What can we do?

SCIENTIFIC SCISSORS

Make crops grow faster and bigger

Benefits

Will help reduce global food shortages

Risks

Will impact on the local ecosystem

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC & SCISSORS

Make crops resistant to diseases

Benefits

Will reduce the use of chemical pesticides

Risks

Could have unintended consequences on food safety

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make crops resistant to pests

Benefits

Will reduce the use of chemical pesticides

Risks

Could have unintended consequences on food safety

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make crops that can survive drought

Benefits

Will protect us from some of the effects of climate change

Risks

Will impact on the local ecosystem

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make crops that can live in salt water

Benefits

Will allow crops to be grown even when there are rising sea levels

Risks

Will impact on the local ecosystem

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

Use algae to create biofuels

Benefits

Will be a source of renewable, carbon neutral fuel

Risks

May slow development of other green energy sources

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Use bacteria to create drugs and medicines for human use

Benefits

Can produce drugs cheaply and on a large scale

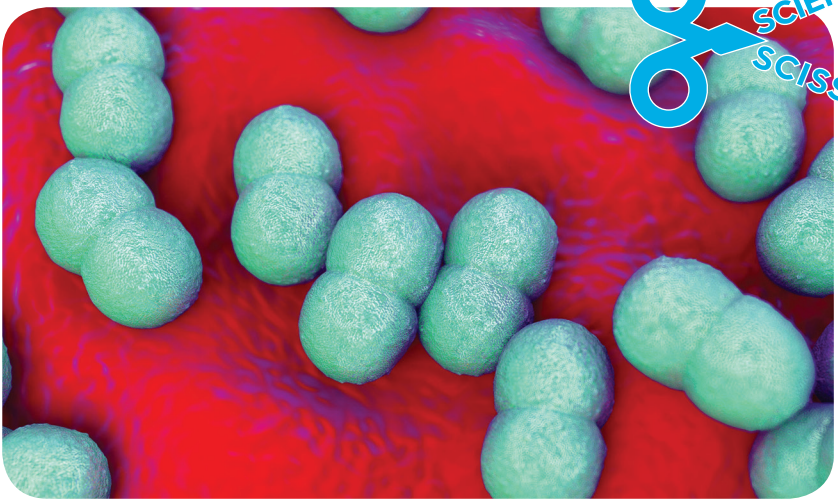
Risks

Could affect wild bacteria if not controlled carefully

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?



Use bacteria to create materials and chemicals for use in industry

Benefits

Able to produce new materials, cheaply and quickly

Risks

Could affect wild bacteria if not controlled

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Adapt animal organs so they can be transplanted into people (xenotransplantation)

Benefits

Will provide organs for people who need transplants

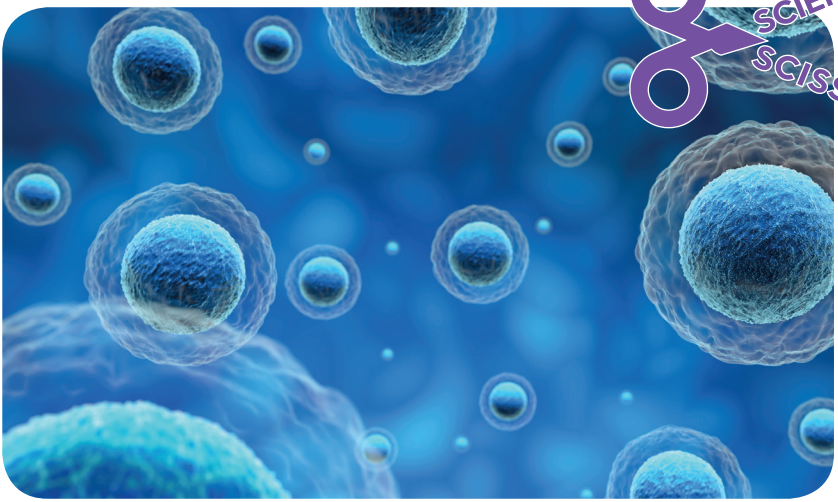
Risks

Could have unintended consequences on health

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?



SCIENTIFIC & SCISSORS

Research human health and disease in a lab by editing human cells

Benefits

Can help develop cures for diseases and help us understand how our bodies work

Risks

Human cells in a lab may not act the same as cells in the body

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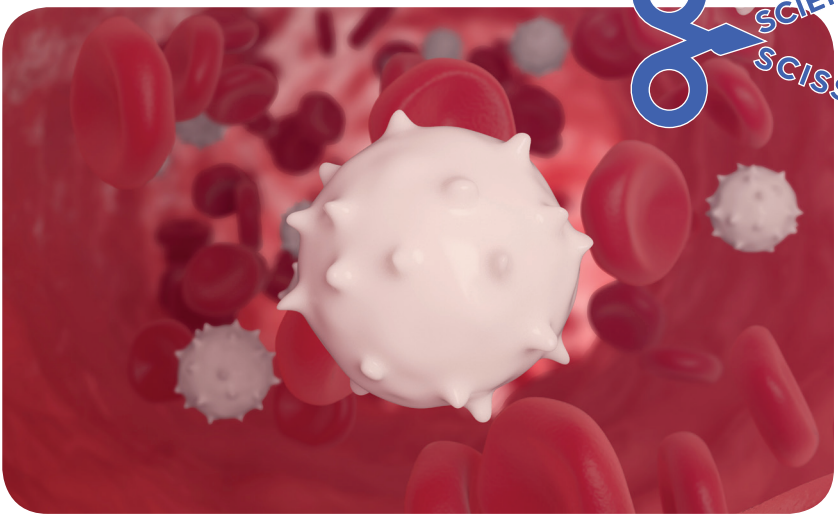
What can we do?



Edit white blood cells to treat HIV

Benefits

Uses a patient's own blood cells to help fight the disease

Risks

Could have unintended consequences on health which would be difficult to reverse

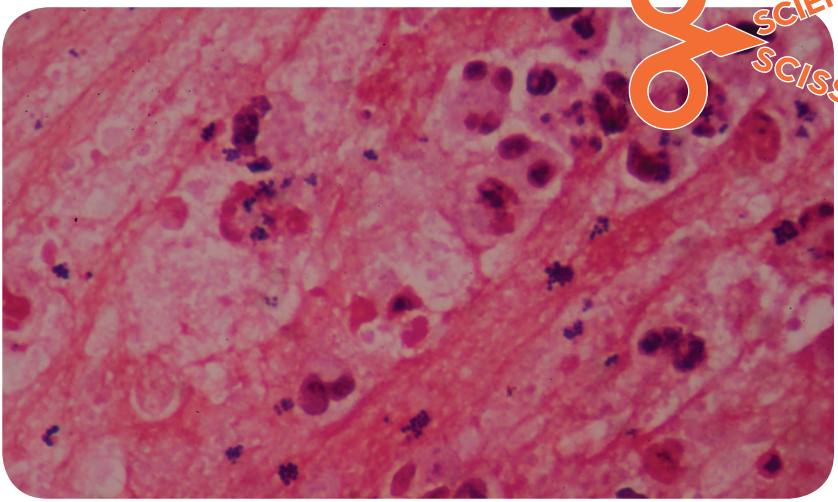
SCIENTIFIC SCISSORS

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS



Stop children getting cystic fibrosis by editing an embryo

Benefits

Cures the disease

Risks

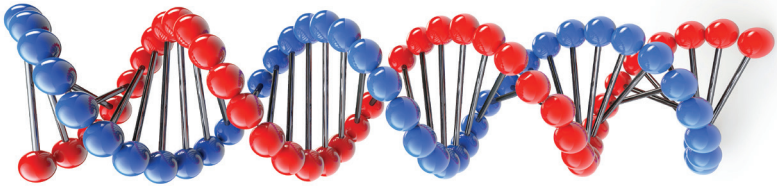
Any mistakes or errors would be passed on to the patient's children

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS



Edit embryonic genes to reduce the risk of getting a disease

Benefits

May reduce the likelihood of getting a disease

Risks

Other factors may be involved and may lead to less cautious behaviour

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make athletes stronger and faster

Benefits

Would make the Olympics awesome

Risks

Only the richest countries would win

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make fruit and vegetables that have better nutritional content

Benefits

Could help reduce deficiency diseases in many areas around the world

Risks

Could have impacts on the local ecosystem and unintended safety issues

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Create chickens that only produce female offspring to increase egg production

Benefits

Would make eggs cheaper and more plentiful

Risks

Is creating an artificial population

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC & SCISSORS

Make hornless cattle that can be kept in a confined space

Benefits

Makes it safer to house cattle in a high density

Risks

Encourages cruelty to animals

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Create more docile animals that are easier to keep

Benefits

Makes farming easier and safer

Risks

Could have unexpected consequences on food safety

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Edit mosquitos so that they cannot transmit malaria or Zika virus

Benefits

Could prevent mosquitoes spreading these diseases

Risks

Once released, would be almost impossible to stop and could have unintended consequences

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Edit mosquitos so that they cannot reproduce and therefore the population is wiped out

Benefits

Would stop them spreading disease

Risks

Mosquitos are food for many other animals, so would affect the food chain

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Reintroduce an extinct species

Benefits

Would be really cool

Risks

Watch *Jurassic Park*

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Let people do genetic experiments at home

Benefits

Would help people learn about molecular bioscience and increase innovation

Risks

They could create dangerous bacterial strains

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Edit people to protect them against chemical warfare

Benefits

Would protect people from the effects of war

Risks

Could cause a biological arms race

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Produce biological weapons

Benefits

Cheaper to manufacture

Risks

Indiscriminate mass destruction

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make crops that are resistant to warmer global temperatures

Benefits

Would help reduce global food shortages caused by climate change

Risks

Could have unintended consequences if cross-bred with natural varieties

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Edit bacteria so that it can produce enzymes for use in laundry detergent

Benefits

Could make detergent more effective at lower temperatures, therefore saving energy

Risks

Could impact on the environment in waste water

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Create mice with cancer so that we can study how to cure it

Benefits

We already do this, but it will now be easier and quicker

Risks

Encourages greater use of experiments on animals

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make extra hairy goats to make them better at producing wool

Benefits

Would increase wool production, making clothes cheaper

Risks

Is it cruel to the goat?

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Give cows bigger muscles to make more meat

Benefits

Cheaper and more plentiful meat could help reduce global food shortages

Risks

Could have other impacts on the cow's health

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make grass for golf courses that doesn't need weed killers

Benefits

Reduces use of chemical herbicides

Risks

Could create a strain of super grass that cannot be stopped

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make tiny pigs to sell as pets

Benefits

They'd be so cute!

Risks

Should we breed animals just for our own amusement?

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Treat inherited eye diseases and blindness

Benefits

Could restore people's sight

Risks

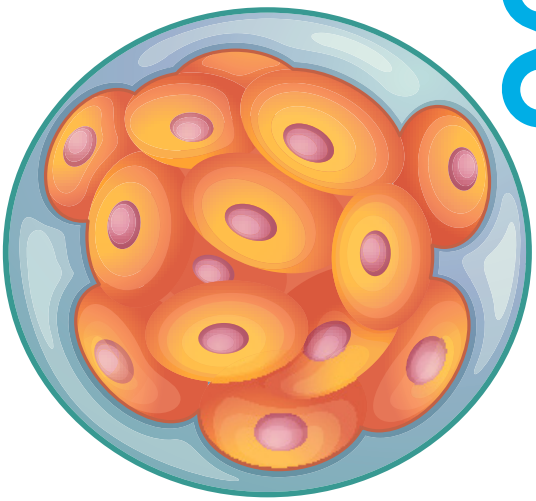
Could have unintended safety issues

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS



Edit human embryos to study what causes miscarriage

Benefits

Would increase our knowledge and safety during pregnancy

Risks

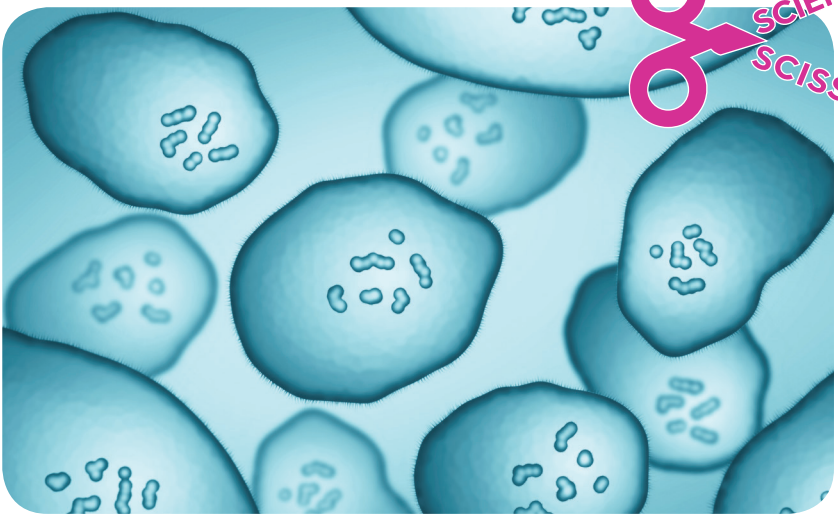
Requires the use of human embryos

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS



Re-sensitise bacteria to antibiotics

Benefits

Would reduce the antibiotic resistance crisis

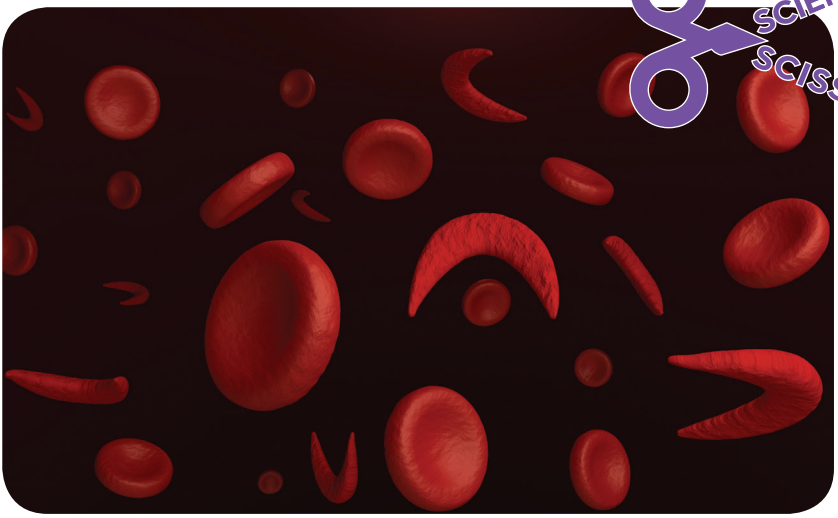
Risks

Could spread to other bacteria that we need to survive – the microbiome

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?



SCIENTIFIC SCISSORS

Cure sickle cell anaemia

Benefits

Cures a nasty disease

Risks

Sickle cell anaemia actually has some benefits in certain populations, for example protecting against malaria

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Create rice which has extra vitamin A

Benefits

Could help people who do not get enough vitamin A in their diet

Risks

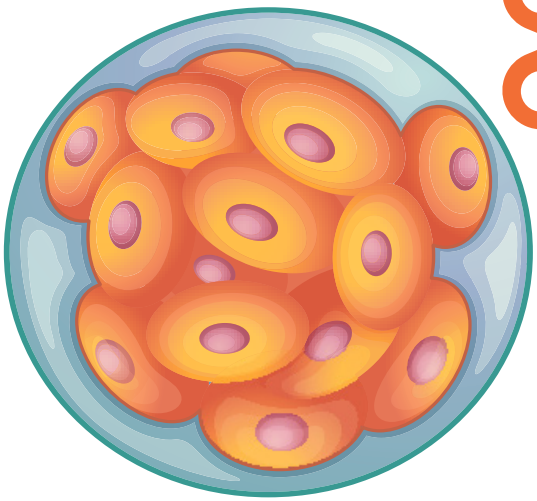
Could have impact on food safety and the local ecosystem

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS



Edit embryos to reduce the risk of getting breast cancer

Benefits

Could reduce the number of people getting breast cancer

Risks

Changes would be passed on down to children and could have unintended consequences

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

Edit embryos to reduce the risk of becoming overweight

Benefits

Could reduce obesity

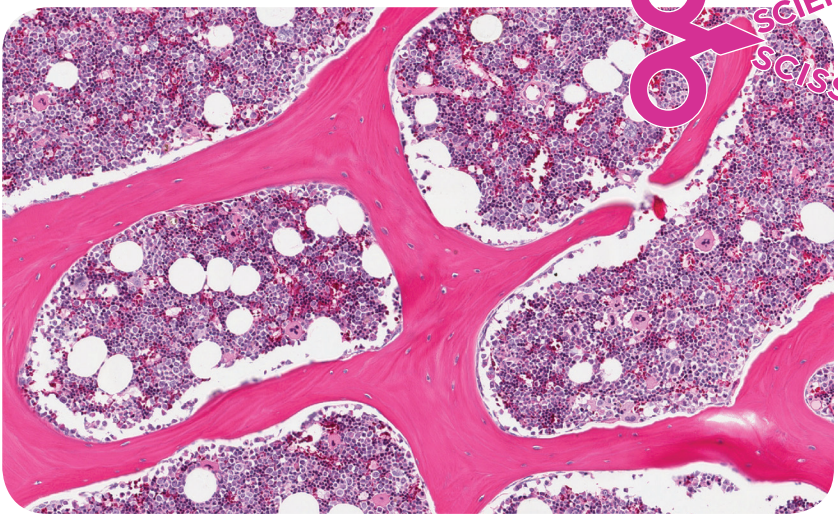
Risks

People may take it as an excuse to eat more food and less healthily

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?



SCIENTIFIC SCISSORS

Edit bone marrow cells to cure leukaemia

Benefits

Cures leukaemia

Risks

Could have knock-on effects on other aspects of health

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Create mice without a particular gene to discover what it does

Benefits

We can learn a lot about human health and disease

Risks

Requires keeping mice and often killing them

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Insert a human gene into a mouse to study the immune system

Benefits

Can help us treat human diseases and find new cures

Risks

Requires keeping mice and often killing them

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC & SCISSORS

Use animals to produce enzymes for people who don't have them

Benefits

Could provide insulin for diabetics, cheaply and on a large scale

Risks

Requires the containment of animals

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy

What can we do?

SCIENTIFIC SCISSORS

Make fluorescent pets

Benefits

Would make great Christmas presents

Risks

Involves adding jellyfish genes into the animal, therefore creating a genetic hybrid

BIOCHEMICAL SOCIETY

British Society for Gene & Cell Therapy