The Royal Children’s Hospital Fertility Preservation Service

Information Sheet

Testicular Tissue Harvest for Possible Fertility Preservation

The impact of a boy’s cancer treatment on his testis and prospects for fatherhood

Treatment with chemotherapy or radiation can affect male fertility by damaging sperm production. Sperm banking prior to commencing cancer treatment is the only reliable option to preserve and protect the chance of fatherhood for males. However, this is only possible when sperm are being produced after puberty.

Sperm production

Sperm are produced in the testes. During a boy’s journey from infancy to pre-puberty, there is no active sperm production in the testes. Instead, the testis contains immature cells called germ cells. Once puberty starts, the testis increases in size because it starts producing sperm. The testes also produce testosterone the hormone which creates the physical changes that distinguish men from boys.

Mature sperms are produced from mature germ cells. Banking mature sperms therefore becomes possible only from about the age of fourteen, although the exact time varies between boys.

In boys too young to make sperm:

In boys that are too young to make sperm there are experimental options available to collect fragments of the testis by biopsy and storing the tissue containing germ cells by freezing it. The cells are immature. It is hoped that in the future, procedures may be developed to allow development of sperm from the germ cells, to allow the young man to father a child. It is hoped that this might be done via two experimental options:

1. Returning the tissue to the body at a later date (transplantation) or
2. Trying to grow sperm outside the body (in vitro spermatogenesis).

Transplantation would take some of the stored tissue containing germ cells and inject it into the testis during adulthood, in the hope that the germ cells settle in the testis and start to make sperm. Similar procedures have been performed in some animals but so far no procedures have ever been effective in humans. Transplantation also has the risk of transplanting some cancer cells.

In vitro spermatogenesis involves growing sperm in the laboratory but so far no such reliable methods have been developed. It is also unknown how testicular tissue from biopsies should be stored and, if this storage is not suitable, sperm production may not be possible.

Testicular biopsy for fertility preservation is experimental, and is only undertaken at The RCH under special approvals. The only situations at The RCH where we may find it acceptable to store germ cells in a child, is if the surgical procedure is going to be low surgical risk, and if the chemotherapy or radiotherapy has a significant risk of infertility. Right now the tissue cannot be used for fertility purposes. Some hope that the technology may advance by the time your child is ready to attempt parenthood, however there is no guarantee of future fertility. Therefore the procedure (testicular tissue cryopreservation) is not considered
standard practice. For some young boys from the age of around 12 onwards, we have found a small number of mature sperm in the biopsy material, which is also saved.

**About the procedure**

During the procedure a small part of one testicle is removed and frozen. It is important to understand that there is no guarantee that the banking of testicular tissue will lead to successful sperm production.

The surgery is performed under a general anaesthetic, preferably at the same time that another procedure is required. After removing part of a testicle, the scrotum may be painful for a few days. The tissue is collected by IVF scientists and stored at IVF laboratories. Currently the scientists from the Reproductive Services Department at The Royal Women’s Hospital (RWH) are able to collect the tissue at surgery and process it at their centre. You do not have to have tissue stored at this centre if you don’t want to, in which case we will do everything possible to arrange storage at another IVF centre of your choice and to inform you of any costs involved. If your child’s tissue is stored at RWH, it does not mean that he will be required to have future fertility care at that centre (Melbourne IVF, RWH). He may go wherever he chooses. Currently there is no storage fee for the tissue up until your child turns 21. However, a storage charge may be introduced by Melbourne IVF at any point. If the tissue also contains mature sperm an annual storage fee may be requested. Doctors at the Royal Children’s Hospital have nothing to do with the tissue storage after it is collected by the scientists, and all future dealings regarding the stored tissue would be between yourself and the IVF centre.

**Who is eligible**

Theoretically there is no lower age limit for testicular tissue biopsy. We may advise against the procedure in certain situations such as cancers where there may be a risk of reintroducing the cancer back into the body from transplantation in the future. For example, in leukemia if tissue is collected it is currently deemed too dangerous to put back into the body and cannot be currently used for fertility purposes.

We also need to determine that your child is well enough for surgery and to ensure that the procedure does not delay cancer treatment. Bleeding disorders or serious immune deficiency may prevent your child from having the procedure done. We also take into account differing views within a family about such procedures. Sometimes we consult with the Clinical Ethics Committee to assist the decision making for the procedure in the event that the decision is not so clear cut. This is undertaken urgently so as not to delay treatment.

**Risks and Benefits**

It remains experimental to collect testicular tissue from boys to be stored frozen in the hope of future fertility. The surgery for the biopsy itself is not experimental as this procedure is performed routinely by surgeons for other indications.

Fertility Preservation is not necessarily offered only if your child has an excellent chance of survival. It can still be offered when the oncology doctors are hoping for cure, regardless of the chance of survival.

**Expected risks of the surgical procedure:**

1. Risk of a general anaesthetic. There may be situations where your child’s medical situation may present specific increases in the risk of anaesthesia. In these situations you the anaesthetist and the other treating teams will need to discuss the risk versus benefit issues. The safety of your child in the short term is a very important factor. Mostly the risk relating to the anaesthesia for the extra fertility procedure for your child will be so small it would be difficult to estimate. The anaesthetist can clarify if your child has any special aspects of their condition that could influence the risk of surgery.

2. Risk of surgery: infection, bleeding and damage to internal structures. In the rare instance that there is a complication such as a haematoma (collection of blood) a second surgery to manage a complication might be required. These risks are likely to be higher during cancer therapy.

3. Delay to treatment: the procedure will usually be timed with other operative procedures necessary for treatment of the disease. As far as possible the surgery is performed within a few days of diagnosis, and if so should not impact prognosis. We will try and find the earliest date to undertake the procedure, however we will defer to your treating doctor (e.g., oncologist) if he or she deems that it is too unsafe to wait for this
date. In this event the fertility procedure will need to be cancelled, as safety is our priority.

4. The biopsied testis may not develop fully as a result of the biopsy so may remain smaller than the non-biopsied testis. This is additional to the damage that chemotherapy or radiation treatment produce to reduce the size of the testes by damaging sperm production.

Other options:

1. Delay intervention until fertility is required. Sperm may still develop in the boy as an adult. But if not, it is possible to have a biopsy or similar procedure as an adult to collect or mature sperm. In some boys, although the chemo- or radiotherapy may be damaging to the testis, sperm production may still develop in adulthood. Even if this is at lower levels than normal, there may be sufficient sperm produced to allow for fatherhood either naturally or with IVF assistance. The degree of testicular damage depends on the extent of cancer treatment, which is usually not known for any boy before treatment starts.

2. Sperm donation in future

3. Adoption

Other issues to consider

1. Cost of procedure: this is currently free but it may change in future

2. Storage of tissue: occurs for at least 20 years after which time you have to renew the request. This is an arrangement between you and the IVF centre and does not involve the Royal Children’s Hospital.

3. Costs of future IVF treatment and tissue storage.

4. The tissue can only be used by your child and in the unfortunate event of death the tissue must be disposed of. In this instance a member of the team would contact you to discuss arrangements.

5. Due to current legal restrictions, the tissue cannot be donated for research. The tissue may never be utilized by anyone other than your child.