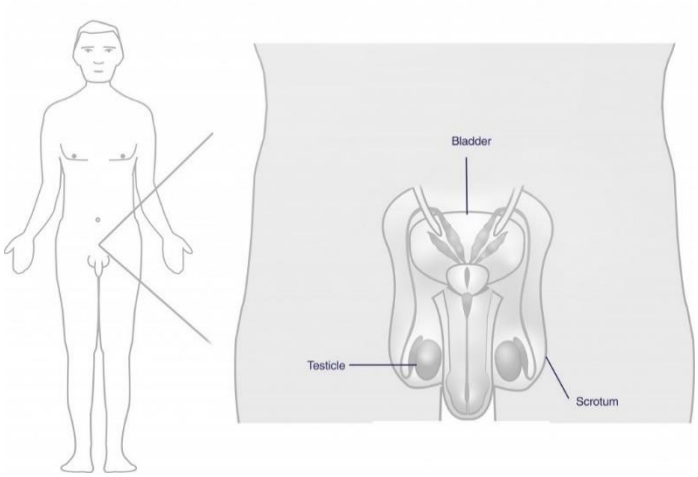
The Royal Children's Hospital Fertility Preservation Service
Testicular Tissue Cryopreservation (TTCP) Information Sheet

What Is Fertility Preservation?
Fertility preservation is a process that has the potential to preserve a person's ability to have a biological child in the future. This includes the freezing of healthy testicular tissue and mature sperm.

Reproduction in Biological Males
The mature testes contain 2 different types of cells, the Sertoli cells and the Leydig cells. The Sertoli cells are responsible for making sperm and the Leydig cells are responsible for producing testosterone. The testicles of a pre-pubertal child do not contain sperm, they contain germ cells. When puberty begins, usually between the ages of 9 & 15, the pituitary gland (located near the brain) secretes hormones (FSH sperm production & LH testosterone) that stimulate the testicles to produce testosterone and mature sperm.



Potential Impact on Fertility
Medical treatments such as chemotherapy and radiotherapy, or conditions in childhood such as genetic conditions, may damage the cells responsible for making sperm. Depending on the severity, this can permanently affect fertility. Your doctor will outline the estimated impact of your child's treatment on their fertility (low, medium or high risk). Unfortunately, it can be difficult to be precise about risk this due to limited data.

How Does Chemotherapy Affect Fertility?
Chemotherapy drugs enter the blood stream and travel around the body searching for cancer cells to destroy. It can also deplete sperm, and sperm-producing cells in the testis.

How Does Radiotherapy Affect Fertility?
Radiotherapy destroys cancer cells. If the testes are exposed to radiotherapy, then both the Sertoli and Leydig cells will be destroyed. Total body radiation has a high risk of causing infertility. If radiotherapy is required to treat a brain tumour, the hormone messages from the brain to the testes can be disrupted or lost.

Testicular Tissue Cryopreservation (TTCP) - How Is This Procedure Done?
TTCP involves the collection of healthy testicular tissue, prior to starting treatment that may harm the testes. It is then preserved and frozen until your child is ready to think about starting a family. This is an experimental procedure. It is important to understand that there is no guarantee that the freezing of testicular tissue will lead to successful pregnancies and/or live births.

The tissue, which contains immature germ cells (Sertoli cells), is harvested via a small incision made in the scrotum, where part of the testicle is removed (approximately 30% of the testicle). The procedure takes approximately 20 minutes and is usually coordinated with another procedure. The incision will be closed with dissolving stitches and will have a small dressing. Recovery time is usually a few days.

Currently, scientists from the Reproductive Services Department at the Royal Women's Hospital (RWH) collect the tissue from theatre and process it at their centre. A small piece is sent for histopathology to see if there are any malignant cells in the tissue. It is then sliced, placed in liquid and frozen until required for future fertility treatment. Sometimes the tissue is dissected for mature sperm in children who are going through puberty.

Using This Tissue In The Future
In the future, it is hoped that the tissue might be utilised via two experimental options. Implanting the tissue back into the body or maturing the tissue outside the body in the IVF lab via a process called In Vitro Maturation (IVM).

Transplanting The Tissue Back Into The Body
Once thawed, the tissue containing the germ cells can be transplanted back onto the testes or another area. It is hoped that these germ cells will start to make sperm. Tissue that has been collected from patients who have been diagnosed with Leukaemia cannot be transplanted due to the risk of malignant cells being present and reintroducing Leukaemia back into the body. For children with Leukaemia we are hoping another technique (IVM) may be utilised.

Maturing The Tissue Via IVM
If the tissue is not suitable to be implanted into the body, we are hoping the tissue can be matured in the IVF lab. An IVF treatment would be necessary to use this sperm to create a pregnancy. IVM is currently experimental.

Who Is Eligible For TTCP?
Theoretically, there is no lower age limit for TTCP and it can be offered to patients of all ages. However, your child needs to be well enough for surgery. Bleeding disorders or serious immune deficiency may preclude your child from having the procedure done.

In a very young child, the testes will usually be very small and it is highly possible that one entire testicle may need to be removed. We cannot guarantee that the testicular tissue collected or the remaining testicle will be functional in the future.

Outcomes So Far
Currently, this procedure is deemed experimental as there are no live births to humans to date. Pregnancy has been achieved with implanted tissue in animal studies but not in humans. We would need Ethical approval for this procedure.

Risks and Benefits
The surgery (Testicular Biopsy, Testicular Tissue Cryopreservation, removal of one testicle) is not experimental as this procedure is performed routinely by surgeons for other indications.

Expected risks of the surgical procedure:

- Risk of a general anaesthetic.
- Infection
- Bleeding
- Haematoma (collection of blood)
- Risk of a second operation to address any of the above issues

What Other Options Are Available?

- If you decide not proceed with fertility preservation, your child can have their testicular function assessed later after treatment is finished.
- Sperm donation from father, brother, male relative or other donor in the future.
- Fostering or adoption.
- For post pubertal males, freezing of mature sperm is an option.

Other Issues to Consider

- Cost of tissue storage: currently the RWH does not charge for the storage of tissue until your child turns 21. After this, there will be an annual storage fee.
- Cost of IVF treatment if required.
- The tissue can only be used by your child and, in the unfortunate event of death, the tissue must be disposed of. The tissue cannot be donated to research or be utilised by anyone other than your child.

Who Do I Contact For Further Information?

For further information, please contact the Oncofertility team at RCH.

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