

0000 00:00:00:00 00:00:00:08

0001 00:00:06:18 00:00:13:07

"An experienced surgeon  
knows when to cut or not to cut."

0002 00:00:13:11 00:00:19:13

You are lucky. This morning I fought with  
a journalist from the Swedish Television.

0003 00:00:19:17 00:00:22:19

She wanted an interview...

0004 00:00:24:01 00:00:29:07

...about the allegations,  
and we decided to do it now instead.

0005 00:00:32:24 00:00:38:24

This is Paolo Macchiarini,  
one of the world's best known surgeons-

0006 00:00:39:03 00:00:42:11

-in one of his most difficult moments.

0007 00:00:44:08 00:00:50:02

He had declined almost every interview,  
but he agreed to talk to me.

0008 00:00:50:06 00:00:54:06

Perhaps he was hoping  
to get an fair chance-

0009 00:00:54:10 00:00:59:10

-or that I at least would tell the story

with all its complexities.

0010 00:00:59:14 00:01:05:14

He has gained attention around the world  
using artificial windpipes in his transplants.

0011 00:01:06:02 00:01:10:24

Surgeons in Sweden have carried out  
the world's first transplant of a synthetic organ.

0012 00:01:11:03 00:01:15:09

An 11-year-old boy has had pioneering  
treatment to rebuild his windpipe...

0013 00:01:15:11 00:01:20:13

Macchiarini is trying come up with  
a solution to our lack of spare parts-

0014 00:01:20:15 00:01:23:14

-when something breaks inside our bodies.

0015 00:01:23:18 00:01:28:24

He has already tried to create  
the world's first windpipe out of plastic.

0016 00:01:29:04 00:01:31:20

In what seems like the plot  
from a science fiction novel-

0017 00:01:31:22 00:01:33:18

-researchers built a new windpipe...

0018 00:01:33:22 00:01:37:10

Soon all the organs can be built in a lab.

0019 00:01:38:19 00:01:44:21

So far 17 people around the world have received one of Macchiarini's windpipes.

0020 00:01:45:00 00:01:48:07

Soon you'll be able to live a normal life again.

0021 00:01:48:09 00:01:53:09

But many of them have died as a result.

0022 00:01:58:05 00:02:01:13

-Is it one of the biggest medical scandals?  
-Yeah.

0023 00:02:01:17 00:02:08:02

If you do experimental surgery on humans, and you know beforehand that it's a disaster...

0024 00:02:09:03 00:02:15:06

He has been accused of falsifying results and of experimenting on humans.

0025 00:02:15:10 00:02:19:01

Some of his operations are under police investigation-

0026 00:02:19:03 00:02:22:06

-for causing bodily harm, and for manslaughter.

0027 00:02:22:10 00:02:25:23

And yet he has got the support of the medical establishment.

0028 00:02:26:02 00:02:32:02

Paolo Macchiarini is not guilty of misconduct in his research.

0029 00:02:32:06 00:02:36:09

This means he is trusted  
by Karolinska institutet.

0030 00:02:36:18 00:02:42:20

So who is Paolo Macchiarini?  
Is he a genius, or is he a fraud?

0031 00:02:42:24 00:02:49:02

And how important is a human life  
at the cutting edge of medicine?

0032 00:02:49:06 00:02:53:19

The road towards the answers  
proves harder than expected.

0033 00:02:54:01 00:02:57:03

Can you switch off?

0034 00:02:58:13 00:03:02:04

This is really important to me also.

0035 00:03:04:05 00:03:07:13

Can you switch off this as well?

0036 00:03:07:17 00:03:11:02

This is the last time.

0037 00:03:11:06 00:03:17:24

-I didn't expect any of that from you.  
-But these questions must be asked.

0038 00:03:18:03 00:03:23:18

-The way you do it is very harsh.  
-But it's the only way...

0039 00:03:23:22 00:03:28:00

No, there are more gentle ways  
to ask things.

0040 00:03:28:04 00:03:33:12

-But you're not replying.  
-I'm not? Good luck.

0041 00:04:30:01 00:04:34:04

## THE EXPERIMENTS

0042 00:04:40:07 00:04:44:21

### PART 1: THE STAR SURGEON

0043 00:04:44:23 00:04:49:23

For me it all started at the end of 2014,  
when Macchiarini was accused-

0044 00:04:50:02 00:04:55:02

-of falsifying research results,  
and of gross misconduct.

0045 00:04:55:06 00:05:02:13

Could this really be true?  
At Karolinska, the home of the Nobel Prize?

0046 00:05:03:13 00:05:09:15

These were serious allegations.  
What if it was true?

0047 00:05:09:19 00:05:12:24

I decided to find out what had happened.

0048 00:05:16:01 00:05:22:04

Soon I got to meet Paolo Macchiarini

at his lab in Karolinska institutet, KI.

0049 00:05:28:00 00:05:30:15

So this...

0050 00:05:41:01 00:05:47:17

The tissue renewal lab is 2525?  
It doesn't work with my 2525.

0051 00:05:48:15 00:05:51:15

I got my first surprise right away.

0052 00:05:51:19 00:05:56:04

Macchiarini's base at KI  
seemed very small and modest.

0053 00:05:56:06 00:05:57:11

Thank you.

0054 00:05:57:13 00:06:02:04

But according to Macchiarini, big things  
were happening in this ordinary setting.

0055 00:06:02:06 00:06:09:16

This is, I think, the most advanced lab  
that we do have here-

0056 00:06:09:20 00:06:16:21

-in regenerative medicine, probably  
one of the most advanced in the world.

0057 00:06:17:00 00:06:21:09

We have a series of devices and tools-

0058 00:06:21:13 00:06:27:09

-to evaluate ex vivo, the organs,

whether biological or artificial.

0059 00:06:27:13 00:06:34:09

Here we do everything from the brain  
to the heart, lungs, kidneys, intestine-

0060 00:06:34:13 00:06:39:00

-to the urethra, and other... investigations.

0061 00:06:42:17 00:06:48:19

Untold numbers of people die each year  
when their organs cease to work.

0062 00:06:48:23 00:06:53:23

The lack of new organs is one  
of the biggest problems in the medical world.

0063 00:06:54:02 00:06:59:09

It is this riddle  
that Macchiarini is trying to solve.

0064 00:06:59:13 00:07:03:16

These containers hold organs from rats.

0065 00:07:03:20 00:07:08:09

Hearts, kidneys, oesophagi, and tracheas.

0066 00:07:08:13 00:07:11:16

Organs that will bathe in stem cells-

0067 00:07:11:20 00:07:18:19

-and, perhaps one day in the future,  
become new artificial organs.

0068 00:07:18:23 00:07:25:00

Macchiarini will revolutionise

the medical world if he succeeds.

0069 00:07:26:07 00:07:31:07

The lab may be small, but it is still  
Macchiarini's main base in the world.

0070 00:07:31:11 00:07:37:11

He travels constantly and collaborates  
with other scientists, especially in Russia.

0071 00:07:37:17 00:07:42:08

The findings here  
you may apply perhaps in Russia?

0072 00:07:42:12 00:07:48:00

The findings here will be available to everyone,  
because they will be published.

0073 00:07:48:04 00:07:53:10

But by sharing the information we can move...

0074 00:07:54:10 00:07:58:08

...at a higher speed and knowledge.

0075 00:07:58:10 00:08:04:17

But the reason behind the current pressure  
is his work in Stockholm.

0076 00:08:04:19 00:08:07:06

Attorney Chases Those Responsible  
for Deadly Windpipes

0077 00:08:07:08 00:08:08:06

Leading Surgeon Is Accused of Misconduct

0078 00:08:08:08 00:08:14:07

The Swedish Research Council  
is stopping all payments to Macchiarini.

0079 00:08:14:11 00:08:17:11

He is under investigation  
for falsifying research results.

0080 00:08:17:15 00:08:23:04

..illegal operations,  
and may be charged with manslaughter.

0081 00:08:25:17 00:08:27:19

Explain to me,  
what is my interest in...

0082 00:08:28:18 00:08:32:01

...doing illegal surgery or...

0083 00:08:32:05 00:08:38:10

...fabricating or manipulating data.  
That would be foolish.

0084 00:08:43:17 00:08:50:23

Being what the media calls me, a superstar,  
I am always Black Peter, the bad boy.

0085 00:08:52:08 00:08:56:19

Being famous, you're very easy to attack...

0086 00:08:56:23 00:09:00:16

...before even  
the final judgement has come.

0087 00:09:00:20 00:09:06:09

I think it's quite unfair,  
and it has destroyed my reputation.

0088 00:09:06:13 00:09:09:05

And my honourability.

0089 00:09:10:12 00:09:15:05

And you know exactly  
that media don't come back-

0090 00:09:15:09 00:09:20:02

-and they highlight the bad things,  
but not the good things.

0091 00:09:28:06 00:09:33:10

Macchiarini was headhunted  
to Karolinska in 2010-

0092 00:09:33:14 00:09:38:21

-to start up a centre for research  
and transplantation with new organs.

0093 00:09:38:23 00:09:41:08

Please welcome Professor Macchiarini.

0094 00:09:41:10 00:09:47:14

The world of academia competes over  
famous scientists like Macchiarini.

0095 00:09:49:09 00:09:56:03

Through top scientists, a university can hope  
to get bigger discoveries and bigger grants.

0096 00:09:58:02 00:10:01:01

The very best are recruited  
from all over the world.

0097 00:10:01:03 00:10:03:13

The local time is 5:55 pm...

0098 00:10:03:15 00:10:08:17

Russia has also invited Macchiarini.

0099 00:10:21:08 00:10:27:11

I travelled with Paolo to Krasnodar,  
his second base.

0100 00:10:30:09 00:10:34:00

It was the first of many journeys-

0101 00:10:34:04 00:10:40:12

-as Macchiarini's story was  
bigger and stranger than I had expected.

0102 00:10:40:21 00:10:42:13

-Hello!  
-Hello.

0103 00:10:42:17 00:10:46:09

-How are you?  
-I'm fine.

0104 00:10:48:09 00:10:51:09

-Like usually?  
-Like usually.

0105 00:11:00:04 00:11:04:22

-What are you working on, Paolo?  
-I'm working for the university.

0106 00:11:06:13 00:11:10:04

We are trying to create new organs.

0107 00:11:11:04 00:11:14:00

Like Frankenstein.

0108 00:11:18:02 00:11:24:09

It hit me how untouched Paolo seemed  
by the allegations.

0109 00:11:24:13 00:11:28:13

It was as if it was just a minor glitch.

0110 00:11:28:17 00:11:33:09

Macchiarini had his sights  
on something much bigger.

0111 00:11:33:24 00:11:39:20

My dream would be, as I was saying...  
to avoid the surgery.

0112 00:11:39:24 00:11:43:23

That's crazy, right,  
for a surgeon to be saying that, but...

0113 00:11:44:02 00:11:48:24

...to, for instance, use the cells to restore  
the function of an organ, that would be perfect.

0114 00:11:51:04 00:11:55:09

So cell therapy is, in my eyes, the future.

0115 00:11:57:10 00:12:03:13

Paolo was hoping to change the very  
foundations of modern medical care.

0116 00:12:04:22 00:12:09:23

-It's been a long fight for you to do this.  
-Oh yes.

0117 00:12:10:09 00:12:16:00

Do you feel that you're closer to succeeding now, than you've been before?

0118 00:12:17:00 00:12:24:11

If I had more time to delegate to science without dealing with all these other issues-

0119 00:12:24:15 00:12:29:21

-and complaints, and allegations, and attacks, and so forth, then yes.

0120 00:12:32:08 00:12:38:24

So the allegations and the complaints, they hinder your work, they take up a lot of time?

0121 00:12:39:03 00:12:42:05

Right now I'm doing almost only that-

0122 00:12:42:09 00:12:48:19

-so clearly I cannot have a relaxed and creative mind... right now.

0123 00:12:48:23 00:12:52:02

It's been going on for six months.

0124 00:12:52:23 00:12:56:04

Interesting. Something you can talk about?

0125 00:12:56:08 00:13:02:18

No, because the deal was that we would not talk about this. Do you remember that?

0126 00:13:02:20 00:13:08:20

Of course I remembered. Macchiarini let me into his world on one condition.

0127 00:13:08:24 00:13:13:24

He wanted to wait  
before commenting on the allegations.

0128 00:13:14:03 00:13:18:07

His Swedish employer, Karolinska institutet,  
was still investigating the case.

0129 00:13:18:11 00:13:21:11

And we had to let the process  
run its course.

0130 00:13:22:01 00:13:22:19

Perfect.

0131 00:13:22:21 00:13:25:24

Later he would give me all the answers.

0132 00:13:35:06 00:13:38:13

I like it. Changes...

0133 00:13:40:19 00:13:46:16

-See you later, or tomorrow morning.  
-Later or tomorrow morning at 6... 6:20.

0134 00:13:46:20 00:13:50:21

See you. Cheers, Paolo, it was really nice.

0135 00:14:14:15 00:14:17:18

Here in Southern Russia-

0136 00:14:17:22 00:14:22:24

-Paolo is creating a centre  
for transplantation and research.

0137 00:14:23:03 00:14:26:12

Completely Russian and also world-leading.

0138 00:14:30:04 00:14:35:14

The base of the project is Paolo's lab  
at the University of Krasnodar.

0139 00:14:49:20 00:14:54:08

Hello, how are you? Wait!  
Elena... Oh, I'm sorry.

0140 00:14:54:12 00:14:58:20

-We should come, because of...  
-Now? OK, then you...

0141 00:14:58:22 00:15:04:22

Elena Gubareva is the research director,  
and she has created an artificial diaphragm-

0142 00:15:05:01 00:15:08:01

-which is one of the muscles  
we use when we breathe.

0143 00:15:08:06 00:15:12:05

What she has done-

0144 00:15:13:01 00:15:18:10

-is transplanting the entire diaphragm  
on the left side, which is... incredible.

0145 00:15:18:14 00:15:22:00

Nobody has done that with that success rate.

0146 00:15:22:04 00:15:25:08

But... nobody believes it.

0147 00:15:26:07 00:15:30:07

Whether it is  
because it is coming from Russia-

0148 00:15:30:11 00:15:36:14

-whether it is because I'm  
under investigation of these... allegations-

0149 00:15:36:18 00:15:44:24

-whether it is because it's too incredible...  
So we're having problems publishing it.

0150 00:15:45:03 00:15:49:10

But you will see how it works,  
and so forth, and so forth...

0151 00:15:49:14 00:15:51:16

So that's...

0152 00:15:53:02 00:15:59:08

...part of the challenge of this new field,  
this high technology-

0153 00:15:59:12 00:16:06:06

-this new advanced field.  
Well, everything that's new scares us.

0154 00:16:06:10 00:16:08:20

It's like Mahatma Gandhi.

0155 00:16:08:24 00:16:13:15

First they don't believe you,  
then they criticise you, then they start to...

0156 00:16:13:19 00:16:19:18

And when you die...  
"Oh, maybe he was right." Or she.

0157 00:16:19:22 00:16:23:13

But I'm not Mahatma Gandhi.

0158 00:16:23:17 00:16:29:07

OK, I think you should take your coat now.

0159 00:16:30:18 00:16:33:11

Elena shows me the rest of the lab.

0160 00:16:33:13 00:16:37:17

This is a controversial part of  
medical research, and few are allowed in.

0161 00:16:38:01 00:16:41:10

OK, we should go to the animals.

0162 00:16:47:07 00:16:54:10

These are cages for big animals, for pigs,  
which will come here in the future.

0163 00:16:54:14 00:16:59:15

And these cages are for rabbits and rats.  
They live here.

0164 00:16:59:19 00:17:03:20

This is for different types of investigations.

0165 00:17:09:14 00:17:14:18

-Vasia. Are you ready?  
-Just a minute.

0166 00:17:14:22 00:17:22:13

OK. We will go to the surgical room  
to do all the steps of operation.

0167 00:17:22:17 00:17:26:01

-Did you anaesthetise them?

-Yes.

0168 00:17:26:05 00:17:32:17

Are they asleep? They anaesthetise rats.  
Now one of them is asleep.

0169 00:17:32:21 00:17:38:11

You can see...  
Now we will bring it to the surgical room.

0170 00:17:41:11 00:17:45:24

-Is it asleep? Will it work now? OK...  
-Yes.

0171 00:17:57:10 00:18:00:11

Experiments on cells alone  
are often not enough-

0172 00:18:00:15 00:18:05:16

-to gain knowledge of whether a treatment  
method will work in the human body.

0173 00:18:05:20 00:18:12:13

But if the experiments aren't performed  
on a person, you may need something else.

0174 00:18:14:14 00:18:19:14

It might seem cruel,  
and at times it really is.

0175 00:18:24:11 00:18:29:11

First you remove the diaphragm  
from the donor rat.

0176 00:18:31:03 00:18:38:15

The muscle is then washed in strong chemicals until all the donor cells are gone.

0177 00:18:38:19 00:18:43:04

You are then left with a dead scaffold of a diaphragm.

0178 00:18:46:10 00:18:51:15

The scaffold is submerged in a solution of stem cells-

0179 00:18:51:19 00:18:54:23

-from the rat that will receive the muscle.

0180 00:18:56:01 00:19:02:04

The receiver rat is then opened up, and the old diaphragm is removed.

0181 00:19:03:11 00:19:09:20

The new muscle scaffold is taken out of the bath and put into the receiver rat.

0182 00:19:11:20 00:19:17:21

The idea is that the stem cells will trigger the body to create a new organ.

0183 00:19:22:07 00:19:25:00

This is animals after treatment, and these two rats-

0184 00:19:25:04 00:19:31:04

-are rats after orthotopic transplant of the diaphragm after six months.

0185 00:19:31:08 00:19:38:13

They are absolutely healthy. They have no problem with their health.

0186 00:19:38:18 00:19:42:23

-These two are basically world unique?  
-Yes.

0187 00:19:43:02 00:19:45:07

-The first...  
-The first.

0188 00:19:45:09 00:19:52:24

These two rats are supposedly the first  
animals to breathe with an artificial muscle.

0189 00:19:53:05 00:19:59:09

A hundred years ago, everybody said  
that a heart transplant was impossible.

0190 00:19:59:13 00:20:02:13

But now we can see that heart transplants...

0191 00:20:02:17 00:20:07:07

...are not routine, but everybody knows  
that it's possible to do.

0192 00:20:07:11 00:20:12:14

It's very important never to stop,  
but to try to do everything that you can.

0193 00:20:12:18 00:20:15:12

-Bye.  
-Goodbye.

0194 00:20:15:14 00:20:19:14

The more I saw,  
the harder it was not to be impressed.

0195 00:20:19:18 00:20:25:18

What they tried to achieve was simply great.  
To Gubareva and Macchiarini-

0196 00:20:25:22 00:20:31:22

-it didn't seem to be a question of IF  
their new method would ever become reality-

0197 00:20:32:01 00:20:35:01

-but rather of WHEN  
the breakthrough would come.

0198 00:20:35:18 00:20:40:13

We started with the trachea, and now  
we are at the higher level of complexity-

0199 00:20:40:17 00:20:46:13

-because the oesophagus needs to contract,  
the diaphragm needs to contract-

0200 00:20:46:17 00:20:52:08

-so all these functional capacities  
need to be preserved.

0201 00:20:53:14 00:20:58:22

We do hope that, possibly,  
in the middle of next year-

0202 00:20:59:01 00:21:04:08

-we could think to, after having  
the Ethics Commission's clearance-

0203 00:21:04:12 00:21:07:20

-to have the green light to do it on humans.

0204 00:21:15:05 00:21:21:08

Paolo intends to go from rat to human

in just one year, which is very fast.

0205 00:21:23:15 00:21:30:03

During this time he will also need to test his new artificial muscles on other animals.

0206 00:21:35:20 00:21:43:10

In Sochi there is one of the world's largest facilities for experiments on monkeys.

0207 00:21:44:13 00:21:50:17

Previously secret departments of the Soviet defence were located here.

0208 00:21:50:21 00:21:56:21

Civilian scientists are now able to experiment on the thousands of monkeys that live here.

0209 00:21:58:23 00:22:04:05

But the preparations for Paolo's work here in Sochi had been delayed.

0210 00:22:04:09 00:22:08:06

Paolo seems stressed, and he urges them on.

0211 00:22:11:10 00:22:14:16

-Hello, how are you?  
-Nice to meet you.

0212 00:22:16:03 00:22:20:11

It's such a pleasure to meet you.

0213 00:22:20:15 00:22:24:00

We are about four months...

0214 00:22:24:04 00:22:27:21

We have a four months' delay  
in the time schedule.

0215 00:22:28:11 00:22:33:05

Because we haven't done  
that much progress since we started.

0216 00:22:33:09 00:22:38:16

And these research grants are so strict-

0217 00:22:38:20 00:22:44:07

-that if we don't provide results,  
we will not be able to continue.

0218 00:22:44:11 00:22:51:02

-It's probably...  
-It only lasts until the end of the year.

0219 00:22:51:06 00:22:55:06

She wanted to know what time it concerns.

0220 00:22:55:10 00:22:57:18

Yesterday.

0221 00:22:57:22 00:23:02:07

My problem is that nothing happens,  
and I hate that.

0222 00:23:02:11 00:23:05:24

It makes no sense,  
we talk and we talk, but nothing happens.

0223 00:23:07:08 00:23:13:20

Last time we met in December. Now we are  
almost in April, and nothing has been done.

0224 00:23:13:24 00:23:17:22

And clearly we cannot continue this way-

0225 00:23:18:01 00:23:23:08

-because otherwise we need to take in the report of the project and say: "Njet."

0226 00:23:23:12 00:23:27:16

"Njet" and "njet". Then it's very bad.

0227 00:23:32:14 00:23:36:13

Unfortunately things need to be done.

0228 00:23:38:03 00:23:40:08

Ladies!

0229 00:23:48:10 00:23:54:13

Starting by doing tests in test tubes, followed by experiments on rats-

0230 00:23:54:17 00:23:59:22

-moving on to bigger animals, and after that you start performing tests on humans-

0231 00:24:00:01 00:24:07:07

-that's usually how medical science works, to avoid the risks getting out of hand.

0232 00:24:07:11 00:24:13:08

If Paolo had always worked in this way, this film may never have happened.

0233 00:24:13:12 00:24:16:12

But that's not the case.

0234 00:24:21:12 00:24:28:03

A method similar to the one Paolo tests here,  
he has previously used on humans.

0235 00:24:29:02 00:24:34:03

In 2008  
he took that controversial step.

0236 00:24:35:24 00:24:38:24

This is Claudia Castillo.

0237 00:24:39:03 00:24:45:03

She sought Macchiarini's help  
after one of her tracheas had closed up.

0238 00:24:45:07 00:24:48:07

A defect which couldn't be corrected  
at this particular time.

0239 00:24:48:20 00:24:55:24

We are simply removing  
the damaged windpipe-

0240 00:24:56:03 00:25:01:08

-and substituting it for a donated windpipe  
without its own stem cells.

0241 00:25:02:02 00:25:07:02

This was something completely new,  
tracheas and stem cells.

0242 00:25:07:06 00:25:10:07

This is how it was explained to the world...

0243 00:25:11:04 00:25:16:04

Paolo cut out a piece of the windpipe  
from a dead donor.

0244 00:25:18:04 00:25:21:14

The piece was then washed clean  
from donor cells.

0245 00:25:24:06 00:25:29:06

Then Claudia's cells  
were taken from her bone marrow.

0246 00:25:32:01 00:25:37:01

The cleansed windpipe  
was submerged in Claudia's cell solution-

0247 00:25:37:05 00:25:40:12

-and a piece of it was inserted into Claudia.

0248 00:25:42:24 00:25:49:04

Because they are able to grow stem cells,  
she is first to receive a new trachea.

0249 00:25:49:19 00:25:56:07

Claudia Castillo, aged 30 and a mother  
of two, has plenty to be happy about.

0250 00:25:59:03 00:26:05:07

Even if Macchiarini had gambled heavily,  
it all seemed to have worked out.

0251 00:26:05:19 00:26:11:10

The scientists believe that the technique  
can help up to 3000 more across Europe-

0252 00:26:11:14 00:26:16:07

-and eventually tens of thousands more  
with diseases like cancer of the larynx.

0253 00:26:16:19 00:26:22:14

Macchiarini's method became world news.  
The well-respected journal The Lancet-

0254 00:26:22:18 00:26:28:22

-ranked his research study  
among that year's ten most important.

0255 00:26:29:13 00:26:34:04

In this case it's not just a promise,  
we've achieved what we set out to do.

0256 00:26:34:08 00:26:38:01

It's a major achievement  
in the history of medicine.

0257 00:26:40:18 00:26:45:18

In a short space of time, Macchiarini  
goes on to transplant several tracheas.

0258 00:26:52:20 00:26:57:06

In London he operates on a ten-year-old who  
was born with a trachea too small.

0259 00:26:57:16 00:27:02:12

It saved his life and has been described  
as a kind of miracle.

0260 00:27:02:14 00:27:06:05

And in Moscow,  
on a woman from Kazakhstan.

0261 00:27:06:09 00:27:11:12

And in Florence,  
on a young British woman with cancer.

0262 00:27:15:06 00:27:19:08

Macchiarini's status as a star  
was now at its peak.

0263 00:27:36:13 00:27:42:16

He was desirable prey for universities  
and hospitals around the globe.

0264 00:27:43:20 00:27:48:15

In the end, he was hired  
in Russia and in Sweden.

0265 00:27:48:19 00:27:54:24

Karolinska was overjoyed with him, and he  
was considered fantastic among surgeons.

0266 00:27:55:03 00:27:58:03

Not only was he  
an extremely competent surgeon-

0267 00:27:58:07 00:28:04:16

-he also seemed to be revolutionising  
the entire science.

0268 00:28:04:20 00:28:10:24

I remember the first time I met him,  
in the beginning of 2011.

0269 00:28:12:00 00:28:18:11

He was a very powerful  
and colourful person in many ways...

0270 00:28:19:12 00:28:23:12

...and surrounded by a huge aura.

0271 00:28:24:19 00:28:27:04

This is the future.

0272 00:28:27:06 00:28:31:04

You were in awe of him,  
and you just absorbed it all.

0273 00:28:31:08 00:28:34:17

"What an amazing person we have here!"

0274 00:28:34:21 00:28:38:21

Karl-Henrik Grinnemo  
is a surgeon and researcher.

0275 00:28:39:00 00:28:45:02

Together with Matthias Corbascio he was  
asked to help Macchiarini set it all up.

0276 00:28:45:06 00:28:50:06

We helped him with the most basic of things-

0277 00:28:50:10 00:28:56:02

-like establishing a facility,  
and showing him how to pay the bills...

0278 00:28:56:06 00:29:01:20

We collaborated  
and applied for different grants together-

0279 00:29:01:24 00:29:05:08

-like you normally do  
in a research environment.

0280 00:29:05:12 00:29:08:12

Macchiarini was now  
commissioned to start up-

0281 00:29:08:16 00:29:14:02

-an international centre for transplantation

and surgery at Karolinska.

0282 00:29:14:06 00:29:19:16

He was meant to do research at the institute  
and also perform experimental surgery.

0283 00:29:19:20 00:29:24:20

I saw great advantages  
with the entire concept.

0284 00:29:24:24 00:29:31:11

I also felt that Paolo would get involved in  
a completely different context at Karolinska.

0285 00:29:31:15 00:29:37:18

That we would finally be able to build  
a general thoracic surgical unit-

0286 00:29:37:22 00:29:41:12

-with Macchiarini as its star.

0287 00:29:42:19 00:29:48:22

Paolo had also been asked  
to do research on other vital organs.

0288 00:29:49:01 00:29:54:03

I think you take for granted  
that things will just work.

0289 00:29:54:07 00:29:57:07

I can't say I understood how it all worked-

0290 00:29:57:11 00:30:03:12

-but I completely trusted  
that what they did was correct.

0291 00:30:03:16 00:30:06:16

I thought it was incredibly exciting.

0292 00:30:06:20 00:30:12:15

I was meant to focus on heart and lungs-

0293 00:30:12:19 00:30:19:08

-while Paolo's team  
would focus more on the airways.

0294 00:30:19:12 00:30:24:13

They would create kidneys and oesophagi.

0295 00:30:24:17 00:30:30:16

You would be part of a large team  
creating new organs.

0296 00:30:30:20 00:30:34:10

That was the feeling I got.

0297 00:30:37:20 00:30:40:23

But the pressure was hard.

0298 00:30:41:02 00:30:47:03

Paolo was expected to have started  
ground-breaking operations within 3 months.

0299 00:30:49:20 00:30:55:22

Months went by without Paolo  
performing a single transplant.

0300 00:30:57:03 00:31:01:01

And he was also facing other problems.

0301 00:31:01:05 00:31:06:12

Paolo had carried out transplants

on nearly ten patients using his new method.

0302 00:31:06:16 00:31:13:16

But several tracheas had started to collapse.  
How was this going to be solved?

0303 00:31:13:20 00:31:17:02

Paolo had a new idea.

0304 00:31:18:16 00:31:22:16

He would stop the transplants  
using donated windpipes-

0305 00:31:22:20 00:31:28:14

-and instead manufacture artificial ones,  
out of plastic.

0306 00:31:28:18 00:31:32:01

But who would be the experimental subject?

0307 00:31:36:21 00:31:41:05

He came across a patient in Iceland:

0308 00:31:41:09 00:31:46:17

An Eritrean guest student  
by the name of Andemariam Beyene.

0309 00:31:46:21 00:31:51:22

Andemariam was studying  
geothermal energy.

0310 00:31:52:01 00:31:56:08

He was finding it hard to breathe.

0311 00:31:56:12 00:32:02:12

For a while he thought it was asthma,

but the drugs didn't help.

0312 00:32:02:16 00:32:05:18

It was then discovered  
that he had cancer of the trachea.

0313 00:32:06:12 00:32:09:22

In the beginning,  
he responded well to the treatment.

0314 00:32:10:01 00:32:16:03

The tumour receded. This type of cancer  
is fairly unusual in the trachea.

0315 00:32:16:07 00:32:21:11

The treatment seemed to work,  
but then the tumour began to grow again.

0316 00:32:21:21 00:32:26:00

In 2011, Andemariam's  
ability to breathe worsened.

0317 00:32:26:04 00:32:33:14

His doctor began to look abroad,  
and Karolinska suggested Macchiarini.

0318 00:32:34:10 00:32:37:11

A patient was referred from Iceland-

0319 00:32:37:15 00:32:43:10

-that was given, in Harvard, Boston,  
a life expectancy of six months-

0320 00:32:43:14 00:32:48:11

-because he had already been operated on.  
He had a shortness of breath.

0321 00:32:48:15 00:32:54:05

The case was discussed here,  
multidisciplinary-

0322 00:32:54:09 00:32:58:01

-and we decided  
that there was a risk of suffocation.

0323 00:32:58:05 00:33:01:23

We were in need of something now,  
and not tomorrow.

0324 00:33:02:16 00:33:08:09

Paolo decided to try his new idea  
with plastic tracheas on Andemariam.

0325 00:33:08:11 00:33:15:22

Compared to the old procedure, since 2008  
we have a completely new approach-

0326 00:33:16:01 00:33:22:13

-where we don't use natural windpipes  
that are decellularised-

0327 00:33:22:17 00:33:29:07

-but synthetic polymers to build  
a custom-made individual windpipe.

0328 00:33:32:17 00:33:38:17

The operation was performed at  
Karolinska University Hospital in June 2011.

0329 00:33:43:12 00:33:50:00

Grinnemo was one of several  
assisting surgeons during the surgery.

0330 00:33:50:04 00:33:56:11

It was almost like being in a bubble  
while you were in there.

0331 00:33:59:21 00:34:05:11

You didn't really hear what people said,  
because you were so focused.

0332 00:34:05:15 00:34:10:15

Everybody involved was completely focused  
on a successful operation.

0333 00:34:12:13 00:34:15:08

Apply it to the surface here...

0334 00:34:15:21 00:34:19:03

I was convinced that it would work.  
Of course I was.

0335 00:34:19:07 00:34:24:17

It didn't even cross my mind  
that it might not work.

0336 00:34:34:20 00:34:40:22

The surgery was very difficult. We were three  
experienced surgeons at the operating table.

0337 00:34:41:01 00:34:44:10

It was one  
of the most difficult surgeries we did.

0338 00:34:44:14 00:34:49:05

And clearly, it was the first time that we used  
this material, which wasn't optimal-

0339 00:34:49:09 00:34:53:03

-because it was done in a hurry, and so forth.

0340 00:34:57:22 00:35:03:16

You believed that the synthetic trachea  
would be populated with cells-

0341 00:35:03:20 00:35:08:23

-and then grow to become a real windpipe?

0342 00:35:09:02 00:35:12:05

Absolutely. I was convinced of it.

0343 00:35:12:09 00:35:18:13

-Everybody in the room felt the same way?  
-Yes, they did. And so...

0344 00:35:20:01 00:35:27:02

The only thought we had  
was that it would be successful.

0345 00:35:38:14 00:35:43:17

And when it was all over  
we were all on a high.

0346 00:35:43:21 00:35:50:01

You were both tired and happy,  
and of course hungry.

0347 00:35:50:05 00:35:55:05

I remember we all got into a car-

0348 00:35:55:09 00:36:00:09

-and drove off to Max  
and bought hamburgers for everybody.

0349 00:36:00:13 00:36:05:04

We stuffed our faces

and celebrated the successful surgery.

0350 00:36:05:08 00:36:11:08

It was something of a "hallelujah moment".  
We felt that we had made history.

0351 00:36:13:13 00:36:19:07

A ground-breaking surgery  
gave a man back his trachea and his life...

0352 00:36:19:09 00:36:25:15

Just as they had hoped, Macchiarini  
and Karolinska got the world's attention.

0353 00:36:26:00 00:36:29:21

It's his tissue and his cells, but they  
have differentiated from bone marrow cells-

0354 00:36:29:23 00:36:32:05

-and become all the different cell types.

0355 00:36:32:14 00:36:34:21

So it's a living, breathing organ at this point.

0356 00:36:35:05 00:36:39:22

Over a month later, Beyene started breathing  
and is on the road to recovery.

0357 00:36:40:01 00:36:43:23

He is soon to be discharged from the hospital  
and heading home to his family...

0358 00:36:44:24 00:36:51:08

But things didn't look quite as good  
for Macchiarini's patient Keziah Shorten-

0359 00:36:52:21 00:36:59:13

-the young British woman who had received a donated trachea in Florence.

0360 00:37:01:11 00:37:06:16

After some time, her doctors observed that the transplants had failed-

0361 00:37:06:20 00:37:09:07

-and that her windpipe had loosened.

0362 00:37:11:03 00:37:16:05

For a long time, her British doctors had been collaborating with Macchiarini.

0363 00:37:16:09 00:37:21:14

But they were now handed a disastrous situation.

0364 00:37:21:20 00:37:26:20

We were faced with a very difficult clinical problem here at UCL-

0365 00:37:26:24 00:37:33:12

-of a girl aged 20 who had had a terrible carcinoma, cancer of the windpipe.

0366 00:37:34:03 00:37:37:18

It had been operated on elsewhere.

0367 00:37:37:22 00:37:42:10

She'd had the windpipe essentially removed, reconstructed in a different way,

0368 00:37:42:12 00:37:44:11

-and that had all broken down.

0369 00:37:46:00 00:37:51:07

However, having seen what had happened in Sweden, we felt this offered her some chance.

0370 00:37:53:01 00:37:56:01

The plastic trachea  
Macchiarini had used on Andemariam-

0371 00:37:56:05 00:38:01:16

-had been manufactured in London  
by one of Birchall's colleagues.

0372 00:38:01:20 00:38:06:20

Birchall ordered one more, for Keziah.

0373 00:38:08:12 00:38:13:03

We did put a synthetic...  
I was the one who stitched in the top end-

0374 00:38:13:07 00:38:16:16

-and my colleague stitched in  
the bottom end of this synthetic implant.

0375 00:38:16:22 00:38:23:06

You could tell it was too rigid, and you  
couldn't see any evidence of any cells.

0376 00:38:23:10 00:38:30:08

Microscopically there may have been some  
cells. There was certainly no respiratory lining.

0377 00:38:30:12 00:38:34:08

It was a bit of plastic,  
an expensive bit of plastic.

0378 00:38:35:24 00:38:39:01

I couldn't see it working,  
and sure enough, it didn't work.

0379 00:38:40:00 00:38:46:10

Keziah's trachea was made  
from the same plastic as Andemariam's.

0380 00:38:46:14 00:38:50:14

It was a special plastic called POSS PCU.

0381 00:38:51:01 00:38:53:23

The POSS PCU had not  
performed as well as we'd hoped-

0382 00:38:54:00 00:38:57:01

-it hadn't integrated  
into its surroundings very well.

0383 00:38:57:05 00:39:01:17

And it had become infected, principally  
with fungus, but also with some bacteria.

0384 00:39:04:07 00:39:09:20

The two ends of the trachea were  
very loose, they had not integrated at all.

0385 00:39:09:24 00:39:14:03

There were sutures holding it in place,  
but very loosely.

0386 00:39:14:07 00:39:18:03

She remained on the intensive care unit  
at UCL for another six weeks-

0387 00:39:18:07 00:39:24:02

-but then was able to be discharged back to  
Brighton to be with her family for a few months.

0388 00:39:27:19 00:39:32:22

Keziah's condition worsened,  
and shortly afterwards she passed away.

0389 00:39:35:10 00:39:41:03

-So the material doesn't really work?  
-In its present form...

0390 00:39:42:03 00:39:48:15

...that particular material is not the solution  
to tracheal transplantation right now.

0391 00:40:04:09 00:40:10:15

But the British surgeons weren't the  
only ones doubting Paolo's plastic tracheas.

0392 00:40:10:19 00:40:14:02

A colleague of theirs, Pierre Delaere,  
was working in Belgium.

0393 00:40:14:06 00:40:20:06

He was astounded to hear about  
Paolo's operation on Andemariam.

0394 00:40:20:09 00:40:26:12

It's obvious that a synthetic trachea  
cannot transform into a living trachea-

0395 00:40:26:16 00:40:29:24

-by applying bone marrow on it.

0396 00:40:30:03 00:40:32:15

For me this was unbelievable.

0397 00:40:32:17 00:40:37:03

No theoretical evidence,  
no experimental data...

0398 00:40:37:18 00:40:40:23

...supporting the thesis of regeneration.

0399 00:40:43:20 00:40:49:08

I knew beforehand that it would lead to  
a big disaster. You implant it in a patient-

0400 00:40:49:12 00:40:52:18

-and you know that this patient will die.

0401 00:40:52:22 00:40:59:10

This was so wrong. I wrote immediately  
a paper to the President of Karolinska-

0402 00:40:59:14 00:41:06:10

-"Look what's going on in your institution.  
It's completely wrong."

0403 00:41:07:22 00:41:12:22

Delaere warned the Vice-Chancellor  
at Karolinska, and claimed-

0404 00:41:13:01 00:41:19:04

-that Macchiarini's research studies  
were misleading, making people believe-

0405 00:41:19:08 00:41:25:08

-that plastic tracheas worked,  
despite it being "physically impossible."

0406 00:41:26:04 00:41:30:03

They made misuse  
of the hype around stem cells-

0407 00:41:30:07 00:41:34:06

-to introduce  
something completely impossible.

0408 00:41:34:10 00:41:38:12

To keep it clear, if I had the choice between...

0409 00:41:39:12 00:41:45:20

...a transplantation of a synthetic trachea  
and the firing squad-

0410 00:41:45:24 00:41:49:21

-I would certainly choose the last option-

0411 00:41:50:00 00:41:54:13

-because this is the least painful  
form of execution.

0412 00:41:54:17 00:41:59:10

It can sound very cruel,  
but that's the real situation.

0413 00:42:02:18 00:42:10:13

KI ignored the warning, and the hospital  
went ahead with the next operation-

0414 00:42:10:17 00:42:16:11

-on an American suffering from cancer,  
who had found Macchiarini on the Internet.

0415 00:42:16:14 00:42:20:24

My name is Christopher Lyles,  
I'm born and raised in Maryland.

0416 00:42:21:03 00:42:24:03

Graduated from Morgan State University.

0417 00:42:24:07 00:42:28:20

I have a four-year-old,  
I want to see her grow.

0418 00:42:30:15 00:42:33:15

I'm not going anywhere...

0419 00:42:35:05 00:42:43:02

Lyles was operated on in November, 2011.  
After barely four months he was dead.

0420 00:42:44:21 00:42:50:08

Two out the world's three patients  
with plastic tracheas were now dead.

0421 00:42:52:21 00:42:57:22

But Delaere's warnings  
never took hold in the media.

0422 00:42:58:01 00:43:01:02

From the outside, it all looked good.

0423 00:43:01:06 00:43:06:11

During the Spring of 2012, a German  
TV crew began to follow Macchiarini.

0424 00:43:06:16 00:43:12:00

The micro CT scan would be, eventually,  
of some help as well.

0425 00:43:12:08 00:43:16:17

Here are some shots  
from the team's raw material.

0426 00:43:16:21 00:43:22:21

It's feels like stepping into a time machine,  
as everything was caught on tape-

0427 00:43:23:00 00:43:27:22

-not least the difficulties  
surrounding Macchiarini's project.

0428 00:43:27:24 00:43:33:09

Please try and answer this question, because  
she is making me crazy, and I hate that.

0429 00:43:33:11 00:43:37:23

Through this material  
I made several serious discoveries.

0430 00:43:38:08 00:43:45:22

Mei Ling. You do not forget me?  
OK, bye. Bye.

0431 00:43:51:02 00:43:54:12

Unfortunately, we've had a...

0432 00:43:54:16 00:44:00:19

The latest transplantation was unsuccessful,  
and the patient died.

0433 00:44:00:23 00:44:09:02

It helped us a great deal  
and gave us a lot of energy.

0434 00:44:09:06 00:44:15:22

Naturally, we've had to start over again-

0435 00:44:16:01 00:44:19:08

-to try to find out what went wrong.

0436 00:44:19:12 00:44:28:00

He didn't die as a result of the scaffold.

0437 00:44:29:05 00:44:36:11

Paolo was well aware of the death,  
but it didn't seem to stop him.

0438 00:44:37:05 00:44:44:13

Two patients will undergo transplantations  
in Russia, on July 19 and July 21.

0439 00:44:44:17 00:44:49:15

It's a race against time.  
We have learned a lot.

0440 00:44:50:13 00:44:52:05

A great deal.

0441 00:44:52:09 00:44:58:11

If we gamma sterilise the scaffold,  
why should we treat it with ethanol?

0442 00:44:58:13 00:45:03:13

Even though Paolo couldn't be sure  
why his patient had died-

0443 00:45:03:17 00:45:06:17

-he still made plans for new operations.

0444 00:45:06:21 00:45:12:21

In the US he collaborated with the  
biotechnical company Harvard Bioscience.

0445 00:45:13:00 00:45:16:00

Here's how the President of the company  
presented the method...

0446 00:45:16:06 00:45:23:23

Our bio reactor is about the size of a shoebox,  
and inside there is a rotating part...

0447 00:45:24:00 00:45:30:00

Green manufacture the bioreactor  
where the tracheas bathe in stem cells.

0448 00:45:30:04 00:45:37:11

Green described the method as magic,  
the plastic would come to life in no time.

0449 00:45:38:03 00:45:42:24

-What is it made of?  
-A plastic polymer material with pores.

0450 00:45:43:03 00:45:49:02

The cells can settle into those pores  
and start to grow. It feels like home to them.

0451 00:45:49:06 00:45:52:14

After a few days  
the patient's own blood vessels-

0452 00:45:52:16 00:45:55:18

-grow into the scaffold and make it part of him.

0453 00:45:55:22 00:45:59:12

-Are they actually growing and multiplying?  
-That's exactly right.

0454 00:45:59:14 00:46:04:19

But on the beach in 2012  
the atmosphere was a little different.

0455 00:46:07:04 00:46:09:13

Hi, David.

0456 00:46:09:15 00:46:12:21

What I'm about to hear  
will come as a shock to me.

0457 00:46:13:15 00:46:17:18

Listen. Basically what happens is that...

0458 00:46:18:20 00:46:20:24

...the scaffolds dry out.

0459 00:46:21:03 00:46:26:10

And this is the reason why,  
when I felt the scaffolds-

0460 00:46:26:14 00:46:29:14

-they were completely welded wrong.

0461 00:46:29:18 00:46:35:07

They were like the POSS PCU material  
that we implanted in Mr Beyene.

0462 00:46:38:00 00:46:43:00

Paolo says there was something wrong  
with Andemariam's plastic trachea.

0463 00:46:43:04 00:46:48:04

And not only with that one,  
but also with the new plastic tracheas.

0464 00:46:48:08 00:46:55:00

Despite the problems being unsolved, he  
intended to go ahead with new operations.

0465 00:46:55:20 00:47:02:13

I'm quite unhappy about this, because either we know exactly what's going on...

0466 00:47:02:17 00:47:08:13

Seven people in my lab have worked 24 hours a day for the last three weeks-

0467 00:47:08:17 00:47:10:17

-and then... this is shit now.

0468 00:47:10:21 00:47:14:04

So I think we need to do everything again.

0469 00:47:14:08 00:47:18:08

We've lost two weeks by doing this.

0470 00:47:44:06 00:47:50:10

Macchiarini's team in Stockholm was desperately trying to solve the problems.

0471 00:47:54:10 00:48:00:05

If you have a patient that dies because of a new technology, you always ask yourself...

0472 00:48:02:12 00:48:08:12

"Did I do something wrong? Do I have the right to continue? Should I continue?"

0473 00:48:11:13 00:48:13:19

"What should we do better?"

0474 00:48:13:23 00:48:19:16

...so even with 25 these yellow things are appearing?

0475 00:48:21:01 00:48:28:05

It's very draining.  
It's not a pleasant sensation, at all.

0476 00:48:30:15 00:48:35:00

Good. Thank you again  
for your outstanding work.

0477 00:48:36:21 00:48:40:01

But still you learn only by doing.

0478 00:48:40:11 00:48:45:23

It's going to be quite difficult to distinguish  
the two measurements that we get.

0479 00:48:46:02 00:48:50:12

Difficult, but not impossible, right?

0480 00:48:50:16 00:48:56:14

He should do it, he must do it.  
There's no chances, or no choices.

0481 00:48:57:03 00:49:02:01

I'm saying that we're still improving,  
and we need to improve time over time.

0482 00:49:02:13 00:49:05:15

And only by doing we improve.

0483 00:49:17:10 00:49:23:04

All these studies are ongoing.  
This could be the future. Thank you so much.

0484 00:49:26:15 00:49:31:15

He is one of our leading scientists-

0485 00:49:31:19 00:49:35:02

-and he's also a very capable surgeon.

0486 00:49:35:06 00:49:41:15

This combination is quite rare.  
He's on a high international level.

0487 00:49:42:01 00:49:47:17

It's the kind of surgeon I want on my team.  
As a patient I'd want Macchiarini to help me.

0488 00:49:47:19 00:49:49:21

First and foremost,  
he is a very competent surgeon.

0489 00:49:50:02 00:49:55:24

He is very experienced in transplantations,  
in tracheal surgery... in everything.

0490 00:49:56:01 00:49:59:14

He is very much open to new ideas.

0491 00:49:59:20 00:50:03:10

We need people like Paolo...  
to force the issue-

0492 00:50:03:12 00:50:09:03

-to get the decision to say, let's just do this  
even though we don't have all the answers.

0493 00:50:09:07 00:50:14:16

The idea of this tracheal transplantation  
is something magical.

0494 00:50:22:18 00:50:25:06

He's the only one.

0495 00:50:31:14 00:50:36:22

-But the results so far make you hopeful?  
-Oh yes, of course.

0496 00:50:37:01 00:50:41:04

Otherwise I would have already stopped.

0497 00:50:49:03 00:50:55:17

Paolo had the support of many, and you can  
view the setbacks in more than one way.

0498 00:50:57:01 00:51:02:01

Sure, two out of the three  
with plastic tracheas were dead.

0499 00:51:02:05 00:51:09:09

But you might also point out that one  
out of three was alive, making it a success.

0500 00:51:10:02 00:51:14:12

-So how do you feel physically?  
-I'm OK.

0501 00:51:14:16 00:51:18:18

We speak relatively...

0502 00:51:19:24 00:51:25:09

From time to time it was going to be positive,  
going OK.

0503 00:51:25:13 00:51:28:13

So... I'm very optimistic for the future.

0504 00:51:29:01 00:51:36:11

So how is this day for you, one year exactly  
after the operation on Andemariam?

0505 00:51:36:15 00:51:40:18

I'm very pleased to see him doing so well.

0506 00:51:40:22 00:51:47:03

And it's gratification for all the effort  
we have done in the past, and continue to do.

0507 00:51:47:07 00:51:53:23

It is a major achievement for other patients  
that would need this type of transplantation.

0508 00:51:56:22 00:52:00:22

What if the plastic method  
was fundamentally correct-

0509 00:52:01:01 00:52:04:02

-but that the patients had been too ill?

0510 00:52:04:11 00:52:11:15

On a benign disease you still need other tools,  
like stents or similar.

0511 00:52:11:19 00:52:17:20

It impairs the quality of life,  
but does not put the patient's life at risk-

0512 00:52:17:24 00:52:20:12

-as opposed to the malignant...

0513 00:52:20:14 00:52:27:17

So far, Paolo had been allowed to use  
the plastic tracheas in order to save lives.

0514 00:52:27:21 00:52:33:11

Now he wanted to test his method  
on healthier and stronger patients-

0515 00:52:33:15 00:52:36:15

-who were not  
in any immediate danger of dying.

0516 00:52:36:24 00:52:41:16

We have now clinical trial authorisation  
in Russia and another one in Italy.

0517 00:52:41:20 00:52:45:24

In Italy it's for biological scaffolding,  
and in Russia it's for benign diseases.

0518 00:52:46:03 00:52:50:07

Probably we'll get one in Sweden  
for malignant diseases...

0519 00:52:50:09 00:52:55:09

Paolo had succeeded  
with something almost impossible.

0520 00:52:55:13 00:53:01:20

After very few animal tests, he got  
the go-ahead for a study on humans.

0521 00:53:06:09 00:53:11:09

He was to test  
the plastic tracheas in Russia-

0522 00:53:11:13 00:53:17:16

-on otherwise healthy subjects  
who suffered from old injuries.

0523 00:53:17:20 00:53:23:20

In choosing the right subjects,  
they looked closely at many candidates.

0524 00:53:23:24 00:53:30:10

The winner got to record a video  
explaining why they should pick her.

0525 00:53:32:02 00:53:37:03

Julia Tuulik won the chance  
to be the first experimental subject.

0526 00:53:38:01 00:53:43:01

A teacher and former dancer  
from Saint Petersburg.

0527 00:53:43:19 00:53:49:23

*The German TV crew was also there.  
They would follow her operation.*

0528 00:53:52:16 00:53:59:07

My name is Julia Tuulik. In 2008,  
I was in a very serious road accident.

0529 00:53:59:16 00:54:03:13

I had a tracheostomy inserted.

0530 00:54:05:01 00:54:07:23

Now I have a tube  
that constantly grinds on me.

0531 00:54:08:02 00:54:13:05

It hurts a lot when I speak,  
breathe, lie down, and sleep - always.

0532 00:54:13:09 00:54:17:09

I have lost my health and my beauty.

0533 00:54:21:09 00:54:26:22

My little boy is the only thing that

makes me happy. I'm so blessed to have him.

0534 00:54:28:20 00:54:34:05

But he has never heard his mother sing,  
not even a lullaby.

0535 00:54:35:15 00:54:41:15

As you can see,  
I'm a normal, nice young girl-

0536 00:54:41:19 00:54:46:06

-and I would like to live  
like other normal people.

0537 00:54:46:10 00:54:52:20

I need the tracheal transplantation  
developed by Professor Macchiarini.

0538 00:54:57:22 00:54:59:18

Well?

0539 00:54:59:22 00:55:05:21

Tell us about when you woke up this morning,  
and about how you felt.

0540 00:55:06:00 00:55:08:13

I got myself ready.

0541 00:55:08:17 00:55:13:13

-Were you calm?  
-Yes, shouldn't I be?

0542 00:55:13:17 00:55:16:19

Aren't you scared or worried?

0543 00:55:16:23 00:55:22:08

When you ask, I get the feeling  
that you're trying to get me worked up.

0544 00:55:22:12 00:55:29:01

No, for now I just take it one step at a time.

0545 00:55:40:06 00:55:46:08

Thank you for coming. This is the final  
brainstorming before the transplantation.

0546 00:55:46:12 00:55:49:15

As a matter of fact, the patient, Julia-

0547 00:55:49:19 00:55:53:24

-is the first patient entering a clinical trial.

0548 00:55:54:03 00:55:57:17

So tomorrow, we plan to  
do the first human, ever done-

0549 00:55:57:21 00:56:02:21

-laryngeal tracheal transplant,  
using bio artificial scaffolds.

0550 00:56:04:03 00:56:07:20

How are you feeling,  
waiting for your surgery?

0551 00:56:07:24 00:56:13:11

If you asked less I would be calm,  
but now I'm getting nervous.

0552 00:56:13:15 00:56:18:01

That was the penultimate question.

0553 00:56:19:08 00:56:23:08

-It's as if it's all down to me.  
-That's right.

0554 00:56:23:12 00:56:27:15

50% of the outcome  
is dependant on your attitude.

0555 00:56:31:02 00:56:36:14

Julia was about to receive  
the world's fourth plastic trachea.

0556 00:56:39:20 00:56:46:06

In Iceland was her only living predecessor,  
Andemariam.

0557 00:56:46:10 00:56:51:21

And at Karolinska in Stockholm  
they awaited yet another patient.

0558 00:56:53:05 00:56:56:05

Would the method prove genius-

0559 00:56:56:09 00:57:02:09

-as Macchiarini was able to test it  
on subjects as healthy as Julia?

0560 00:57:02:13 00:57:05:06

Would it be a success?

0561 00:57:08:15 00:57:13:21

-Do you know the problem?  
-No, what is it?

0562 00:57:14:00 00:57:15:18

One of the prosthetis....

0563 00:57:18:04 00:57:23:19

-They'd better not damage anything.  
-No, nothing will be damaged.

0564 00:57:30:07 00:57:35:14

Being at the cutting edge,  
you are always wrong.

0565 00:57:36:10 00:57:41:15

Until sooner, more likely later,  
you demonstrate the opposite.

0566 00:57:43:23 00:57:49:05

Why should I give up?  
I'm not the type to give up.