

# CONTROVERSIES OVER BIOTECHNOLOGICAL ISSUES

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4.1. Read the following opinions about biotechnology and biotechnological applications. With your partner decide which two opinions you agree with, which two you partially agree with and which two you disagree with and why. Remember to provide arguments to support your opinions. Use the expressions from the table in your discussion.

Expressing opinion	Asking for opinion	Agreeing / disagreeing
I think / I believe / I feel ...	Do you agree with this statement?	I agree with this idea ...
As far as I am concerned ...	What do you think of ...?	I partially agree with this idea ...
My point of view is that ...	What is your opinion about ...?	I disagree ...
It seems to me that ...	What are your views on ...?	I can see your point but ...
In my view ...	How do you feel about ...?	I couldn't agree more on that ...
From my point of view	What is your position on ...?	I am unconvinced that ...

*Using biotechnology to prolong one's life can be perceived as selfish.*

*Genetic modifications of animals resulting in for example greater milk production lead to improved productivity for farmers and ultimately lower costs for the customer.*



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**4.2.** Predict whether the following statements about Dolly are TRUE or FALSE.

1. Dolly's embryo carried all the nuclear chromosomes from the host egg cell. \_\_\_\_\_
2. Dolly's existence supports the old theory about embryonic development. \_\_\_\_\_
3. Dolly's special because she proves that cells from an adult organism can generate a new organism. \_\_\_\_\_

**4.3.** Read the text to check your answers.

### DOLLY'S STORY

#### How was Dolly Created?

To create Dolly, Ian Wilmut of the Roslin Institute in Edinburgh, Scotland, and his colleagues used a cell derived from the udder of a six-year-old sheep in the final stage of pregnancy. The researchers fused the adult udder cell with an oocyte that was ready to be fertilized, but taken from a different sheep. The scientists had previously removed the nucleus from the oocyte, and they used an electrical current to fuse it with the udder cell. The key to Dolly's success was to make the nucleus of the donor cell 'quiet' so that it stopped behaving like an udder cell and could be reprogrammed to become an embryo. The resulting embryo – which became Dolly – carried all of the chromosomes from the donor udder cell and none of the nuclear chromosomes from the host egg cell. Therefore, Dolly is an exact genetic copy – a clone – of her donor-cell 'mother'.

#### Why is Dolly so special?

While some people worry about cloning humans, most scientists celebrate Dolly. Her very existence contradicts a long-standing idea about embryonic development, and scientists enjoy research results that turn an old theory upside down. However, it is important to remember that the researchers in Scotland tried 277 times to create cloned sheep, and they succeeded only once. They are still trying to improve the techniques used to create Dolly.

Dolly is special because she disproves the notion that cells from an adult animal are too specialized to generate a new organism. Researchers have known for a long time that during embryonic development, cells become specialized because some of their genes are turned off (inactivation) and others are turned on (activation). Before Dolly, scientists thought that many genes in adult cells are permanently turned off. They believed that only the genes in the fertilized egg, embryo, or very young animal are totipotent – all-powerful, fully activated, and capable of generating a new organism. But Dolly, it seems, proves the old theory wrong.

(abridged from [www.science.education.nih.gov](http://www.science.education.nih.gov))

4.4. Summarise the text above in your own words. Try to answer the same two questions: ‘*How was Dolly Created?*’ and ‘*Why is Dolly so special?*’

4.5. With a partner discuss this statement from the text: ‘*While some people worry about cloning humans, most scientists celebrate Dolly*’. Give your reasons.

4.6. How has cloning developed since the end of the 1990s when Dolly was created? Discuss the question with a partner.

### Language review: TENSES

The text provides examples of variety of tenses:

**PAST SIMPLE** to talk about finished actions in the past:

*...Ian Wilmut of the Roslin Institute in Edinburgh, Scotland, and his colleagues **used** a cell derived from the udder of a six-year-old sheep...*

**PAST PERFECT** to talk about actions which happened before other actions in the past:

*The scientists **had** previously **removed** the nucleus from the oocyte, and they **used** an electrical current to fuse it with the udder cell.*

**PRESENT SIMPLE** to talk about general ideas, concepts, opinions and facts:

*While some people **worry** about cloning humans, most scientists **celebrate** Dolly.*

**PRESENT CONTINUOUS** to talk about actions currently in progress:

*They **are still trying** to improve the techniques used to create Dolly.*

**PRESENT PERFECT** to talk about experiences or actions which began in the past and are not finished:

*Researchers **have known** for a long time that...*

4.7. Put the verbs in brackets into the correct verb forms. Use the tenses from the Language review box.

- Many simple organisms such as bacteria \_\_\_\_\_ (reproduce) themselves by copying their DNA and splitting in half.
- In February 1997, researchers in Oregon \_\_\_\_\_ (produce) two Rhesus monkeys using laboratory techniques that \_\_\_\_\_ (previously, work) with frogs, cattle, and mice.
- The scientists \_\_\_\_\_ (spend) many years developing their experimental techniques, which are still far from perfect.
- Now they \_\_\_\_\_ (try) to modify a sugar molecule that appears on cell surfaces in most mammals – but not in humans and their close primate relatives.
- In 1960s other researchers \_\_\_\_\_ (experiment) with the African clawed frog, *Xenopus laevis*, and \_\_\_\_\_ (win) a Nobel prize for their research.

Q 4.8. Before listening discuss the following question with a partner.

*What are the potential applications of cloned animals?*

After listening compare your answers with what you heard. Then read the audio script to make sure you have discussed the enumerated applications.



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4.9. Read these short definitions and answer the questions below them.

**A DESIGNER BABY** is a baby whose genetic makeup has been artificially selected to ensure the presence or absence of particular genes or characteristics.

(based on [www.wikipedia.org](http://www.wikipedia.org))

1. Should parents be allowed to ‘design’ their children? If yes, under what circumstances?
2. Do you think this could make the parents and children happier?
3. Will people be healthier if they are ‘designed’?
4. Will it create more beautiful people?

**A SPARE PART CHILD** is usually a second child of a couple who has already had one child with a serious disease. Parents use IVF (*in vitro* fertilization) to select embryos so that the second child would be a perfect organ, bone marrow or blood donor for their older sibling.

(based on [www.bionetonline.org](http://www.bionetonline.org))

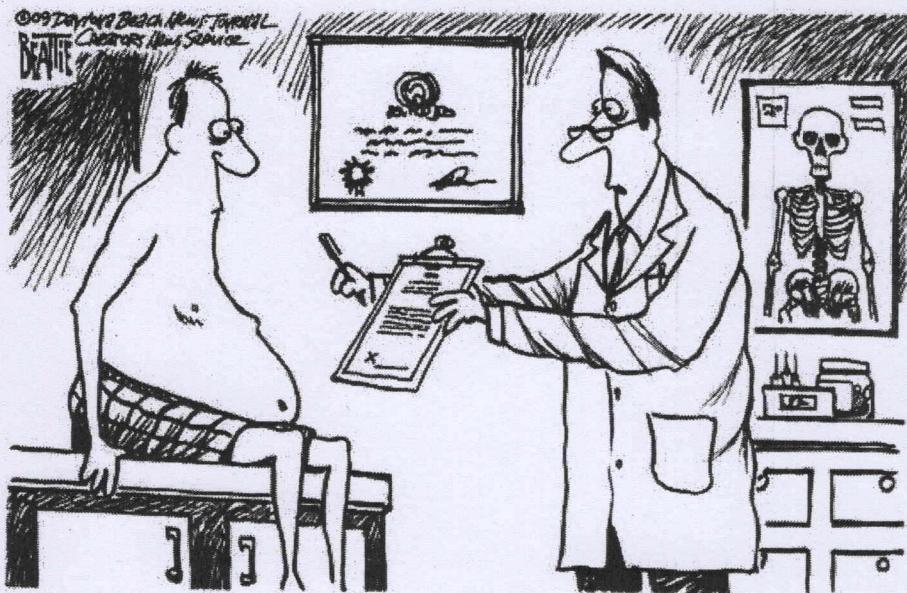
1. Do you consider this practice to be ethical?
2. How do you think a child could feel when they learned they were born as a spare part child?
3. Should this lead to imbalance between the rich and the poor who will not be able to afford such genetic techniques?
4. How can this fact influence the relationships among family members?

4.10. Read this short text about stem cells and stem cells research together with the two opinions below and comment on them.

**STEM CELLS** – are cells found in every body but are much more numerous in a fetus, in other words they can themselves become or create other types of cells such as blood cells, brain cells, tissue cells, muscle cells and the like. The stem cell research proposes to use stem cells to repair or replace damaged tissues in order to treat an extremely wide range of conditions such as Parkinson’s disease, heart disease, spinal cord injuries and many others.

(based on [www.wikipedia.org](http://www.wikipedia.org))

1. ‘Stem cell research is highly unethical as it relies on the destruction of young human life.’
2. ‘It is an essential field to make advances in biomedical research to treat numerous diseases.’



**"The cure to your disease came from stem cell research. Sign here if you wish to refuse treatment for moral, religious or ideological reasons."**

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## GLOSSARY

bone marrow – szpik kostny

contradict – przeciwstawić się, być sprzecznym z

designer baby – dziecko genetycznie zaprojektowane

disprove – obalać

disrupt – zakłócać, przerywać

fertilise – zapładniać

fetus – płód

fuse – łączyć

genetic makeup – budowa genetyczna

host – żywiciel

oocyte – oocyt

perceive – postrzegać

primate – ssak naczelny

sacredness – świętość

sibling – rodzeństwo

spinal cord – rdzeń kręgowy

stem cell – komórka macierzysta

totipotent – totipotentjalny

udder – wymię