The Edge For Spares or Repair

PICTURE	COMMENTARY / SYNC 1
TITTLE SEQUENCE :	**10 : 00 : 00**
	30 : 00 : 00 (music & heartbeat)
MODELS IN NUTOPIA (BLURRED SHOT)	
	35 : 07
BABY ON SOFA IN NUTOPIA	**UNDERSTANDING THE MYSTERY OF HOW WE DEVELOP IS BEGINNING A REVOLUTION IN THE WAY WE TREAT ILLNESS AND DISEASE.**
HUMAN STEM CELLS IN CULTURE MULTIPLYING	
	THE CLUES ARE COMING FROM THE VERY STUFF OF LIFE
	47 : 23 I / V **SYNC:**
DR HARRY GRIFFIN	*The major challenge in the 21st Century is are we going to be healthy in our old age…*
HEARTBEAT FADE TO BLACK	*…We now stand at a threshold of what might be one of the most exciting periods in medicine*
HEARTBEAT FADE TO BLACK	
PROF. IAN WILMUT	**59 : 04 I / V SYNC:** *The aim of all of this research is to be able to offer a treatment to a patient, with a disease like for example Diabetes, or Parkinson's Disease, heart attack. All caused by damage to cells which are not repaired or replaced.*
HEARTBEAT FADE TO BLACK	
DR. HARRY GRIFFIN	**01 : 11 I / V SYNC:** *… you might be able to take a cell from just the inside of the mouth – take a skin cell and convert it into nerve cells heart muscle cells and re-introduce them into the patient*
PROF. ROBERT WINSTON	**28 : 15 I / V SYNC:** *Well we are talking about what is loosely called tissue engineering and essentially tissue engineering might be used to replace any humans tissues which are damaged,…*
HEARTBEAT FADE TO BLACK	
COLIN TUDGE	**41 : 12 I / V SYNC:** *I mean this is quite astonishing. This is really a transformation of so much of medical practice*
	47 : 07
LAB SHOTS	**WILL WE HARVEST OUR OWN CELLS TO RESTORE DAMAGED TISSUE, OR EVEN REGENERATE WHOLE ORGANS**
PROF. IAN WILMUT	**58 : 06 SYNC :** *… understanding cell development.*
MODEL IN NUTOPIA	*Will open up very important areas of medicine, that we can only just begin*
CU MODEL IN NUTOPIA	*to imagine.*
(Title) 02: 11 **'FOR SPARES OR REPAIR'** CU REFLECTION OF SUNRISE ON THAMES	

PICTURE	COMMENTARY / SYNC 2
	20 : 13
W/S MILLENIUM DOME	**THE DAWNING OF A NEW MILLENNIUM COULD SET THE RISE OF A NEW AGE IN MEDICINE.**
MIDLOTHIAN MOUNTAINS	**THE SEEDS OF WHICH WERE SOWN IN AN UNLIKELY LOCATION.**
BUS MAIN STREET ROSLIN	**A QUIET SCOTTISH VILLAGE**
	02 : 37
EXT ROSLIN INSTITUTE	**IN 1997, THE ROSLIN INSTITUTE NEAR EDINBURGH ANNOUNCED THE BIRTH OF THE FIRST, CLONED, ANIMAL.**
DOLLY CU	**DOLLY THE SHEEP BECAME AN OVERNIGHT SENSATION.**
ESTABLISHING PAN	**THE BRITISH SCIENTISTS WHO MADE HER ALSO FOUND THEMSELVES IN THE WORLDS SPOTLIGHT.**
SUPER 02 : 56 PROF. IAN WILMUT Head of Gene Expression Roslin Institute	**02 : 54 I/V SYNC** *Dolly really is a star she must be one of the best known animals in the world ever. And I don't think that's surprising really either for scientists, for the first time we proved that we could take a cell from an adult animal and make a new animal from that cell. Or for the general public this is such a new and exciting observation*.
CU PROJECTOR	**03 : 71 I/V SYNC**
WS THROUGH DOOR FRAME DOWN TO SIMON SUPER 03 : 74	*… She is rather remarkable, she is familiar, she is photogenic and she is a very normal sheep and an extraordinary scientific achievement.*
SIMON BEST Managing Director Roslin Bio-Med	**03 : 33** **BUT NOT ALL THE PUBLICITY FROM CLONING DOLLY WAS WELCOME**
DOLLY CU DOLLY AND GRIFFIN	**03 : 36 SYNC**
SUPER 03 : 39 DR HARRY GRIFFIN Assistant Science Director – Roslin Institute	*… A lot of the coverage initially// was full of speculation about the human cloning and there was a tremendous amount of interest. .*
PROF. IAN WILLMUT	**03 : 35 I/V SYNC** There… there has been been a continuing media interest in the possibility of using this technology to make copies of people prehaps a dictator prehaps an army of identical people these ideas are really nonsensical. If you actually make a copy of a dictator they might turn out to be a person. Because our personalities are only half determined by genes and half determined by personality by enviroment.
04 : 07 ESTABLISHING SHOT WINSTON	
SUPER 04 : 15	**04 : 11 SYNC** *… an understanding of technology*

PROF. ROBERT WINSTON
Professor of fertility Studies

// an understanding of science is crucial to our well being. And what troubles me so much is that so much of this is actually enflamed by the media who fail to look at the basic knowledge that we should actually have.

04 : 03
SO HOW DO YOU MAKE A CLONE LIKE DOLLY

DOLLY CU

04 : 34 I/V SYNC

PROF. IAN WILLMUT

The way that you produce a clone is to take two different cells. //
You have to have an egg which you

CU MICRO SHOT EGGS BEING FLUSHED ONTO MICROSCOPE

take from a sheep at around the time that normally she would be mated.
You remove the genetic information

BILL RICHIE WITH MICROSCOPE
CU REMOVAL NUCLEA

from that egg.

04 : 57
BILL RICHIE AN EXPERT IN MICRO MANIPULATION,

USING A PIPETTE NO WIDER THAN A HUMAN HAIR

CU HAND ON MICROSCOPE

EXTRACTS DNA FROM THE EGG, -

MANIPULATION CU

IT GLOWS WHITE UNDER THE MICROSCOPE.

DNA GLOWING CU

THIS LEAVES JUST THE CYTOPLASM OR EGG WHITE

YOU THEN TAKE A CELL FROM WHAT EVER YOU WANT TO CLONE

SHOT OF SHEEP FROM THE FLOCK OF DOLLY

FOR DOLLY A MAMMARY CELL WAS TAKEN FROM A SIX YEAR OLD SHEEP

THE DONOR CELL IS STARVED, WHICH PUTS IT INTO A QUIESCENT STATE – SIMILAR TO

CU CELL

HIBERNATION.

THIS ALLOWS IT'S GENES TO BE REPROGRAMMED

LAB RESERCHER TRACKING THROUGH DOOR

05 : 26 /V SYNC

SIMON BEST

it was this particular part that was unique to scientists at Roslin. Lots of people have tried to do this but had failed to actually get the reconstructed egg to develop….

05 : 41 I/V SYNC

PROF. IAN WILMUT

the same small pipette can pick up one of the donnor cells in the case of the Dolly grown from the udder of the donor ewe. //

CU BILLY'S SCREEN

Place that next to the egg

05 : 55

MICRO MANIPULATION, CU INJECTION OF DONOR CELL

THE HIBERNATING DONOR CELL IS INJECTED INTO THE STRIPPED DOWN EGG.
WHICH AMAZINGLY REPROGRAMMES IT TO

PICTURE	COMMENTARY / SYNC 4
CU BLURRED MICROSCOPE	**BEHAVE LIKE AN EARLY EMBRYO CELL ONCE AGAIN** **THE RECONSTRUCTED EGG IS PLACED BETWEEN TWO FINE ELECTRODES. AND GIVEN A MILD ELECTRIC SHOCK**
REPROGRAMMED EGG BEING ACTIVATED	
PROF. IAN WILMUT	**06: 14 I/V SYNC.** *What an elctric current does is it fuses the two cells together so it brings in the extra genetic information and it gives the egg a jumpstart to life*
CU EGG UNDER MICROSCOPE	**06 : 24** **THE RECONSTRUCTED EGG BEHAVES JUST LIKE ANY EGG FERTILISED NORMALLY AND THE CELLS DIVIDE INTO AN EMBRYO.**
MARJORIE IN THE LARGE ANIMAL UNIT SUPER 06 : 31 MARJORIE RICHIE Head of Large Animal Unit Roslin Institute	**06 : 30 I/V SYNC …** *It's our role is to put these embryos back into the surrogate mother. We take the animal give it a general anetsthetic and pop the eggs back in …* *//* *At the scanning stage we knew that was special in a way but were not aware of its significance, not that she has been produced from an adult cell. …*
CU SCANNER TWO SHOT WITH SHEEP	
MILLENIUM WHEEL SHOTS BIG BEN REVEALED WIDE OF THE WHEEL	**06 : 54** **BY REVERSING THE BIOLOGICAL CLOCK OF AN ADULT CELL.** **THE ROSLIN SCIENTISTS REWOUND IT'S CYCLE** **TAKING A SPECIALIZED CELL BACK ROUND TO THE START**
ONE CAPSULE	**THE TEAM ARE NOW PLANNING A MEDICAL REVOLUTION**
GV'S OF PEOPLE AT THE WHEEL DR. HARRY GRIFFIN CU CHILDREN SUPER 07 : 21 DR HARRY GRIFFIN Assistant Science Director - Roslin	***07: 07 SYNC*** *// We all start off as a single cell -…. by the time we are born there are prehaps 2 or 3 hundred different cell types. Heart cells, muscle cells // every cell that has a nucleus and almost every cell in our body do, will have a full genetic code of a full complement of about 100 000 genes. but most of the genes are switched off. A muscle cell for e.g. does not need the genes that for e.g. code for brain neuro-transmitters. In most of our cells, most of our genes, prehaps 90% of the genes are switched off…*
PROF. IAN WILMUT	**07: 45 I/V SYNC …** *That's what enables the embryo as it develops to produce muscle and brian and intestine and all the different organs that are necessary for a person or an animal. And the view at the time when we began the project was that it was not possible to reverse those changes.*

CANARY WHARF CLOCKS
SEQUENCE
DR. HARRY GRIFFIN

08 : 04 SYNC
So irrespective of how long a cell's
been specialized, however long have the genes been switched off it seems
possible to re – activate them and turn a cells biological clock to 0.

PROF. ROBERT WINSTON

08 : 19 I/V SYNC
The most important element of the cloning experiment was the notion, undoubtedly, that you can program the nucleus by the technique of transferring it in the nucleus i.e. an egg I think that is fundamentaly important

08 : 35

TRACKING ALONG HOSPITAL CORRIDOR

IF ADULT HUMAN CELLS CAN BE REWOUND BACK TO THE BEGINNING, INSTEAD OF MAKING A WHOLE ORGANISM – LIKE DOLLY –
THEY COULD BE MADE INTO THE TISSUE NEEDED

CU DOCTORS NOTES

TO REPAIR PATIENTS BODIES AFTER ACCIDENTS OR TO CURE DISEASE

CELL DIVISION ANIMATION

WHEN THE BIOLOGICAL CLOCK IS FIRST WOUNDTHE SINGLE CELL DIVIDES AND DIVIDES. INSIDE THIS EARLY EMBRYO ARE CELLS WITH A UNIQUE ABILITY

STILL HUMAN STEM CELL ELECTRON MICROGRAPH

HUMAN STEM CELLS HAVE THE AMAZING POWER TO MAKE ALL THE TISSUE IN THE BODY.

ROSLIN GV
GV LINE OF TREES
ROUNDABOUT WS
CU SIGN

SCIENTISTS IN ROSLIN ARE NOW FOCUSSING ON HOW TO CONTROL STEM CELLS, TO GROW ANY TISSUE AT WILL

PROF. ROBERT WINSTON

09:13 SYNC
// engineering might be used to replaced any /
humans tissue which are damaged,..
through it will be much easier to replace tissues which don't have, if you like, a stucture of an organ. So it may be difficult to replace a kidney or a heart or a lung using tissue engineering at least initially. It might be relatively easier to replace liver tissue or possibly fat tissue or maybe even muscle tissue because there you might expect, given the right genetic influences, to get the tissue to grow in a uniform manner...

10:03

NANCY ESTABLISHING SEQUENCE
CU SHAKING HAND
WS NANCY WITH CLOCK

MANY OF US WILL SUFFER FROM DISEASES LIKE DIABETES, LUKEMIA, STROKE OR PARKINSON'S.

PAN ACROSS NANCY'S FACE

IF ANY ONE OF OUR CELLS STARTS TO FAIL, THIS FORMS THE BASIS OF DEGENERATIVE DISEASE.

10:14 I/V SYNC

SUPER 10:18
NANCY WILLIAMS

…// I had tremor in my small finger my little finger /
and I thought I had a sports injury.
So I went to the doctor, and after I actually told him my father also had Parkinson's and I hated tremors he clicked and said sit down we better send you to a neurologist…//

CU NANCY'S HAND

I had the diagnosis as young onset Parkinson's. Which was a hell of a shock.

10:44

ROSLIN LAB SHOT TRACKING

BUT COULD ROSLIN'S DREAM OF REPLACING SKIN, BRAIN OR BLOOD CELLS IN DISEASED BODIES EVER <u>REALLY</u> WORK.

CU CULTURE TRAY

IN CAMBRIDGE SCIENTISTS THINK IT WILL

BRAIN REPAIR CENTRE ESTABLISHING SEQUENCE CLIVE SVENDSEN

AT THE INTERNATIONALY RENOWNED BRAIN REPAIR CENTRE.
THEY ARE ALREADY DEVELOPING NEW NERVE IMPLANTS TO HELP PATIENTS…

SUPER 11:02
DR. CLIVE SVENDSEN
Wellcome Trust Research Fellow

11:07 I/V SYNC

Traditional approaches to treating the neuronal diseases relied largely on administering drugs to replace chemicals missing in the brain. A good example of this is Parkinson's where the chemical missing is dopamine and the loss of it causes rigidity and problems with movement. //

NANCY WILLIAMS SHOTS

… the analogy is like loosing the oil in the engine of a car. Once the oil is lost the car seizes up and it can't move. You put the oil back in and the car will drive off again.

11:32

CAMBRIDGE CU'S CHEMICALS

AT THE MOMENT DRUGS ARE USED TO TARGET DAMAGED CELLS.
BUT THIS MEANS SOAKING THE WHOLE BRAIN IN THE MISSING CHEMICAL WHEN ONLY ONE PART NEEDS IT

CELL THERAPY IS A <u>NEW</u> APPROACH.
IN THE FUTURE TISSUE WILL BE GROWN TO MATCH THE FAILING CELLS, THEN TRANSPLANTED INTO PATIENTS.

CU NEEDLE CASES IN UV LIGHT

DR. CLIVE SVENDSEN

11:50 I/V SYNC

…in cell therapy we actually rplace the dopamine calls lost rather than inseting the chemical back.

(VO13)
THE CURRENT WORK IN CAMBRIDGE IS WITH RAT MODELS, TO FIND A CURE FOR PARKINSON'S.

CU COMPUTER GFX
DR. CLIVE SVENDSEN

SYNC 12:01

The recent excitement with stem cell biology has made

that //
this one step closer. Here in Cambridge we work with cells that we isolate from the foetus…//

CU'S STEM CELLS IN FLASK

and we grow these cells in culture flasks as spheresand they get bigger and bigger

CU MICROSCOPE CLIVE ENTERS SHOT

…each sphere may have up to a 100,000 individual stem cell within it.
…We take a whole sphere and we put it in another culture dish

CU TIMELAPSE STEM CELLS IN CULTURE

…

12:32
HERE THE STEM CELLS ARE GROWING INTO BRAIN CELLS

DR. CLIVE SVENDSEN

SYNC 12:37
…. It is almost poetic when you see cells. They look like trees growing in the garden and they've got branches developing and to try how those branches interact to make thoughts -

BLURRED TREE SHOT

WS OAK TREE

12:43
THE CULTURED STEM CELLS ARE THEN SIMPLY INJECTED INTO THE AREA OF THE RATS BRAIN DAMAGED BY DISEASE

CU RAT EATING FOOD

MIRACULOUSLY THEY GROW INTO MATURE NEURONES IN THE RATS

GROWING STEM CELLS TIMELAPSE

ONE FOETUS CAN PROVIDE THOUSANDS OF STEM CELLS WHEN GROWN IN CULTURE. BUT AS YET, WHEN TRANSPLANTED THEY FAIL TO PRODUCE THE MAGIC DOPAMINE.

SO TO TREAT PEOPLE IN THIS WAY IS MORE DIFFICULT.

FOR THE BRAIN CELLS TO PRODUCE THE MISSING CHEMICAL. THE STEM CELLS MUST BE TRANSPORTED FROM ABORTED FOETUSES.

LAB SHOTS CU BOTTLE

WS TECHNICIAN
CU CULTURE TRAY

BUT, TRIAL OPERATIONS HAVE GIVEN REMARKABLE RESULTS

PROF. ROBERT WINSTON

13:22
…neuronal transplant for Parkinson's disease has been going on using foetal tissue//
for some time and it certainly does work. It works up to a limited extent. I have one friend actually who is an extremely well know author who developed very, very severe Parkinson's disease, whose life, I mean it has been pretty well saved by neuronal transplantations.

DR.CLIVE SVENDSEN

13:46 I/V SYNC
Every patient requires five foetuses in order to achieve transplant on one side of their brain. This has really restricted the method and this type of approach to very small centres and very small numbers of patients.

PROF. ROBERT WINSTON

14:04 I/V SYNC
… I think there are quite legitimate ethical reasons and objections to using foetal tissue, because there I think you are tampering and destroying human life.

14:16

AMERICAN FOOTAGE OF OPERATION
CU OF DOCTORS WATCHING A SCAN

ALTERNATIVES TO USING FOETAL TISSUE, FOR CELL REPLACEMENT THERAPY, RECENTLY BEGAN AT THE UNIVERSITY OF PITTSBURGH MEDICAL CENTRE.

WS PREPARING THE SHEET

THIS IS THE WORLD'S FIRST CELL REPLACEMENT OPERATION FOR A PARALYSED STROKE PATIENT.

CU APPLYING THE BRAIN FRAME

INSTEAD OF FOETAL TISSUE, SURGEONS ARE EXPERIMENTING BY INJECTING CULTURED NEURAL CELLS INTO THE BRAIN.

MS PREPPING THE NEEDLE

A NEEDLE SYRINGE DIRECTS THE CELLS IN AND AROUND THE AREA OF THE STROKE, USING THE SAME TECHNIQUE AS THE PARKINSON'S TRIALS.

CU NEEDLE

INJECTION INTO THE SKULL CU.

RESEARCH IS AT AN EARLY STAGE AND RELIES ON GROWING A LARGE BATCH OF THE SAME CELLS TO TREAT EVERYONE.
BUT, COULD TREATMENT BE PERSONALIZED TO GROW TISSUE FROM THE PATIENTS OWN HEALTHY CELLS

GV OF LAB PAN ROUND TO EMPTY ROOM

THE ROSLIN TEAM THINK SO.

CU PIPPETES

THE LATEST RESEARCH IN SCOTLAND HOPES TO TAILOR THE TREATMENT INDIVIDUALLY.

TRACKING SHOT FOLLOWING RESEARCHER

USING A TECHNIQUE SIMILAR TO THE CLONNING OF DOLLY. THEY WANT TO FUSE A PATIENT'S HEALTHY CELL WITH A HUMAN EGG.

PAN LAB SHOTS ROSLIN

AFTER A FEW DAYS THE STEM CELLS COULD BE EXTRACTED FOR TRANSPLATION.

AS A CLONE OF THE PATIENT – THE NEW TISSUE WOULD BE A PERFECT MATCH

SUPER 15:26
SIMON BEST
Managing Director Roslin Bio-Med

15:25 I/V SYNC
… The vision would be that we can take a healthy skin cell for instance from a patient who is starting to suffer from Parkinson". We would techniqes that we know from animal clonning, to reprogram the healthy skin cell into a new poulation of replacement cells for the damaged cells in the patient's brain..

DR. CLIVE SVENDSEN

15:49 **I/V SYNC**
The work that Roslin is doing now is very fascinating and of interest to us because we would like to reprogram human stem cells in order to make

them into dopamine neurones.

CU LAB SHOTS LIQUID NITROGEN
MS SHADOW ON WALL

16:02
… EVEN WITHOUT ETHICAL CONCERNS, THE DIFFICULTY OF GETTING LOTS OF HUMAN EGGS TO REPROGRAM OUR ADULT CELLS IS NOT A PRACTICAL WAY TO TREAT THE <u>MILLIONS</u> OF PATIENTS WHO COULD BENFIT.

CU GLOVED HAND EXTRACTING EGGS

CU HAND PLACES TRAY DOWN

THE MIRACLE OF DOLLY COULD ONCE AGAIN HOLD THE KEY

CU FACE IN MASK

ROSLIN INSTITUTE THINK THAT INSTEAD OF EGGS, HUMAN STEM CELLS ALONE <u>COULD</u> RE-PROGRAM THE PATIENTS CELLS.

LOW ANGLE SHOT REPLACING THE DRUM IN THE FRIDGE

SUPER 16:23
PROF. IAN WILMUT
Head of Gene Expression Roslin Institute

16:21 SYNC
… If we can identify //
what it is that an egg does to the genetic information. If we can find ways of mimicking it without using an egg then we will have ways of being able to offer people for example the nerve cells, which are needed, to correct Parkinson's Disease.

DE-FOCUSSED TAXI REAR LIGHTS

16:40
ONCE A HUMAN CELL HAD BEGUN ITS LIFE CYCLE – THE FINAL DESTINATION ALWAYS <u>SEEMED</u> PERMENENT,

UNDERPASSES TRAFFIC LIGHTS ANALOGY OF CELL JOURNEY

IT WAS DESTINED TO STAY A BLOOD MUSCLE, BONE OR SKIN CELL

SADDLE SHOT IN TUNNEL BIKES PASSING IN MIDDLE DISTANCE

BUT ROSLIN'S RESEARCH SHOWS THAT CELLS CAN BE TRANSPORTED BACK TO THE BEGINNING, AND REPROGRAMMED TO GO IN A NEW DIRECTION –

REVERSED INVERTED UNDERPASS LIGHTS ONE BLINKING IN SLO MO

AS A COMPLETELY DIFFERENT NEW CELL

PROF. IAN WILMUT
CU TRAFFIC LIGHTS THROUGH WINDSCREEN AND RAIN CHANGING PHASE TO GREEN

17:05 SYNC
/ Cell therapy will depend on being able to take a healthy cell from the patient and reversing this process right back to the beginning before we control it to go down the particular path we want. To produce Islet cells for with Diabetes Neurones for Parkinson's heart muscle for people who've had heart attacks. It depends first of all and taking it all the way back to the beginning before it comes up a different route.

TRACKING HOSPITAL CORRIDOR SHOT

PAN IN LAB IN ROSLIN

COLIN TUDGE ESTABLISHING TILT AND PAN

17:37 SYNC
/ It seemed as if the only way to do it was to use the embryo tissue because only the embryo tissue//

SUPER 17:42
COLIN TUDGE
Biologist and Author

has the potential to grow in any other kind of tissue. Well now with the technique that produced Dolly in theory it becomes possible to turn any kind of tissue into any other kind of tissue so you can miss out the embryo stage all together. It really seems to me if you use this advanced technique that you raise no real

ethical problems at all.

SUPER 18:01
DR. HARRY GRIFFIN
Assistant Science Director Roslin Institute

18:01 SYNC I/V
it may be possible to identify people who are at risk from the sort of diseases that cell therapy could treat. In those circumstances you could imagine a proportion of population banking cells – you could take cells from the umbilical cord of a new born child and bank those cells in the expectation that they might be needed // 30, 40 or 50 yr.

CU SLOMO MOFUTURISTIC SHOTS OF MODELS
INNUTOPIA

18:28
IN THE FUTURE RE-PROGRAMMING OUR OWN CELLS WILL MAKE GROWING FRESH SUPPLIES OF SIMPLE TISSUE POSSIBLE

2 SHOT NUTOPIA

CELL REPLACEMENT THERAPY COULD FINALY PROVIDE TRULY EFFECTIVE MEDICINE.

2 SHOT REVERSE
DE-FOCUSSED THROUGH LIGHT SCULPTURE

BUT WOULD IT REALLY BE POSSIBLE TO ENGINEER WHOLE ORGANS OR <u>LARGE BODY PARTS?</u>

PROF. ROBERT WINSTON

18:47 SYNC
There're better scientists than myself who seriously belive that growing organs in culture may be possible. … Whether we will grow a heart, or a lung //

CU MODELS CHIN IN UV LIGHT

CU MODELS EYE

or a kidney in my lifetime I think is fairly dubious. But there are serious attempts being set up in laboratories to try and do that.

COLIN TUDGE

19:01 SYNC I/V
It's a tremendos thing to be able to produce cells of any kind you want in culture from any other kind of cell, that's amazing. But to produce organs, whole organs is one or two or several steps further on. How are you gonna turn this sheet of cells into a three dimensional organ. One way that's been poposed is to take a plastic model and let the cells grow over it. But the plastic model would be bio-degradable so that would disappear //

CU MODEL'S HAND IN SILHOUETTE NUTOPIA

and all you'd be left with would be the facsimile of the original organ

CU CARDIOGRAPH

19:33 SYNC … *Lets imagine a heart for example you'd need muscle,*

PROF. IAN WILMUT
CU HEART OPERATION IN SLOMO

you need nerve, //

IN VIS

you need various bits of connective tissue. And the cells that line the blood vessels at the very least. So you have to get different cell types, you then have to get them to arrange themselves in a three dimensional structure which is immensely complex, and grow out to something which is larger by far than anything which had ever been grown at the present time. It may be possible one day. But I honestly think that is very far into the future

20:08 SYNC I/V

PROF. ROBERT WINSTON

… And a lot, I think, will depend on our understanding of

the genetic control of how these particular organs develop and that might be the key to much of this work.

20:19 SYNC I/V
I try never to say never about what might happen because of scientific research because after all remember people said that just a few years ago that it would be impossible to produce a clone like Dolly. But having said that I do think that the idea of trying to grow a whole organ is really very ambitious….

20:37

FUTURE BABY PAN AND TILT CU

WE ALL START LIFE AS A SINGLE FERTILISED EGG WHICH GROWS TO PRODUCE A WHOLE PERSON. STEM CELL RESEARCH IS AT THE CORE OF UNDERSTANDING THAT PROCESS. JUST A FEW YEARS AGO THE IDEA OF TAKING PATIENT'S CELLS AND TURNING THEM INTO ANY TISSUE NEEDED WOULD HAVE SEEMED PURE SCIENCE FICTION

DE-FOCUSSED FUTURISTIC SHOTS NUTOPIA COMPUTERS
MS TILT TO COMPUTERS

CU OF NUTOPIA SCREENS

SYNC 20:55

SUPER 21:01
SIMON BEST
Managing Director Roslin Bio-Med

// This area of techology has the potential for abuse but //
there are much more everyday technologies which can be abused the chlorine that cleans up or drinking water was used as a gas in First World War as weapons. So I don't think there is anything unique in these particular technologies in there potential for abuse

DR. HARRY GRIFFIN

21:24 SYNC I/V
Cloning does raise a large number of ethical issues. Some people have suggested that what we do is unnaturalor is playing with God. I think that mankind has been trying to improve on nature for 5 to 10 thousand years. Certainly in the last century we have had some major medical breakthroughs that have benifited everyone – vaccinations and antibiotics for e.g. We belive that our work is in that tradition.

PROF. ROBERT WINSTON

21:51 SYNC I/V
People very rapidly accepted transplantation, and they very rapidly accepted in-vitro fertilization. It was only within a few years of Louise Brown's birth that people widely belived IVF was a good thing.

COLIN TUDGE

22:04 SYNC I/V
In the very long term these technologies are actually going to transform all of medicine. And when we are talking about replacing damaged tissue replacing damaged organs. In a sense that is only the beginning. The real point is that as all the technologies are coming together we are coming to understand very fundamental processes. Why cells grow the way they do why they differentiate why cancer cells arise – that's one of the most intractable these days – why does the aids just simply takes off. When we understand how the cell really works we will be able to get on top of all these diseases. And this kind of technology is really taking us

into the areas of knowledge that will enable us to do that.

PROF. ROBERT WINSTON

22:40 SYNC I/V
I come from a tradition which belives that, that part of that divine spark is our intelligence and our inventivness and that was actually a God given tool. And that to fail to use that actually is a mistake. It's true that the knowledge can be put to evil use as well as to good use but only if you don't have the knowledge you can't decide. And the key aspect of our morality is that, is our sure, our ability to have a free will, the ability to chose between good and evil. So without that knowledge you can't begin to chose. So you're not human.

LONG TRACKING SHOT OF FUTURE BABY

23:18
OUR CHOICE HAS BROUGHT US TO THE POWER FOR GREATER BIOLOGICAL UNDERSTANDING OF EXACTLY WHAT MAKES US HUMAN

CU BABY TAPPING COMPUTER KEYS

THIS NEW KNOWLEDGE FROM THE RESEARCH INCAMBRIDGE AND ROSLIN COULD GIVE US THE ABILITY TO ALTER THE FATE AND FUTURE GENERATIONS

DR. HARRY GRIFFIN

SYNC
//…
If these expectations come to

CU – BABY TOUCHES SCREEN OF DOLLY WEB PAGE

fruition then that will be a tremendous legacy for the future from essentially a Scottish sheep.

CREDITS

24:01 ENDS

(ROLL CREDITS 1 MIN)