Woman gives birth using ovaries she had frozen as a child

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The UK papers today welcome news of a world first in fertility treatment. As The Guardian concisely summarises: "A young woman in Belgium has become the first to give birth to a healthy baby after having her fertility restored by a transplant of ovarian tissue that was removed and frozen when she was a child".

The woman was born with [sickle cell anaemia](http://www.nhs.uk/conditions/Sickle-cell-anaemia/Pages/Introduction.aspx), a serious inherited blood disorder where the red blood cells, which carry oxygen around the body, develop abnormally. This can cause severe pain and organ damage.

Due to the severity of her condition, a decision was taken to perform a[stem cell transplant](http://www.nhs.uk/conditions/Bone-marrow-transplant/Pages/Introduction.aspx).

This involves taking blood stems cells from a healthy donor and transplanting them into the recipient's bone marrow. The donor blood stem cells allow the recipient to make healthy red blood cells, white immune cells and platelets. While this offers hope of a cure, it requires the immune system to be suppressed, which usually destroys the functioning of ovaries, leaving patients [infertile](http://www.nhs.uk/conditions/Infertility/Pages/Introduction.aspx).

A decision was made to take a sample of ovarian tissue and freeze it, to see if could be used at a later date.

The hope now is that a similar technique could be used for other teenagers who require potentially fertility-threatening treatment, such as those with [acute lymphoblastic leukaemia (cancer of the white blood cells)](http://www.nhs.uk/conditions/leukaemia-acute-lymphoblastic/Pages/Introduction.aspx).

Using frozen ovarian tissue to restore fertility has happened before; however, this is the first time a live birth has followed the use of tissue frozen at such a young age.

## What is the basis for these current reports?

News of the success was published as a [case report](http://www.nhs.uk/news/Pages/Newsglossary.aspx#caseseries) in Human Reproduction, a [peer-reviewed](http://www.nhs.uk/news/Pages/Newsglossary.aspx#peerreview) medical journal.

They case study was produced by the Université libre de Bruxelles (Belgium) and funded by the Fondation Belge contre le Cancer and the Fonds de la Recherche Scientifique (FNRS).

## The authors report no conflicts of interest

The UK media reported the story accurately, though the Mail Online seems to have caused confusion among its readers (as can been seen by the comments), by using the headline "World first gives fertility hope to millions of cancer patients". It should have made clear that while the treatment described in the study may be of potential use to teenagers and women with cancer, the case report actually involved sickle cell anaemia, which is a genetic, not a cancerous, disorder.

## What was her medical background?

The case report described an unnamed 27-year-old woman born in the Republic of Congo and diagnosed with sickle cell anaemia at the age of five.

Sickle cell anaemia is a serious inherited blood disorder, where the red blood cells, which carry oxygen around the body, develop abnormally. Mild to moderate cases can usually be controlled with medication. More serious cases require surgery to prevent organ damage.

By 13, and following a move to Belgium, her condition became so severe that doctors in Brussels decided she needed a stem cell transplant. This is a transplant of very early stage blood cells that can then divide and develop into the different types of blood cell.

The transplant is intense and requires the patient's existing immune system to, effectively, be wiped out using chemotherapy or radiotherapy to prevent rejection of the new tissue. The faulty blood and immune cells are then replaced with new, healthy ones from the stem cell transplant. When stem cell transplants are given, the cells can either come from the patient themselves (taken prior to treatment), or from a donor. In this case the person had sickle cell anaemia, so produced abnormal red blood cells. Healthy stem cells were donor cells taken from her sibling.

The strong treatment regimen to suppress the immune system often results in infertility.

Aware of this, the doctors surgically removed and froze 62 fragments of the girl’s right ovary before she started the bone marrow transplant. She was 13 years and 11 months old at the time and had not yet started her periods. However, at around 10 years of age, she had breast development and hormone levels showing signs that she had started puberty.

During treatment, which involved a combination of chemotherapy and other immunosuppressant drugs, her remaining left ovary was damaged and she was infertile. Her periods were artificially induced using drugs at 15 years of age.

The good news was that the stem cell transplant worked, as she was largely cured of sickle cell anaemia.

## What happened in the transplant?

Ten years after the stem cell transplant, she wanted to start a family.

She had robot-assisted surgery to put back the ovarian tissue fragments. Four thawed fragments were attached to her existing left ovary and 11 were grafted on the right-hand side.

Four months later, her hormone levels reached a fertile level, she began having natural periods at five months, and maintained regular periods thereafter.

She was not able to conceive during the first two years after transplant, but this was because of male infertility with her partner.

However, this relationship ended and she was able to conceive naturally with a new partner and delivered a healthy boy in November 2014.

## What do the authors conclude?

The transplant team says: "This case reports the first live birth after transplantation of ovarian tissue harvested before menarche [the first period]."

They add that: "These data highlight the need to further investigate the viability of ovarian tissue transplantation for restoring fertility when the cryopreservation [freezing] procedure occurs before the patient starts puberty."

## What are the implications of this?

The findings are promising for girls who have had ovarian tissue frozen before receiving intensive chemotherapy, radiotherapy or other immunosuppressant treatments, providing hope that they may be able to have a healthy pregnancy and baby in the future. Such intensive treatment may be given not only for blood diseases such as sickle cell anaemia, but more commonly for blood or tissue cancers.

It is, however, important to note that this is a single case study. The study authors say there have been at least 35 live births that have followed women who have had ovarian tissue frozen. This is said to be the first case where a live birth has resulted from tissue obtained at a pre-pubertal or pubertal age. However, it is unclear how consistent the method would be in other girls and women, and it may not work for everyone.

In this case, the girl had breast development and hormone levels suggesting early signs of puberty at the time the ovarian tissue was originally frozen, but had not yet had a period. It seems crucial to establish how early the tissue can be harvested, and whether the stage of puberty influences the chance of success.

## Is this available in the UK?

The [Human Fertilisation & Embryology Authority (HFEA)](http://www.hfea.gov.uk/), which regulates fertility clinics and related research in the UK, states the following about fertility preservation for young cancer patients:

"Pre-pubertal patients who undergo medical treatment which may affect their future fertility may have the option of tissue freezing. This may be an option for young patients who are unable to produce mature sperm and eggs to preserve their future fertility.

"Where treatment involves patients of 16 years and younger, the decision of whether to store a child’s reproductive material may rest with the parents. A practitioner must decide whether a child is able to consent to his or her own medical treatment without the need for parental permission or knowledge."

For further help and advice about fertility preservation, speak with the health professional in charge of your or your child's care.