?
981	00:55:32:14	00:55:34:12	01:22	(MOTOR WHIRRING IN DISTANCE)
982	00:55:39:16	00:55:41:18	02:02	BLASER: <i>Our next stop is Beijing.</i>
983	00:55:43:05	00:55:46:07	03:02	<i>There's a growing body of work about autism.</i>
984	00:55:46:09	00:55:48:23	02:14	<i>Of the diseases that affect the brain,</i>
985	00:55:49:01	00:55:51:07	02:06	that's the one

				I'm most interested in,
986	00:55:51:09	00:55:54:03	02:18	because autism is a disease of early life.
987	00:55:54:05	00:55:56:15	02:10	It has to be forming in early life.
988	00:55:56:17	00:56:00:05	03:12	And it's... The rate of autism has gone up tremendously.
989	00:56:00:09	00:56:02:04	01:19	Autism rates continue to climb, and experts don't exactly know
990	00:56:02:06	00:56:04:10	02:04	<i>It's not genes. Our genes haven't changed,</i>
991	00:56:04:12	00:56:06:03	01:15	<i>but something environmental has changed.</i>
992	00:56:06:05	00:56:07:06	01:01	Millions of People Likely to Have Autism in China
993	00:56:07:08	00:56:10:02	02:18	<i>And I think the main environmental thing is the microbiome.</i>
994	00:56:12:02	00:56:13:15	01:13	<i>We know it's a two-way street.</i>
995	00:56:13:17	00:56:16:06	02:13	<i>Your mood and your anxiety influence your gut.</i>
996	00:56:17:02	00:56:20:02	03:00	<i>And now we know more and more that events in the gut</i>
997	00:56:20:04	00:56:21:13	01:09	<i>influence the brain,</i>
998	00:56:21:15	00:56:24:10	02:19	<i>especially as driven by microbes.</i>
999	00:56:24:12	00:56:27:04	02:16	<i>For example, gut microbes affect cells</i>
1000	00:56:27:06	00:56:30:12	03:06	<i>in the intestinal wall that make serotonin.</i>
1001	00:56:31:02	00:56:33:03	02:01	<i>And that's involved in brain development</i>

1002	00:56:33:05	00:56:35:09	02:04	<i>and also helps regulate emotions.</i>
1003	00:56:36:06	00:56:39:10	03:04	<i>We call this interplay the gut-brain axis.</i>
1004	00:56:40:07	00:56:41:10	01:03	<i>And there are a number of other people</i>
1005	00:56:41:12	00:56:43:07	01:19	<i>who are interested in the same problem.</i>
1006	00:56:43:09	00:56:44:11	01:02	Hi.
1007	00:56:44:13	00:56:46:08	01:19	You Xin, MD RHEUMATOLOGIST
1008	00:56:46:19	00:56:52:08	05:13	Do antibiotics and C-sections <i>You Xin, ok verified from End Credits</i>
1009	00:56:52:10	00:56:55:02	02:16	contribute to the rise of autism?
1010	00:56:56:07	00:56:58:04	01:21	We believe so, yes.
1011	00:56:58:06	00:57:03:04	04:22	But we're collecting data to verify this.
1012	00:57:05:12	00:57:07:02	01:14	(XIN AND SON SPEAKING MANDARIN)
1013	00:57:08:20	00:57:12:09	03:13	Tongtong DR. YOU'S SON
1014	00:57:16:02	00:57:20:03	04:01	Three months into my pregnancy, I got severe bronchitis.
1015	00:57:21:02	00:57:24:23	03:21	So I had to take penicillin for about two weeks.
1016	00:57:26:11	00:57:31:06	04:19	And then I got a C-section at 34 weeks.
1017	00:57:31:11	00:57:33:01	01:14	(MAN SPEAKS IN MANDARIN)
1018	00:57:33:19	00:57:36:00	02:05	After I learned how important
1019	00:57:36:02	00:57:39:11	03:09	the microbiome is to development,

1020	00:57:40:12	00:57:42:18	02:06	I had regrets.
1021	00:57:46:08	00:57:50:02	03:18	So as a doctor, I felt I must do something.
1022	00:57:55:15	00:57:57:05	01:14	In the spring of 2015,
1023	00:57:57:09	00:58:01:19	04:10	my son received his first fecal microbiota transplant.
1024	00:58:05:14	00:58:08:06	02:16	A few hours after the procedure,
1025	00:58:08:08	00:58:10:09	02:01	he showed obvious improvements.
1026	00:58:11:11	00:58:16:06	04:19	That's when I decided to focus my research on gut microbes.
1027	00:58:17:20	00:58:21:03	03:07	Actually, even in the olden days,
1028	00:58:21:06	00:58:22:20	01:14	we had doctors who used similar methods.
1029	00:58:22:22	00:58:25:00	02:02	For example, Yellow Dragon Soup
1030	00:58:25:02	00:58:29:02	04:00	was a mixture of fecal bacteria and urine.
1031	00:58:29:04	00:58:33:01	03:21	It was used to treat diarrhea.
1032	00:58:37:02	00:58:41:14	04:12	BLASER: (IN ENGLISH) <i>The medical community is rightfully cautious about FMTs.</i>
1033	00:58:42:16	00:58:45:20	03:04	<i>But kids with autism often have intestinal problems.</i>
1034	00:58:46:14	00:58:48:22	02:08	<i>Many scientists suspect their symptoms</i>
1035	00:58:49:00	00:58:51:12	02:12	<i>reflect differences in the microbes they carry.</i>
1036	00:58:52:09	00:58:53:23	01:14	<i>This makes it even more difficult</i>
1037	00:58:54:01	00:58:56:22	02:21	<i>to educate them and it affects</i>

				<i>their behavior.</i>
1038	00:58:58:12	00:58:59:12	01:00	(INDISTINCT CHATTER)
1039	00:58:59:14	00:59:02:10	02:20	This is the hospital. Very big and modern hospital.
1040	00:59:02:12	00:59:03:16	01:04	PEKING UNION MEDICAL COLLEGE HOSPITAL
1041	00:59:05:02	00:59:06:15	01:13	<i>So we're curious about the work</i>
1042	00:59:06:17	00:59:09:03	02:10	<i>being done by doctors around the world,</i>
1043	00:59:09:05	00:59:11:01	01:20	<i>like Dr. You Xin,</i>
1044	00:59:11:03	00:59:13:15	02:12	<i>who are trying whatever they can to help families</i>
1045	00:59:13:17	00:59:16:20	03:03	<i>with sick children who are really desperate.</i>
1046	00:59:17:10	00:59:19:22	02:12	BLASER: Your regular work is rheumatology? XIN: Yes.
1047	00:59:20:01	00:59:22:00	01:23	I have to use my spare time
1048	00:59:22:02	00:59:24:05	02:03	to see these patients.
1049	00:59:25:07	00:59:27:03	01:20	Food intervention is the first.
1050	00:59:28:02	00:59:32:14	04:12	No rice, no wheat, no food full of carbohydrates.
1051	00:59:34:01	00:59:38:00	03:23	If there are still huge limitations for speech,
1052	00:59:38:12	00:59:42:14	04:02	then we will suggest to the strong therapy
1053	00:59:42:16	00:59:44:08	01:16	like fecal transplantation.
1054	00:59:45:18	00:59:48:18	03:00	BLASER: <i>What Xin is doing is impressive and important.</i>

1055	00:59:49:03	00:59:51:16	02:13	<i>Three million children in China have autism,</i>
1056	00:59:52:12	00:59:54:18	02:06	<i>and her waiting list is very long.</i>
1057	00:59:54:22	00:59:57:01	02:03	(INDISTINCT MURMURING)
1058	01:00:06:12	01:00:08:07	01:19	(DOOR OPENS)
1059	01:00:08:09	01:00:09:11	01:02	(SPEAKING MANDARIN)
1060	01:00:09:15	01:00:12:11	02:20	Ningning, age 9
1061	01:00:12:17	01:00:15:15	02:22	Li NINGNING'S MOTHER
1062	01:00:20:19	01:00:24:02	03:07	Ningning was premature and was born by C-section. <i>Li, ok as per burn in</i>
1063	01:00:24:18	01:00:27:13	02:19	He was born with aspiration pneumonia.
1064	01:00:28:08	01:00:32:15	04:07	It took the strongest antibiotics to save his life.
1065	01:00:36:10	01:00:39:20	03:10	I took him for a checkup when he was two years old.
1066	01:00:41:01	01:00:43:20	02:19	I was told by the doctor that he had autism.
1067	01:00:48:11	01:00:54:11	06:00	(SPEAKING MANDARIN)
1068	01:01:03:03	01:01:05:18	02:15	His emotional problems can be very severe.
1069	01:01:07:20	01:01:09:20	02:00	He can't say what he feels inside.
1070	01:01:10:17	01:01:11:21	01:04	He just can't.
1071	01:01:19:19	01:01:21:08	01:13	Even learning a little bit would be great,
1072	01:01:21:10	01:01:23:13	02:03	but he can't control his emotions.

1073	01:01:26:03	01:01:30:22	04:19	How can he live without us in the future?
1074	01:01:34:04	01:01:40:11	06:07	There is no treatment that can cure autism.
1075	01:01:40:13	01:01:44:16	04:03	So I decided we have to try anything.
1076	01:01:44:20	01:01:46:11	01:15	(TRUNK CLOSES)
1077	01:01:47:03	01:01:49:16	02:13	Then a friend introduced me to Dr. You Xin.
1078	01:01:56:08	01:01:59:12	03:04	I hope we can help this boy. <i>Dr. Xin, okay as per Burn in</i>
1079	01:01:59:14	01:02:03:20	04:06	His poor complexion means his digestive system is not working properly.
1080	01:02:04:00	01:02:10:14	06:14	She thought that his symptoms could be related to his gut microbes.
1081	01:02:11:01	01:02:14:04	03:03	She suggested we begin dietary treatment.
1082	01:02:19:04	01:02:24:02	04:22	It's been two months, but we haven't seen much change.
1083	01:02:26:09	01:02:29:22	03:13	So, Dr. You Xin recommended a fecal microbiota transplant,
1084	01:02:30:00	01:02:32:10	02:10	and said this treatment could help him a lot.
1085	01:02:42:09	01:02:46:10	04:01	(NURSES SPEAKING IN MANDARIN)
1086	01:02:47:12	01:02:49:05	01:17	Ningning, listen to me, hold still.
1087	01:02:49:08	01:02:52:06	02:22	Or they will have to poke you again.
1088	01:02:54:02	01:02:57:06	03:04	It's okay, it's fine now.
1089	01:03:01:20	01:03:05:07	03:11	(MACHINE BEEPING)

1090	01:03:29:06	01:03:31:06	02:00	-You can go see your child now. -Okay.
1091	01:03:36:18	01:03:40:15	03:21	Let him keep sleeping. Don't wake him up.
1092	01:03:40:17	01:03:46:16	05:23	If he wakes, the fecal transplant cells may come out when he moves.
1093	01:03:47:13	01:03:51:19	04:06	(MACHINERY BEEPING)
1094	01:04:07:23	01:04:12:17	04:18	They told me everything went well.
1095	01:04:16:10	01:04:17:17	01:07	Yes, he needs his rest.
1096	01:04:33:03	01:04:35:19	02:16	(SLOW THEME MUSIC PLAYS)
1097	01:04:36:04	01:04:37:22	01:18	GLORIA: (IN ENGLISH) <i>After we got back from China,</i> China, ok https://www.britannica.com/place/China Gloria Dominguez-Bello, ok https://www.imdb.com/title/tt7322624/
1098	01:04:38:05	01:04:41:01	02:20	<i>I took a position at Rutgers University.</i> Rutgers University, ok https://www.rutgers.edu/
1099	01:04:42:09	01:04:44:21	02:12	<i>So, I have to move the collection of microbes.</i>
1100	01:04:47:09	01:04:48:19	01:10	(GARAGE DOOR WHIRRING)
1101	01:04:48:21	01:04:50:03	01:06	Come here a sec.
1102	01:04:51:08	01:04:53:18	02:10	<i>My collection survived three hurricanes,</i>
1103	01:04:54:02	01:04:56:02	02:00	<i>including Sandy in New York,</i> New York, ok https://www.nyc.gov/

				<i>Hurricane Sandy, ok</i> <i>https://www.britannica.com/event/Superstorm-Sandy</i>
1104	01:04:56:07	01:04:58:10	02:03	<i>which was a miracle.</i> Okay, which way are we going?
1105	01:04:58:14	01:04:59:16	01:02	This way. Okay.
1106	01:04:59:18	01:05:04:00	04:06	GLORIA: <i>We have to safeguard those microbes before they go extinct.</i>
1107	01:05:04:02	01:05:05:09	01:07	We have to open this...
1108	01:05:05:12	01:05:08:09	02:21	<i>Because one day we will know which ones we can use to</i>
1109	01:05:08:12	01:05:12:12	04:00	<i>prevent or cure asthma, allergies, and other diseases.</i>
1110	01:05:12:14	01:05:13:15	01:01	GLORIA: This way.
1111	01:05:14:05	01:05:15:13	01:08	I'll open the door for you.
1112	01:05:15:16	01:05:19:11	03:19	<i>It could be wars, tidal waves, political chaos.</i>
1113	01:05:19:17	01:05:22:08	02:15	<i>We never know what could cut off our access</i>
1114	01:05:22:14	01:05:25:21	03:07	<i>to isolated peoples, or destroy our collection.</i>
1115	01:05:26:02	01:05:28:07	02:05	(GLASS CLINKING)
1116	01:05:29:21	01:05:33:11	03:14	<i>What would we do if we don't have those microbes anymore?</i>

1117	01:05:34:15	01:05:36:10	01:19	Got it. <i>It's really too much to</i>
1118	01:05:36:15	01:05:38:19	02:04	<i>be on the shoulders of one person.</i>
1119	01:05:40:16	01:05:42:18	02:02	Did you plug it? Yes.
1120	01:05:42:22	01:05:44:01	01:03	Great.
1121	01:05:45:00	01:05:47:20	02:20	GLORIA: <i>We found that one freezer was failing.</i>
1122	01:05:48:16	01:05:51:18	03:02	Raising the temperature and going up and down.
1123	01:05:52:01	01:05:55:17	03:16	If you can find out what's wrong with this freezer and we fix it...
1124	01:05:55:19	01:05:58:00	02:05	Yeah, I just gotta call my office. Okay.
1125	01:05:58:14	01:06:01:15	03:01	We... We have to find ways to preserve this
1126	01:06:01:19	01:06:05:10	03:15	that it is not, you know, my individual responsibility.
1127	01:06:08:23	01:06:11:23	03:00	Just look at the landscape around us and how remote
1128	01:06:12:04	01:06:13:04	01:00	Arwa Damon Sr. International Correspondent
1129	01:06:13:07	01:06:15:10	02:03	this is, and then jutting out of the side of
1130	01:06:15:12	01:06:19:05	03:17	this Arctic mountain is the Svalbard Global Seed Vault.

				<p>Arctic, ok https://www.britannica.com/place/Arctic</p> <p>Svalbard Global Seed Vault, ok https://www.croptrust.org/our-work/svalbard-global-seed-vault/</p>
1131	01:06:20:11	01:06:24:03	03:16	<p>GLORIA: <i>There is an example which is The Crop Trust.</i></p> <p>Crop Trust, ok https://www.croptrust.org/our-work/svalbard-global-seed-vault/</p>
1132	01:06:24:07	01:06:26:07	02:00	<i>It's a vault of seeds.</i>
1133	01:06:27:06	01:06:31:04	03:22	<i>And, uh, that is very inspiring, because it's the first example of</i>
1134	01:06:31:09	01:06:33:11	02:02	<i>preserving biodiversity.</i>
1135	01:06:34:15	01:06:36:01	01:10	They are doing it for seeds
1136	01:06:36:03	01:06:40:11	04:08	of plants in the world, we want to do it for the human microbiome.
1137	01:06:48:23	01:06:54:04	05:05	FMT / OBESITY TRIAL WEEK 26
1138	01:06:56:01	01:06:58:07	02:06	HOHMANN: Hi, how are you doing? Good to see you again.
1139	01:06:58:11	01:07:00:08	01:21	How did today's visit go upstairs?
1140	01:07:00:16	01:07:02:07	01:15	Um... (CLEARS THROAT)
1141	01:07:02:22	01:07:05:05	02:07	Well... I'm already going to get emotional, because
1142	01:07:05:10	01:07:07:02	01:16	I prepared myself coming in
1143	01:07:07:04	01:07:09:05	02:01	to have results

				of the placebo.
1144	01:07:09:11	01:07:12:17	03:06	But when they weighed me, I actually gained 4.4 pounds.
1145	01:07:12:22	01:07:15:07	02:09	Well, I'll just cut to the chase for ya.
1146	01:07:15:10	01:07:16:22	01:12	Mm-hmm. You know, I guess I'm
1147	01:07:17:04	01:07:19:16	02:12	sad to tell you that you did get placebo.
1148	01:07:21:01	01:07:25:23	04:22	Um, as you know it was a 50-50 chance and, uh,
1149	01:07:26:16	01:07:31:21	05:05	I was actually hopeful that you'd gotten the real thing, so to speak.
1150	01:07:32:07	01:07:34:18	02:11	Oh, man, that's definitely not the case.
1151	01:07:35:22	01:07:38:13	02:15	That was just still (CLEARS THROAT) a lot of time,
1152	01:07:38:19	01:07:41:00	02:05	(BREATH TREMBLING) a lot of work, a lot of driving.
1153	01:07:41:19	01:07:43:22	02:03	A lot of... you know,
1154	01:07:44:06	01:07:46:22	02:16	lifestyle changes, because me and my husband did wanna start
1155	01:07:47:04	01:07:49:17	02:13	to have another baby, so we put that on hold.
1156	01:07:50:23	01:07:53:11	02:12	To do this... (CLEARS THROAT) um...
1157	01:07:54:07	01:07:57:14	03:07	And obviously, I couldn't diet during it, so it just kinda...

1158	01:07:58:02	01:08:00:11	02:09	backs everything up. (SNIFFLES)
1159	01:08:02:00	01:08:04:04	02:04	(SOMBER INSTRUMENTAL MUSIC PLAYING)
1160	01:08:09:17	01:08:11:10	01:17	I think we all have
1161	01:08:11:16	01:08:13:18	02:02	optimistic view points about this...
1162	01:08:13:22	01:08:16:18	02:20	this kind of thing, or we wouldn't be doing it.
1163	01:08:17:15	01:08:20:19	03:04	<i>It's gonna be helpful for science</i>
1164	01:08:20:21	01:08:24:14	03:17	<i>to advance our knowledge of the microbiome and how it affects people.</i>
1165	01:08:26:05	01:08:27:13	01:08	Stay in touch. I will.
1166	01:08:27:18	01:08:28:22	01:04	Thank you. HOHMANN: <i>On the other hand,</i>
1167	01:08:29:01	01:08:31:21	02:20	it's not fun telling somebody they got a placebo,
1168	01:08:32:00	01:08:34:04	02:04	when they were hoping to get the active therapy
1169	01:08:34:07	01:08:36:17	02:10	in a... in a project like this.
1170	01:08:41:18	01:08:44:15	02:21	THERESA: <i>I don't have regrets about doing the clinical trial.</i>
1171	01:08:47:07	01:08:50:00	02:17	'Cause it can make a difference in someone's life.
1172	01:08:54:21	01:08:57:00	02:03	YU: <i>Unfortunately, we didn't see any weight loss,</i>

1173	01:08:57:06	01:09:00:11	03:05	<p><i>of the participants who received the FMT.</i></p> <p><i>FMT - Fecal Microbiota Transplant, ok https://www.childrenshospital.org/treatments/fmt</i></p>
1174	01:09:00:22	01:09:04:05	03:07	Usually, there is a series of failures before you can actually get to success.
1175	01:09:04:07	01:09:05:15	01:08	<i>But the important point</i>
1176	01:09:05:20	01:09:09:16	03:20	<i>is to learn as much as you can from the failures.</i>
1177	01:09:09:19	01:09:12:05	02:10	<i>Try and figure out, "Well, why did we fail?"</i>
1178	01:09:12:07	01:09:13:15	01:08	(KEYBOARD CLACKING)
1179	01:09:13:19	01:09:16:21	03:02	<i>There's still a lot of important information you can glean from this</i>
1180	01:09:17:00	01:09:20:17	03:17	<i>to design the next study to be better and more targeted.</i>
1181	01:09:20:22	01:09:22:18	01:20	<i>To move the field forward.</i>
1182	01:09:23:12	01:09:24:22	01:10	Wow, that's exciting.
1183	01:09:25:04	01:09:26:14	01:10	I know, that's why there's...
1184	01:09:26:17	01:09:28:08	01:15	LIBBY: Cam, what's so good about today?
1185	01:09:28:15	01:09:31:20	03:05	<p>I get to try and Reese's Peanut Butter Cup for the first time.</p> <p><i>Reese's, ok https://www.hersheyland.com/reeses</i></p>
1186	01:09:31:22	01:09:33:18	01:20	I'm really, like, excited to try it,

1187	01:09:33:20	01:09:35:21	02:01	because I've never exactly had it before.
1188	01:09:35:23	01:09:38:01	02:02	And I've never really had the opportunity.
1189	01:09:38:03	01:09:39:08	01:05	So, yeah, I'm pretty excited.
1190	01:09:39:11	01:09:40:18	01:07	LIBBY: Awesome. How long have you been
1191	01:09:40:20	01:09:42:07	01:11	waiting to have a Reese's Peanut Butter Cup?
1192	01:09:42:10	01:09:44:09	01:23	Um, my whole life, probably, yeah.
1193	01:09:50:10	01:09:51:23	01:13	It's... It's pretty good.
1194	01:09:52:23	01:09:54:02	01:03	BRIAN: High-five!
1195	01:09:56:17	01:09:58:14	01:21	(GIGGLING) Sorry.
1196	01:09:58:16	01:10:00:04	01:12	Cut.
1197	01:10:00:07	01:10:01:12	01:05	(ENCHANTING INSTRUMENTAL MUSIC PLAYING)
1198	01:10:01:17	01:10:03:03	01:10	THIERINGER: <i>It's a commitment.</i>
1199	01:10:03:14	01:10:07:13	03:23	<i>It takes years to work through allergies like Cam has,</i> <i>Cam aka Cameron, ok Burn In</i>
1200	01:10:08:01	01:10:09:20	01:19	<i>and it's different for everybody.</i>
1201	01:10:15:11	01:10:17:15	02:04	BRIAN: <i>He couldn't eat so many things for so long,</i>
1202	01:10:17:18	01:10:19:22	02:04	<i>he's now turned into what I would describe as a "foodie".</i>
1203	01:10:21:11	01:10:23:14	02:03	He loves watching

				cooking shows,
1204	01:10:23:17	01:10:26:09	02:16	and he has aspirations of being a chef.
1205	01:10:28:07	01:10:30:07	02:00	I'm making guacamole.
1206	01:10:30:20	01:10:32:07	01:11	Yay!
1207	01:10:32:12	01:10:33:22	01:10	My favorite thing to make.
1208	01:10:34:03	01:10:35:17	01:14	Get out the whole thing, really.
1209	01:10:36:12	01:10:37:17	01:05	Put it in there. Get this one here.
1210	01:10:37:20	01:10:39:00	01:04	Cam continues to eat many foods
1211	01:10:39:02	01:10:40:07	01:05	that used to cause allergic reactions.
1212	01:10:40:22	01:10:43:18	02:20	(GLASS CLINKING) Now we're gonna smush this together here,
1213	01:10:43:22	01:10:47:04	03:06	until it's like smooth and tasty.
1214	01:10:49:06	01:10:51:19	02:13	Others, including most nuts,
1215	01:10:51:21	01:10:54:03	02:06	may still cause dangerous reactions.
1216	01:11:01:14	01:11:04:21	03:07	So, there you have it! Thank you for watching "Cameron's Kitchen", and
1217	01:11:05:02	01:11:08:12	03:10	here's my homemade guacamole!
1218	01:11:10:04	01:11:11:22	01:18	(CRUNCHING)
1219	01:11:13:16	01:11:14:19	01:03	Pretty good.
1220	01:11:18:13	01:11:22:03	03:14	<i>BLASER: Researchers in biotech firms are seeing promising results,</i>

				Marty Blaser, ok https://www.imdb.com/title/tt7322624/
1221	01:11:22:06	01:11:25:20	03:14	<i>when desensitization is combined with targeted probiotics.</i>
1222	01:11:26:10	01:11:27:12	01:02	<i>And with luck,</i>
1223	01:11:27:14	01:11:30:12	02:22	<i>such approaches could substitute for what we have now.</i>
1224	01:11:31:06	01:11:32:12	01:06	This gives us hope,
1225	01:11:32:19	01:11:36:22	04:03	that help is on the way for the more than 200 million people around the world
1226	01:11:37:00	01:11:39:03	02:03	who suffer from food allergies.
1227	01:11:39:12	01:11:42:02	02:14	(CROWD BUSTLING)
1228	01:11:44:05	01:11:48:16	04:11	Ningning has now had six monthly poop transplants
1229	01:11:49:11	01:11:51:13	02:02	(ANNOUNCER SPEAKING IN MANDARIN)
1230	01:11:51:20	01:11:52:22	01:02	Let's slow down, Mom.
1231	01:11:53:00	01:11:54:17	01:17	All right. And we'll go home after this, okay?
1232	01:11:54:19	01:11:55:19	01:00	Okay.
1233	01:11:57:05	01:11:58:06	01:01	Hello.
1234	01:11:59:10	01:12:01:04	01:18	Come, flip over your hand.
1235	01:12:02:09	01:12:03:09	01:00	The other one.
1236	01:12:04:14	01:12:05:15	01:01	Play with me.

1237	01:12:07:08	01:12:08:12	01:04	We've done FMT six times,
1238	01:12:08:23	01:12:10:15	01:16	what do you think of the treatment so far?
1239	01:12:10:18	01:12:11:18	01:00	He has shown great improvement.
1240	01:12:11:20	01:12:13:14	01:18	(SPEAKING MANDARIN)
1241	01:12:15:19	01:12:19:21	04:02	Compared to before, Ningning talks more.
1242	01:12:19:23	01:12:22:15	02:16	And he's able to express what he wants.
1243	01:12:25:08	01:12:28:07	02:23	His vocabulary is much richer.
1244	01:12:31:02	01:12:33:01	01:23	Repeat after me, here we go.
1245	01:12:36:19	01:12:38:15	01:20	(CONTINUES IN MANDARIN)
1246	01:12:41:12	01:12:45:00	03:12	His teachers evaluate the students
1247	01:12:45:03	01:12:48:09	03:06	at the end of the semester.
1248	01:12:48:20	01:12:51:11	02:15	And Ningning was the student
1249	01:12:51:13	01:12:54:14	03:01	who has made the most progress.
1250	01:12:55:22	01:12:58:01	02:03	And the fastest progress.
1251	01:12:58:21	01:13:01:03	02:06	You can ask Mumu yourself.
1252	01:13:01:19	01:13:03:19	02:00	Can I kiss you, Mumu?
1253	01:13:04:07	01:13:06:00	01:17	-May I. -May I?
1254	01:13:07:12	01:13:08:19	01:07	May Ningning kiss you?
1255	01:13:09:12	01:13:10:14	01:02	Yes.
1256	01:13:12:04	01:13:13:06	01:02	What about the other cheek?

1257	01:13:15:05	01:13:18:08	03:03	Now you can say, "We are good friends."
1258	01:13:20:23	01:13:23:01	02:02	As his abilities increase,
1259	01:13:23:04	01:13:24:15	01:11	he will be able to swallow pills.
1260	01:13:24:21	01:13:27:01	02:04	Then he can take FMT capsules.
1261	01:13:27:19	01:13:31:13	03:18	Taking FMT capsules is safer.
1262	01:13:32:03	01:13:37:01	04:22	(SPEAKING MANDARIN)
1263	01:13:38:05	01:13:39:20	01:15	Up to a few years ago,
1264	01:13:39:22	01:13:43:03	03:05	I thought autism was "untreatable."
1265	01:13:43:05	01:13:44:07	01:02	(SQUEALING)
1266	01:13:45:10	01:13:49:21	04:11	But our research and research from the U.S. have shown exciting results.
1267	01:13:51:23	01:13:54:05	02:06	I'm hopeful that in the not too distant future,
1268	01:13:54:07	01:13:57:01	02:18	the prognosis for autistic children can be improved.
1269	01:13:59:20	01:14:02:15	02:19	Dr. You began setting up a clinical trial
1270	01:14:02:17	01:14:06:00	03:07	for FMT and autism in late 2019.
1271	01:14:07:06	01:14:09:09	02:03	FEMALE REPORTER 1: (IN ENGLISH) <i>The mysterious Coronavirus has sickened</i> <i>Coronavirus, ok https://www.who.int/health-topics/coronavirus</i>
1272	01:14:09:12	01:14:10:14	01:02	DECEMBER, 2019
1273	01:14:10:16	01:14:13:22	03:06	<i>dozens of people in Asia and is linked to two deaths.</i>

				Asia, ok https://www.britannica.com/place/Asia
1274	01:14:14:02	01:14:18:03	04:01	<i>It's still unclear if the virus spreads from person to person...</i>
1275	01:14:18:23	01:14:19:23	01:00	JANUARY, 2020
1276	01:14:20:02	01:14:23:17	03:15	FEMALE REPORTER 2: <i>At least 132 people have died in China as a new Coronavirus</i>
1277	01:14:23:22	01:14:26:07	02:09	<i>extends beyond the country's border.</i>
1278	01:14:26:14	01:14:30:08	03:18	So far, here in America, there are no known cases. America, ok https://www.britannica.com/place/United-States
1279	01:14:30:18	01:14:32:10	01:16	FEMALE REPORTER 3: <i>The CDC confirmed the first</i> CDC aka Center of Disease Control ok https://www.cdc.gov/
1280	01:14:32:14	01:14:33:14	01:00	FEBRUARY, 2020
1281	01:14:33:16	01:14:36:07	02:15	<i>person to person transmission right here in the United States.</i>
1282	01:14:36:11	01:14:39:15	03:04	MALE REPORTER: <i>Several patients are in critical condition, already suffering</i>
1283	01:14:39:17	01:14:42:05	02:12	<i>from underlying health conditions.</i>
1284	01:14:42:14	01:14:44:23	02:09	<i>The U.S. now has more cases of Coronavirus than anywhere in the world.</i>
1285	01:14:45:01	01:14:46:01	01:00	MARCH, 2020
1286	01:14:47:09	01:14:50:14	03:05	BLASER: <i>If there was ever a moment that the power</i>

				<i>of microbes became</i>
1287	01:14:50:17	01:14:52:22	02:05	<i>evident to every person on the planet,</i>
1288	01:14:53:07	01:14:54:10	01:03	<i>this is it.</i>
1289	01:14:55:20	01:14:57:01	01:05	What's remarkable is
1290	01:14:57:04	01:14:58:04	01:00	APRIL 2020
1291	01:14:58:06	01:15:02:00	03:18	it's... it's an unprecedented time for scientists working together.
1292	01:15:02:06	01:15:05:16	03:10	So many scientists have dropped everything they were doing
1293	01:15:05:18	01:15:10:19	05:01	to work on COVID, because it... it's a war, and we've enlisted.
1294	01:15:12:18	01:15:15:14	02:20	GLORIA: <i>We have seen how diabetes and obesity</i>
1295	01:15:15:16	01:15:18:09	02:17	<i>increase the risk of having severe COVID,</i>
1296	01:15:18:16	01:15:20:03	01:11	<i>and dying from it.</i>
1297	01:15:22:08	01:15:26:05	03:21	BLASER: <i>Our microbiome evolved to defend us against invaders.</i>
1298	01:15:26:10	01:15:28:09	01:23	<i>And when the microbiome is perturbed,</i>
1299	01:15:28:18	01:15:31:00	02:06	<i>we have lost an important defense.</i>
1300	01:15:32:10	01:15:33:21	01:11	MAY, 2020
1301	01:15:34:02	01:15:36:07	02:05	We're going up Sixth Avenue. <i>Sixth Avenue, ok</i> <i>https://www.tripadvisor.in/Attraction_Review-g60763-d10759466-Reviews-</i>

				<i>Sixth Avenue Avenue_of_the_Americas-New_York_City_New_York.html</i>
1302	01:15:36:16	01:15:39:13	02:21	Not much traffic. City is empty.
1303	01:15:41:08	01:15:44:11	03:03	We've been collecting samples from healthcare workers,
1304	01:15:44:19	01:15:46:21	02:02	who are at high risk of getting the virus.
1305	01:15:47:18	01:15:50:15	02:21	BLASER: Yeah, I... No, I see the guy. GLORIA: Stop.
1306	01:15:52:04	01:15:54:13	02:09	BLASER: <i>Over time, we'll compare the microbes</i>
1307	01:15:54:18	01:15:57:05	02:11	<i>of those who were infected and had symptoms...</i>
1308	01:15:57:13	01:15:59:10	01:21	<i>to those who had no symptoms at all.</i>
1309	01:16:02:19	01:16:03:19	01:00	Researchers investigate gut microbiome
1310	01:16:03:21	01:16:04:22	01:01	and COVID-19 connection
1311	01:16:05:00	01:16:08:18	03:18	GLORIA: <i>Like many scientists, we are asking if a healthy microbiome</i>
1312	01:16:09:04	01:16:12:06	03:02	<i>protects us from the worst symptoms of the virus.</i>
1313	01:16:12:10	01:16:13:20	01:10	Can Gut Microbes Predict COVID-19 Severity?
1314	01:16:15:06	01:16:19:08	04:02	<i>Questions like this add more urgency to having a vault</i>
1315	01:16:19:18	01:16:23:00	03:06	<i>where we can preserve microbes safely.</i>
1316	01:16:25:00	01:16:26:23	01:23	(ENCHANTING INSTRUMENTAL MUSIC PLAYING)

1317	01:16:34:16	01:16:36:23	02:07	GSTAAD, SWITZERLAND
1318	01:16:37:01	01:16:38:19	01:18	GLORIA: Hi, my love. (BLASER SPEAKS OVER PHONE)
1319	01:16:39:00	01:16:41:05	02:05	Good morning. Look how beautiful.
1320	01:16:41:07	01:16:42:11	01:04	BLASER: (ON PHONE) <i>Wow, nice.</i>
1321	01:16:47:01	01:16:50:10	03:09	GLORIA: <i>We want a place where the collection can be safe.</i>
1322	01:16:51:23	01:16:57:06	05:07	<i>Safe from wars, destruction, events that are catastrophic.</i>
1323	01:16:57:20	01:17:00:05	02:09	<i>In a neutral country,</i>
1324	01:17:00:12	01:17:02:13	02:01	in a place where there are no hurricanes, or
1325	01:17:02:16	01:17:03:16	01:00	Manuel Fankhauser, PhD
1326	01:17:03:18	01:17:04:19	01:01	BIOENGINEER THE MICROBIOTA VAULT INITIATIVE
1327	01:17:04:21	01:17:07:03	02:06	major earthquakes hopefully. Not usually.
1328	01:17:10:06	01:17:12:20	02:14	GLORIA: <i>The idea was we needed to do something.</i>
1329	01:17:12:22	01:17:14:15	01:17	<i>And it grew and grew.</i>
1330	01:17:16:07	01:17:21:21	05:14	<i>And it triggered an immediate response from the press all over the world.</i>
1331	01:17:26:07	01:17:29:21	03:14	<i>So, we put together an international team of experts.</i>
1332	01:17:30:10	01:17:32:11	02:01	<i>And the goal is have to the vault</i>

1333	01:17:32:17	01:17:36:16	03:23	<i>store collections from many countries, from many institutions.</i>
1334	01:17:41:16	01:17:43:04	01:12	(WATER RUSHING)
1335	01:17:46:04	01:17:50:00	03:20	It is old Swiss Army ammunition deposition. <i>Swiss Army, ok</i> <i>https://www.vtg.admin.ch/en/home.html</i>
1336	01:17:50:07	01:17:53:14	03:07	And yeah, so one thing we have to be a bit mindful of is that (CHUCKLES)
1337	01:17:53:22	01:17:56:00	02:02	the Swiss Army is very...
1338	01:17:56:11	01:17:59:02	02:15	secretive, even though they're... they're... Oh.
1339	01:17:59:13	01:18:00:17	01:04	...declassified.
1340	01:18:02:21	01:18:06:04	03:07	The bad news is we're not actually allowed
1341	01:18:06:08	01:18:09:01	02:17	to film inside the bunker.
1342	01:18:22:07	01:18:26:08	04:01	It's a real bunker. Isn't it spectacular, just inside this, uh,
1343	01:18:26:12	01:18:29:16	03:04	<i>rock structure?</i> (DOOR CLICKS OPEN)
1344	01:18:29:23	01:18:31:22	01:23	GLORIA: <i>Oh, look at that.</i>
1345	01:18:32:04	01:18:34:23	02:19	<i>It's salt.</i> <i>Calcium salt.</i>

1346	01:18:35:23	01:18:38:04	02:05	MANUEL: <i>Yeah.</i> (IN SING-SONG VOICE) <i>Ah!</i> (ECHOES)
1347	01:18:38:16	01:18:39:20	01:04	<i>Ah!</i>
1348	01:18:40:20	01:18:43:10	02:14	<i>Oh! Beautiful.</i> <i>Acoustics.</i>
1349	01:18:44:04	01:18:46:11	02:07	<i>So there are...</i> <i>There's chamber one,</i>
1350	01:18:46:18	01:18:50:01	03:07	<i>two, three, three A, four.</i>
1351	01:18:53:19	01:18:56:06	02:11	<i>I don't know,</i> <i>this could be the place.</i>
1352	01:18:57:11	01:18:59:10	01:23	<i>I think it has everything</i> <i>we need.</i>
1353	01:19:08:19	01:19:13:01	04:06	<i>It's exciting to imagine</i> <i>the microbes may soon</i> <i>have a safe home.</i>
1354	01:19:13:16	01:19:18:06	04:14	<i>And that one day, they may</i> <i>cure or prevent diseases</i> <i>like diabetes,</i>
1355	01:19:18:09	01:19:19:11	01:02	<i>or asthma.</i>
1356	01:19:19:16	01:19:21:16	02:00	<i>Or even future diseases.</i>
1357	01:19:24:17	01:19:27:17	03:00	BLASER: <i>The big question is,</i> <i>what's the future gonna bring?</i>
1358	01:19:27:23	01:19:29:09	01:10	<i>Are we gonna reverse this?</i>
1359	01:19:29:16	01:19:32:16	03:00	And we need to find and implement solutions.
1360	01:19:33:02	01:19:37:08	04:06	Desperately. This... This is about your kids and your grandkids.
1361	01:19:37:12	01:19:39:01	01:13	How was school?
1362	01:19:40:04	01:19:42:02	01:22	(FAINTLY) <i>Yay!</i> BLASER: <i>But we believe we're</i>

				<i>in the early days</i>
1363	01:19:42:07	01:19:44:01	01:18	<i>of a scientific revolution,</i>
1364	01:19:44:03	01:19:46:00	01:21	<i>that will turn things around</i>
1365	01:19:46:05	01:19:48:18	02:13	<i>and change the way we look at the world.</i>
1366	01:19:49:00	01:19:50:03	01:03	(SOFT SCUFFLING)
1367	01:19:50:10	01:19:53:01	02:15	BLASER: Look at how those branches have curved up. You see that?
1368	01:19:53:06	01:19:57:02	03:20	Yeah. There is the trail. You can get home from here. Yeah.
1369	01:19:58:06	01:20:00:10	02:04	SCIENTISTS ARE IMPROVING DIAGNOSTIC TESTS
1370	01:20:00:12	01:20:03:17	03:05	TO DETERMINE WHEN PATIENTS TRULY NEED ANTIBIOTICS.
1371	01:20:06:18	01:20:08:11	01:17	SEGAL AND ELINAV'S PERSONALIZED DIET
1372	01:20:08:13	01:20:10:15	02:02	FOR DIABETES IS NOW AN APP
1373	01:20:10:18	01:20:13:06	02:12	USED BY ISRAEL'S TWO LARGEST HMOs.
1374	01:20:13:08	01:20:14:23	01:15	GLORIA: Oh! (LAUGHING)
1375	01:20:16:01	01:20:18:12	02:11	MICROBE THERAPIES ARE SHOWING PROMISE IN TREATING
1376	01:20:18:14	01:20:21:02	02:12	MANY OTHER HEALTH ISSUES, INCLUDING...
1377	01:20:22:14	01:20:24:17	02:03	ALZHEIMER'S, BACTERIAL VAGINOSIS,
1378	01:20:24:19	01:20:26:13	01:18	KIDNEY STONES, PARKINSON'S, MS,
1379	01:20:26:15	01:20:29:13	02:22	COLITIS, AND CANCER TREATMENT.

1380	01:20:30:18	01:20:32:01	01:07	RESEARCH IS ACCELERATING
1381	01:20:32:03	01:20:33:18	01:15	INTO WHETHER OUR MICROBES
1382	01:20:33:20	01:20:35:20	02:00	HELP PROJECT US FROM COVID.
1383	01:20:39:13	01:20:43:05	03:16	BLASER: <i>Bacteria have been the dominant form of life on Earth.</i> <i>Earth, ok https://www.britannica.com/place/Earth</i>
1384	01:20:44:05	01:20:48:00	03:19	<i>They're the oldest form of life, they're the most numerous form of life.</i>
1385	01:20:48:11	01:20:51:17	03:06	<i>Everything about human life depends on bacteria.</i>
1386	01:20:52:19	01:20:56:09	03:14	<i>And we're... we're just specks in a bacterial world.</i>
1387	01:21:05:06	01:21:08:22	03:16	GLORIA: <i>Every time we cheat nature, there is a price.</i>
1388	01:21:09:08	01:21:12:22	03:14	<i>But of course, we do it because we want to save lives.</i>
1389	01:21:13:18	01:21:15:17	01:23	<i>So, we ask ourselves,</i>
1390	01:21:15:19	01:21:18:10	02:15	<i>"How do we restore what we've lost?"</i>
1391	01:21:19:17	01:21:21:10	01:17	<i>And every day,</i>
1392	01:21:21:15	01:21:24:20	03:05	<i>science brings us closer and closer</i>
1393	01:21:25:00	01:21:26:11	01:11	<i>to the answers.</i>
1394	01:21:46:00	01:21:49:07	03:07	(UPBEAT INSTRUMENTAL MUSIC PLAYING)