

1

00:00:00,181 --> 00:00:10,190

Most of us will live for a billion heartbeats.

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00:00:10,190 --> 00:00:18,878

Within that span of time, we will have reached old age.

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00:00:18,878 --> 00:00:23,563

Today, however, aging and death are becoming less inevitable.

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00:00:23,563 --> 00:00:27,566

We are moving closer to the dream of immortality.

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00:00:54,591 --> 00:01:03,600

Like distance runners on a measured course, all of us will move through time in a roughly predictable pattern.

6

00:01:08,604 --> 00:01:15,611

In the first stage of our lives, we develop and grow, reaching toward an ultimate peak of physical vitality.

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00:01:15,611 --> 00:01:27,622

As we mature, however, the body begins an irreversible process of gradually wearing out.

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00:01:33,628 --> 00:01:38,632

A new awareness of physical fitness may help prolong our years of health and vigor.

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00:01:38,632 --> 00:01:43,637

Yet nothing we do will work to halt the inevitable force of aging.

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00:01:46,640 --> 00:01:52,645

Most of the changes of aging take place deep inside the body.

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00:01:52,645 --> 00:01:57,650

The lungs become less able to take in vital oxygen.

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00:02:01,653 --> 00:02:05,657

Powerful muscles gradually lose their strength.

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00:02:07,659 --> 00:02:11,663

The heart loses power and pumps less blood.

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00:02:15,666 --> 00:02:18,669

Bones grow ever more brittle.

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00:02:22,673 --> 00:02:25,676

Valves and arteries begin to harden.

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00:02:31,681 --> 00:02:34,684

Blood no longer circulates as well.

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00:02:35,685 --> 00:02:40,690

As our lives continue, the symptoms of deterioration grow worse.

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00:02:40,690 --> 00:02:44,693

The body becomes more and more vulnerable.

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00:02:46,695 --> 00:02:49,698

Finally, we encounter a stress.

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00:02:49,698 --> 00:02:53,702

A stress that is greater than our physical resistance.

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00:02:53,702 --> 00:03:01,709

Often, it is only a minor accident or chance infection, but this time, it brings life to an end.

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00:03:03,711 --> 00:03:07,715

Each of us must at some time confront the grim reality of growing old.

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00:03:07,715 --> 00:03:13,720

With every passing year, the visible signs of wear and decline become more and more apparent.

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00:03:13,720 --> 00:03:15,722

Try as we might to hide the fact.

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00:03:15,722 --> 00:03:22,729

Our wrinkling, sagging, and loss of strength tell us undeniably that we are aging.

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00:03:27,733 --> 00:03:34,740

Since our earliest history, we have been obsessed with the idea of prolonging life and recapturing

lost youth.

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00:03:35,741 --> 00:03:40,745

We have endlessly searched for ways to vanquish the physical toll of passing time

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00:03:40,745 --> 00:03:46,751

and a means to unlock the working secrets of the clock of aging that ticks inside us.

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00:03:54,758 --> 00:04:00,764

Alchemists sought for centuries to brew an elixir of life that would reverse the effects of age.

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00:04:04,767 --> 00:04:06,769

The Elixir of Life

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00:04:25,787 --> 00:04:32,793

In 1919, a rejuvenation treatment was introduced by a Russian-born surgeon named Serge Voronov.

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00:04:33,794 --> 00:04:39,800

Using the sex organs of chimpanzees, Voronov grafted their tissue into the bodies of aging men.

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00:04:43,804 --> 00:04:47,807

Voronov claimed amazing results and his therapy made him a millionaire.

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00:04:47,807 --> 00:04:54,814

Yet the popular treatment met a sudden end when numerous patients became accidentally infected with syphilis from the chimps.

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00:04:56,816 --> 00:05:00,819

Nevertheless, Voronov's work was a pioneering step in medicine.

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00:05:03,822 --> 00:05:06,825

The Elixir of Life

37

00:05:07,826 --> 00:05:14,832

Today, near the warm waters of the Bahamas, a youth spa offers perhaps more modern techniques of rejuvenation.

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00:05:22,840 --> 00:05:25,843

Dr. Elliot Goldwag is the spa's executive director.

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00:05:26,843 --> 00:05:32,849

It is a place that he describes as being devoted to the study and application of revitalization therapies.

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00:05:34,851 --> 00:05:42,858

Here, the often wealthy or famous clientele receive an array of treatments which the center's staff believes can reverse many effects of aging.

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00:05:43,859 --> 00:05:45,861

Dr. Elliot Goldwag

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00:05:54,869 --> 00:05:59,874

To open pores and renew the skin, faces are bathed in a warm mist of steam.

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00:06:07,881 --> 00:06:11,885

Clients who have problems sleeping are taught techniques to induce relaxation.

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00:06:12,886 --> 00:06:15,889

I feel the tightness going out of my chest.

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00:06:18,892 --> 00:06:22,895

The skin is carefully checked for flaws and signs of unusual wear.

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00:06:30,903 --> 00:06:35,907

Regular cosmetic facials remove debris and other dead tissue from the skin.

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00:06:43,915 --> 00:06:48,919

A facial mask is said to improve color and texture and to restore youthfulness.

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00:06:59,930 --> 00:07:06,936

High pressure sprays are used to stimulate the body, reportedly alerting and invigorating millions of tired cells.

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00:07:12,942 --> 00:07:18,947

Inhaling atomized seawater mixed with aromatic oils is prescribed to aid respiration.

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00:07:29,957 --> 00:07:35,963

Regular massages are provided to relax and tone tight muscles and to stimulate circulation.

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00:07:43,970 --> 00:07:49,976

Warm seawater baths are said to allow natural minerals to absorb into the skin.

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00:07:54,981 --> 00:07:59,985

A day of revitalization is often ended with a live chicken embryo cocktail.

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00:08:00,986 --> 00:08:07,993

The egg is believed to act as a biological catalyst to stimulate healthy cell growth and revitalized tissue.

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00:08:12,997 --> 00:08:18,002

Cell therapy is another treatment offered at the center.

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00:08:21,005 --> 00:08:26,009

Cells from unborn lambs supposedly revitalize the body.

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00:08:30,013 --> 00:08:35,018

Cells from unborn lambs also revitalize aging tissue when injected into the body.

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00:08:42,024 --> 00:08:47,029

Dr. Ivan Popov is the medical director of the revitalization center.

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00:08:48,030 --> 00:08:54,035

You have two kinds of troubles which we call premature aging. Some of them are irreversible.

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00:08:55,036 --> 00:09:00,041

And ruin your liver very often it's practically impossible to correct it.

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00:09:00,041 --> 00:09:09,049

But you have many reversible phenomena and those reversible phenomena by stimulating our own body to react to fight against aging.

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00:09:10,050 --> 00:09:13,053

We can't make anybody one day younger than they are.

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00:09:13,053 --> 00:09:23,062

But we can make them function and look younger because the majority of the people does function and does look older than they should.

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00:09:24,063 --> 00:09:28,067

And this is one of our aims to put them in the right age.

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00:09:31,070 --> 00:09:38,076

The magic elixir of life has not yet been found. But compelling new discoveries may be bringing us closer.

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00:09:41,079 --> 00:09:50,087

In 1932 a classic experiment nearly doubled the lifespan of rats simply by cutting back drastically the calories in their diet.

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00:09:51,088 --> 00:09:54,091

The reason for the effect was then unknown.

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00:09:57,094 --> 00:10:05,101

Today at the University of California at Berkeley Dr. Paul Siegel has also greatly extended the normal lifetime of rats.

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00:10:09,105 --> 00:10:16,111

The result was achieved through a special protein restricted diet which had a profound effect on the chemistry of the brain.

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00:10:21,116 --> 00:10:27,121

Siegel showed that within the brain specific chemicals control many of the signals that influence aging.

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00:10:27,121 --> 00:10:32,126

By altering that chemical balance the clock of aging can be reset.

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00:10:33,127 --> 00:10:46,139

Since the mechanism of aging may not be very much different in rats than in humans it implies that we're no longer stuck with the idea that we have to get old.

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00:10:47,140 --> 00:10:55,147

It means that we can now devise treatments that can alter the rate of aging not only in rats but eventually in humans.

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00:10:58,150 --> 00:11:02,154

For the first time the mystery of why we age is being seriously challenged.

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00:11:04,156 --> 00:11:08,159

Scientists in many fields are now making dramatic and far-reaching discoveries.

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00:11:09,160 --> 00:11:16,167

An average lifetime lasts 75 years yet in each of us lies a potential for near immortality.

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00:11:17,168 --> 00:11:28,178

If we could retain the vitality and resistance to disease that we have at age 20 we would live for 800 years.

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00:11:29,179 --> 00:11:35,184

At UCLA Dr. Roy Walford has linked aging to the body's complex immunity system.

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00:11:36,185 --> 00:11:41,190

Dr. Walford believes that aging may not be a slow wearing out of the body but rather an active self-destruct process.

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00:11:44,193 --> 00:11:49,197

When a germ or foreign tissue has entered the body it is a very important process.

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00:11:49,197 --> 00:11:56,204

Dr. Walford believes that with time the immunity system loses its ability to tell the difference between the body's own cells and foreign invaders that should be destroyed.

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00:11:59,207 --> 00:12:04,211

The body has a special blood cell that is used to prevent the immune system from moving.

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00:12:06,213 --> 00:12:14,221

Dr. Walford believes that with time the immune system loses its ability to tell the difference between the body's own cells and foreign invaders that should be destroyed.

83

00:12:19,225 --> 00:12:26,232

As the immune system becomes less able to distinguish self from non-self the body slowly ages.

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00:12:39,244 --> 00:12:43,248

Experiments with mice have supported Dr. Walford's ingenious theory.

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00:12:44,248 --> 00:12:50,254

When injected with drugs to suppress their immune systems their life spans were greatly increased.

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00:12:58,261 --> 00:13:06,269

Special experimental diets designed to affect the immunity system have also been shown to have dramatic effects on aging.

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00:13:07,270 --> 00:13:15,277

Two mice are the same age. A lifetime on a normal diet leaves one tumored and ready to die.

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00:13:16,278 --> 00:13:22,284

The other whose diet has been carefully controlled still appears young and healthy.

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00:13:25,286 --> 00:13:30,291

A new experiment in Dr. Walford's research involves a technique called parabiosis.

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00:13:31,292 --> 00:13:36,297

A young and an old mouse are surgically attached to share a common bloodstream.

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00:13:37,298 --> 00:13:42,302

Perhaps the younger mouse's immune system will extend the lifespan of the older mouse.

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00:13:43,303 --> 00:13:50,310

Dr. Leonard Haeflich, an eminent biologist working in aging research has made a revolutionary discovery about the reasons we grow old.

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00:14:00,319 --> 00:14:07,325

It was long thought that individuals who have been in the field of research have been able to find a way to grow old.

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00:14:08,326 --> 00:14:14,332

It was long thought that individual human cells could continue living indefinitely.

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00:14:15,333 --> 00:14:19,336

Yet Dr. Haeflich found that our cells have a maximum lifespan.

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00:14:20,337 --> 00:14:24,341

They can divide only about 50 times before they wear out and die.

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00:14:28,345 --> 00:14:36,352

If indeed the clock of aging lies deep inside each cell there may be an ultimate limit on how long we can ever hope to live.

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00:14:37,353 --> 00:14:49,364

I think the goal of extending our useful lives for longer periods of time within the normal lifespan is certainly a possibility and a probability.

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00:14:50,365 --> 00:14:55,370

But I think that increasing the absolute lifespan for man is very improbable.

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00:14:56,371 --> 00:15:06,380

Nevertheless, Dr. Haeflich continues his search deeper into the mysteries of the living cell, probing for the secrets of why the body grows old.

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00:15:10,384 --> 00:15:21,394

It's pointless to have as our goals in gerontological research increasing the length of time we spend on this planet simply for the sake of increasing the time.

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00:15:21,394 --> 00:15:27,399

I think what is important to consider and what's essential to consider is how that time is spent.

103

00:15:29,401 --> 00:15:35,407

If we're to spend it with an additional 10 years of infirmities of old age I don't think that's desirable.

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00:15:39,411 --> 00:15:48,419

If we're to spend it with additional 10 years of vigor and activity both physical and mental then that is the kind of goal we should strive for.

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00:15:48,419 --> 00:16:02,432

To understand the mechanisms of aging to the extent that people will live a full and productive life until the stroke of midnight on their 100th birthday at which time we would all drop dead.

106

00:16:05,435 --> 00:16:10,439

Today even the finality of death does not necessarily mean an end to life.

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00:16:11,440 --> 00:16:14,443

A technique called cryonics may offer a hope of immortality.

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00:16:15,444 --> 00:16:19,448

A California cryonics facility is operated by Art Quait.

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00:16:22,450 --> 00:16:25,453

Cryonics is the science of low temperature preservation of human life.

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00:16:26,454 --> 00:16:41,468

Cryonics suspension is the freezing procedure by which we preserve patients after they've been pronounced dead in a hope that at some future date medical science will be able to cure whatever they died of, repair the damage caused by the freezing procedure itself and restore them to life.

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00:16:42,469 --> 00:16:51,477

Now in this capsule we have two human patients, a 65 year old man and a 75 year old woman both of whom died on the same day three and a half years ago.

112

00:16:54,480 --> 00:16:56,482

Their families arranged to have them placed into cryonics suspension.

113

00:16:57,483 --> 00:17:02,488

They're being maintained at the temperature of liquid nitrogen which is minus 320 degrees Fahrenheit.

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00:17:03,488 --> 00:17:09,494

At this temperature there's going to be virtually no change or deterioration or decay for literally eons.

115

00:17:10,495 --> 00:17:15,500

These patients are not immortal now and they won't be if and until we can restore them to life.

116

00:17:16,501 --> 00:17:31,514

I think that if indeed that does prove possible in the future it will be at a time when it will be very likely that almost all the afflictions of man will be treatable and people living at that time will have the expectation of living indefinitely into the future.

117

00:17:33,516 --> 00:17:41,524

Under careful laboratory controls a hamster is painlessly put to death.

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00:17:50,532 --> 00:17:54,536

The animal is packed in ice, maintaining its body temperature at freezing level.

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00:17:56,538 --> 00:18:00,541

It is completely lifeless. Its heart is motionless.

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00:18:03,544 --> 00:18:11,551

Clinically dead for over four hours the hamster's frozen body will now be allowed to gradually thaw.

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00:18:17,557 --> 00:18:22,562

Dr. Paul Siegel will carefully monitor its temperature and other vital signs.

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00:18:23,563 --> 00:18:29,568

So far there is no indication of life. The hamster is still dead.

123

00:18:31,570 --> 00:18:36,575

Dr. Siegel now uses a simple desk lamp to help warm the hamster.

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00:18:39,577 --> 00:18:42,580

There is still no sign of life.

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00:18:45,583 --> 00:18:49,587

Suddenly a faint heartbeat registers on the EKG.

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00:18:49,587 --> 00:18:52,589

The hamster may be coming back.

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00:18:53,590 --> 00:18:57,594

Artificial respiration aids the animal with its first attempts at breathing.

128

00:19:00,597 --> 00:19:04,601

Its temperature is now rising. Its heart beating stronger.

129

00:19:07,603 --> 00:19:09,605

That was her. Yeah, she's doing it.

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00:19:10,606 --> 00:19:12,608

She's starting to breathe on her own a little bit.

131

00:19:13,609 --> 00:19:16,612

She's starting to take her first few attempts at breathing.

132

00:19:16,612 --> 00:19:21,616

She's breathing her abdomen every once in a while, but every 10-15 seconds she'll take in a deep breath.

133

00:19:22,617 --> 00:19:24,619

She still needs some help though.

134

00:19:25,620 --> 00:19:29,624

There it goes. That's her. See it? See the reflexes? Okay, moving us on.

135

00:19:34,628 --> 00:19:40,634

As the hamster returns to life, Dr. Siegel carefully watches its breathing and muscular reflexes.

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00:19:46,640 --> 00:19:50,643

The hamster's body temperature is still very low. It will quickly return to normal.

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00:19:56,649 --> 00:19:59,652

Soon the hamster is almost completely recovered.

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00:20:00,652 --> 00:20:08,660

For this particular animal, its amazing experimental voyage through death and back has already been taken five times.

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00:20:17,668 --> 00:20:24,675

Today, for some laboratory animals, the boundaries between life and death are becoming less distinct.

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00:20:25,676 --> 00:20:33,683

It may not be long before we ourselves can venture safely through death and return to catch at least a glimpse of immortality.

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00:20:34,684 --> 00:20:41,690

Though aging and death may be what nature planned for us, science is at last unraveling some of the mysteries of growing old.

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00:20:41,690 --> 00:20:46,695

The process is no longer beyond our understanding and is quickly becoming controllable.

143

00:20:47,696 --> 00:20:53,702

We may be on the way to realizing one of our fondest dreams, to live forever and never grow old.

144

00:21:11,718 --> 00:21:17,724

Thank you for watching!