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Testicular cancer is a malignant tumour arising from the testis.
Seminoma and Teratoma are two varieties.
Treatment is very successful and most patients are cured

*If it were done when 'tis done...
...then twere well it were done quickly*

WILLIAM SHAKESPEARE 1664 - 1616
MACBETH 1606

The testis is the male organ of reproduction. It is attached to the body by the spermatic cord. The testes also produce the male hormone testosterone. Testosterone is responsible for the secondary sex characteristics such as libido (sex drive), erections, deep voice, facial hair and muscle development.

Incidence

Testicular cancer accounts for 0.64% of all male cancers. That said it is the commonest cancer in young men aged 20 to 39. The incidence has doubled since 1960.

	New cases UK
All	1850
Non Seminoma	1100
Seminoma	750

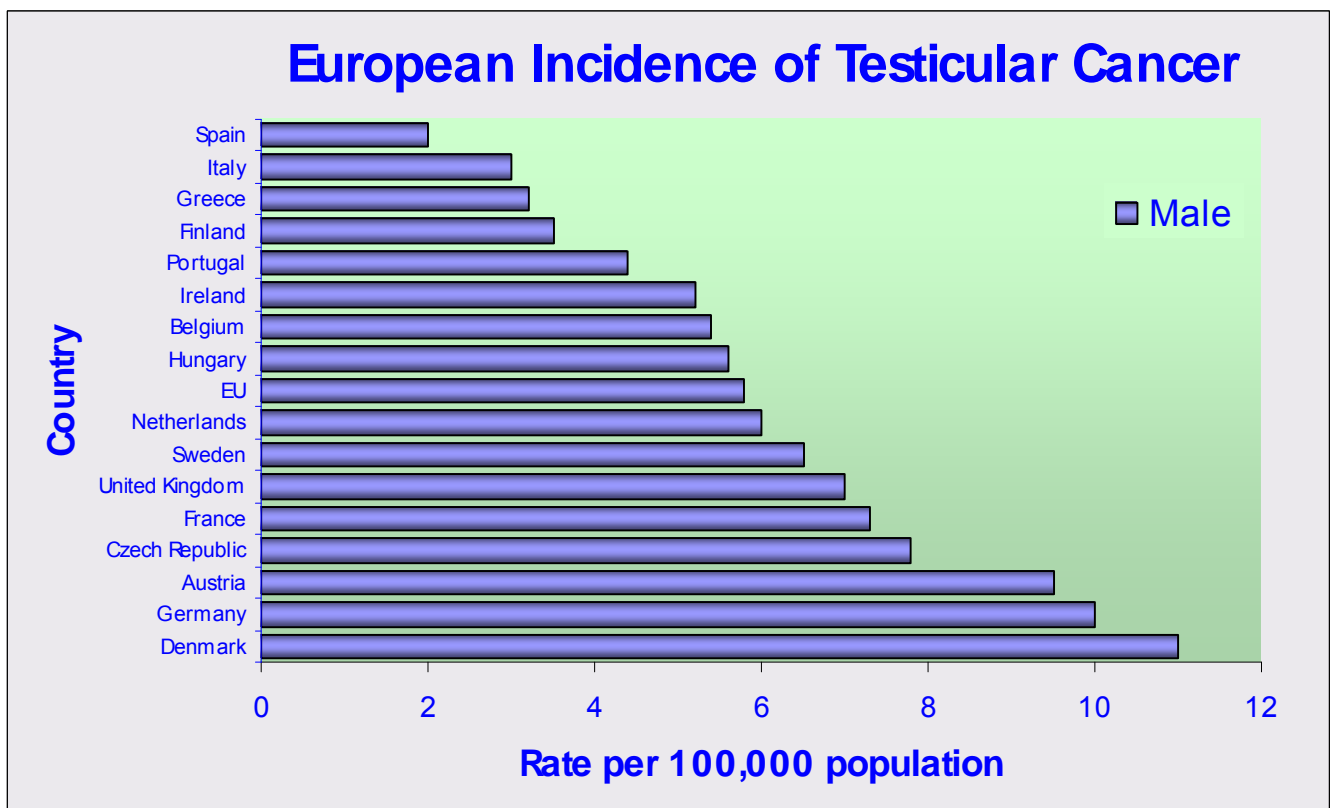
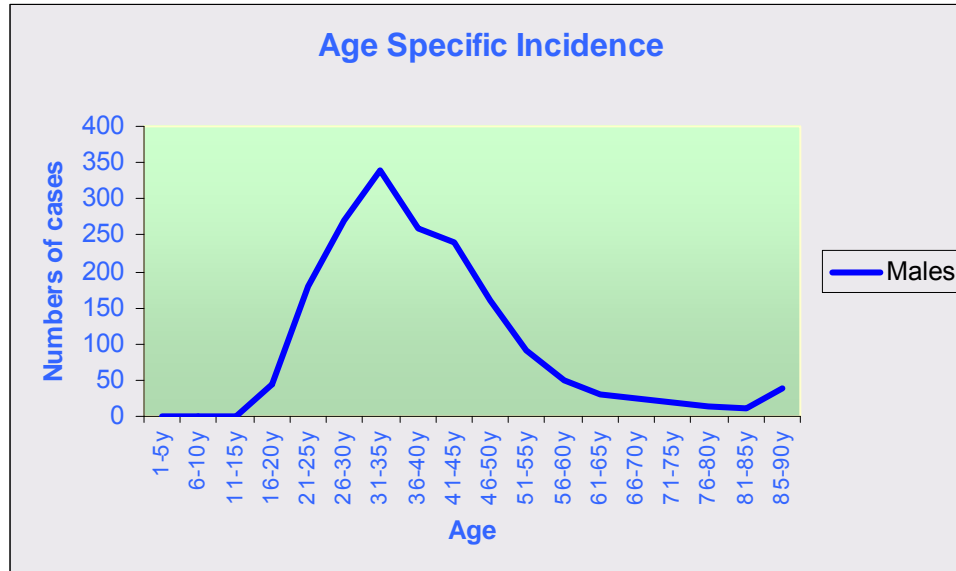
Tumours are found in 4% of all testicular lumps presenting to a urology clinic. In the UK there are 74 deaths per annum from testicular tumours. Despite the incidence of the disease rising the mortality rate is falling.

Age

Teratomas occur most commonly between 15 and 30.
Seminomas occur most commonly between 20 and 40.

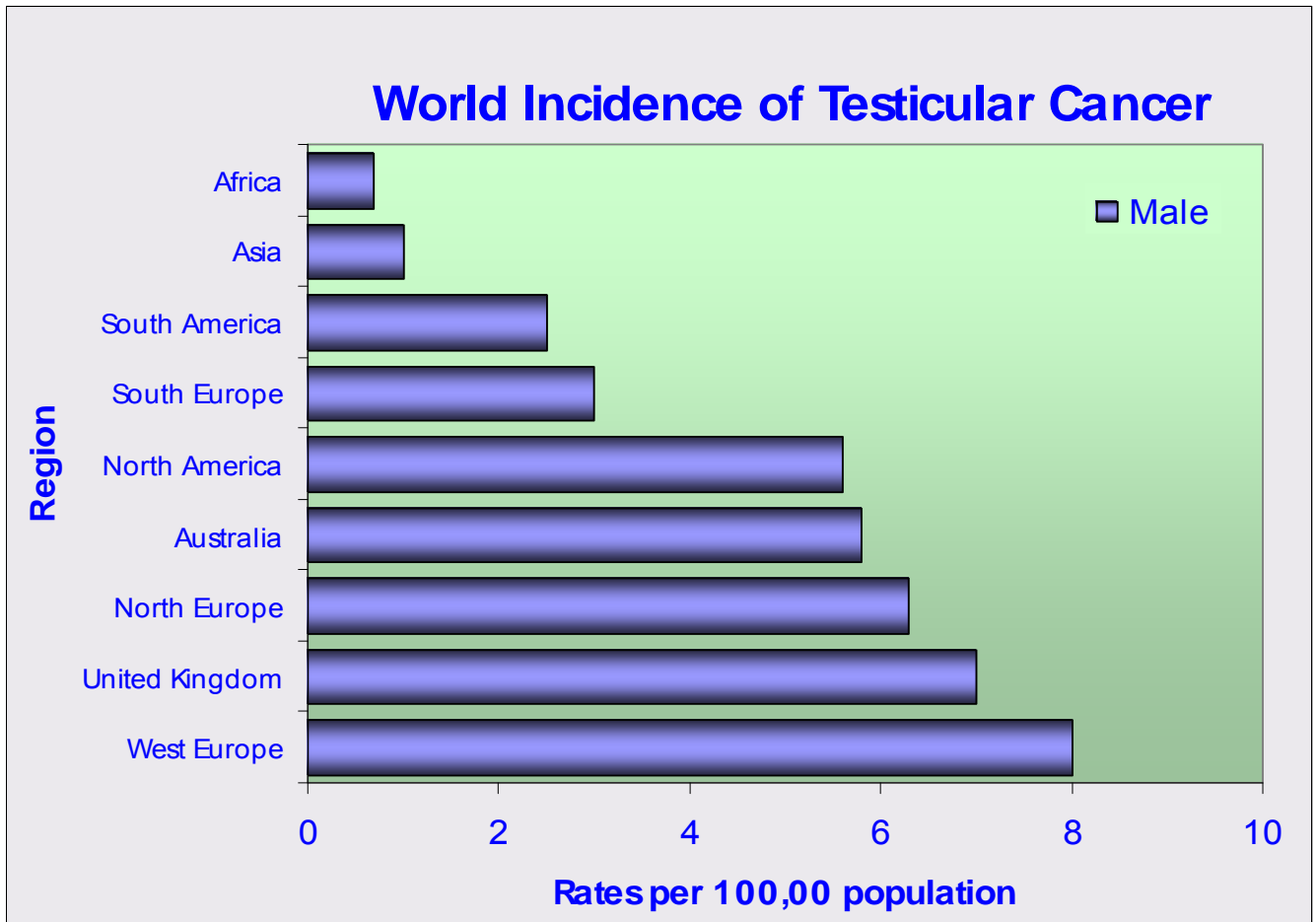


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Sex

It is only found in males

Predisposing factors

Caucasians have a higher incidence of cancer than black men. The cause is unknown.

Undescended testicles carry an increased risk of testicular cancer. The testes should descend into the scrotum at or near birth. The higher the position of the undescended testis the greater the risk of cancer. An intra abdominal testis has a 30 times increased risk. A testis in the inguinal canal has a 2 – 4 times increased risk. 10% of all testicular cancers can be attributed to an undescended testis. Undergoing an orchidopexy before the age of 10 should nullify the risks.



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One twin with a testicular tumour increases the chances in the other twin as does having a brother or father with the condition. A faulty gene has been discovered on the X chromosome. It is therefore inherited from the mother. This may explain the increased risks in twins and brothers.

Male infertility may be linked to testicular tumours.

Carcinoma in situ is a pre-malignant condition. It is discovered on testicular biopsies.

Microlithiasis (microcalcifications seen on ultrasound) have been associated with testicular tumours. Since newer ultrasound machines have much better resolution this abnormality is increasingly being seen. Therefore the exact relationship to cancer is probably unknown.

There is no causal link with vasectomy. The case is unproven.

Types

There are several types of testicular cancer;

- Seminoma (35%)
- Non seminomatous
 - Teratoma (5%)
 - Embryonal carcinoma (20%)
 - Choriocarcinoma (<1%)
 - Yolk sac tumour
- Mixed (40%)
- Lymphoma



Seminoma in upper pole of testis

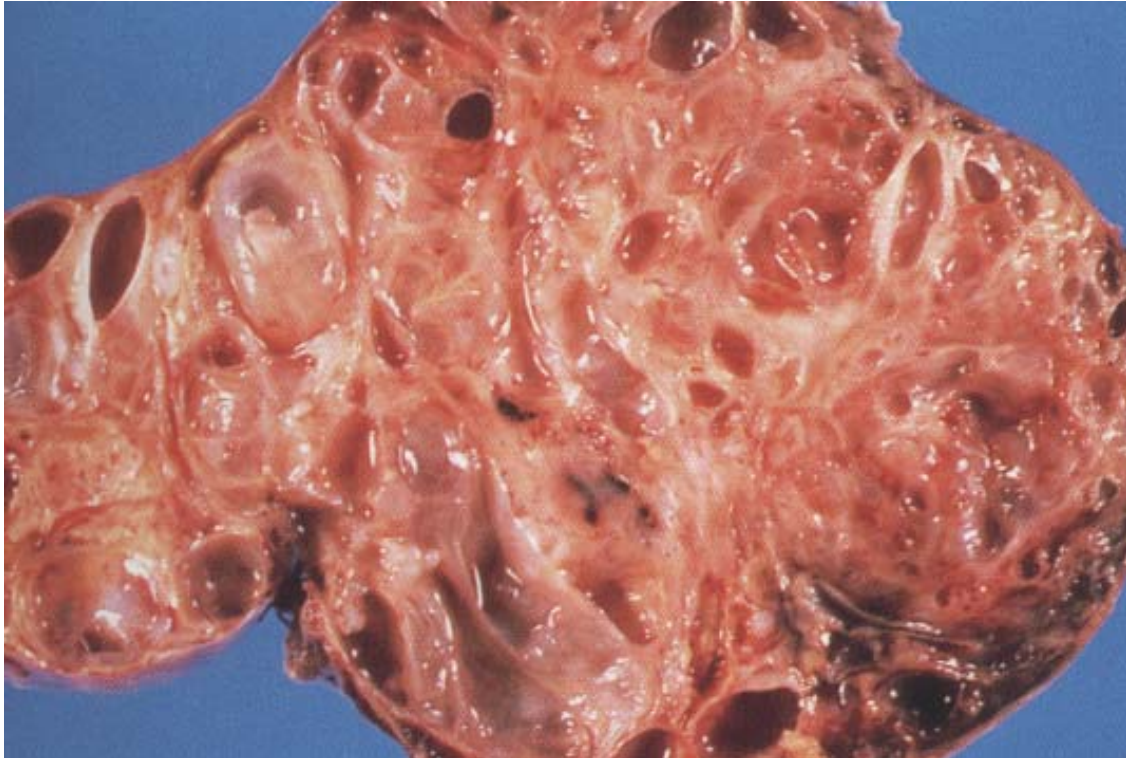
About 40 – 45% of all tumours are pure seminomas. The rest of the tumours are a mixture of the non seminomas. Mixed seminomas and teratomas exist. Lymphoma occurs in an older population over 50 years and are very rare. Lymphomas will not be discussed in this article.



Seminoma replacing testis



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Cystic teratoma

Presentation

Most testicular tumours present with a lump in the testis. The lump may be hard. The surface may be smooth or irregular. Over 60 % of patients have an ache or pain in the testicle. The patient may have a heavy sensation due to the weight of the tumour.

Differential Diagnosis

The differential diagnosis includes

- Hydrocele
- Epididymal cyst
- Epididymo-orchitis
- Testicular gumma (secondary to syphilis)



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Screening

Self examination

The best method of diagnosis is testicular self examination. Educating all men to examine themselves is paramount. About once a month is sufficient. Holding the scrotum in the palm of the hand the testicle is felt using the pulps of the thumb and fingers. Any irregularities or swelling should be reported. Also if the testicle feels heavier than previous the patient should seek advice.

Initial Investigations

Blood tests A full blood count will detect the presence of any anaemia. A renal profile will assess kidney function.

Tumour Markers Three markers of testicular tumours are measured. These markers are used to monitor non seminomatous tumours.

α FP α feto protein

β HCG β human chorionic gonadotrophin

LDH lactate dehydrogenase

α FP is a marker for non seminomatous cancers. If it is raised in a pure seminoma then there should be suspicion that the tumour is in fact a mixed teratoma and seminoma. There is no marker for seminoma. These tests must be performed before the testis is removed to act as a benchmark.

Ultrasound Ultrasound can detect lesions in the testis itself. Some of these tumours may not be palpable. Rarely a testicular tumour can grow so fast in the testis that it outstrips its own blood supply. In this situation the primary tumour dies and forms a scar. This scar is called an Azzopardi scar. It is possible to identify these lesions on ultrasound.

Ultrasound can also be used to identify any intra-abdominal lymphadenopathy or liver deposits.



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Testicular Cancer

CXR A chest Xray is often requested for the benefit of the anaesthetist when the patient first presents in order to detect lung secondaries.

Biopsy If there is a suspicion of a testicular tumour then biopsy is not routinely carried out. This is because the risk of spread after the biopsy is too great.

Initial Treatment

Surgery

Radical orchidectomy

Surgery is important in testicular cancer. It removes the primary tumour and provides the histological diagnosis. The testis and the spermatic cord are excised through an inguinal incision. The operation is never performed through a scrotal incision as the risk of recurrences in the scrotum is too great. A false testicle (prosthesis) can be put into the scrotum at the time of the orchidectomy for cosmetic reasons.

Further Investigations

Serum Markers

α FP, β HCG and LDH are measured serially post orchidectomy. If they were raised pre operatively and the levels fall quickly post operatively then it is likely that all the cancer has been removed by the orchidectomy. If levels do not fall then more cancer persists elsewhere in the body. In this situation further treatment will be necessary. The rate of fall of the markers is also important. A slower rate of decline is associated with a higher rate of recurrence of the tumour. Serum markers are measured at regular intervals to monitor non seminomatous tumours.

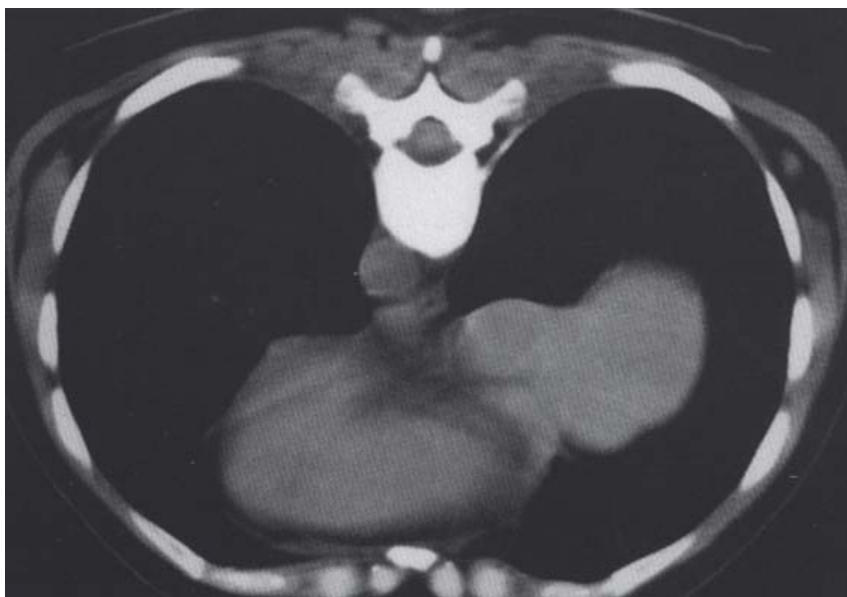


CT scanning

CT scans look at the body in slices. They use Xrays and computers to do so. CT scans will show any enlarged lymph nodes in the abdomen and the chest. Lung, liver and bone deposits can be diagnosed. The testicular tumour can be fully staged. CT scans are done at regular intervals in the follow up of the patient.



CT Teratoma - Abdominal node mass



CT of the Chest showing large mass of nodes



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Testicular Cancer

- MRI scanning** Magnetic resonance images are rarely used in testicular cancer. It is used to diagnose brain secondaries.
- Bone Scans** This is an isotope study using a gamma camera. It detects the increased blood supply to bones found in bone metastases.

Grades

Grading of Testicular Cancer

Sem	Seminoma
TD	Teratoma differentiated
MTI	Malignant Teratoma Intermediate
MTU	Malignant Teratoma Undifferentiated
MTT	Malignant Teratoma Trophoblastic
YS	Yolk Sac Tumour

Staging

There are 4 stages of testicular tumours

Stage 1

The tumour is confined to the testis.

Stage 2

The lymph nodes below the diaphragm are involved.

Stage 2A – nodes <2 cms

Stage 2B – nodes 2 – 5 cms

Stage 2C – nodes 5 – 10 cms

Stage 2D – nodes > 10 cms

This staging assesses the bulk of the disease.



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Stage 3

The lymph nodes above the diaphragm are involved.

Stage 3A – nodes <2 cms

Stage 3B – nodes 2 – 5 cms

Stage 3C – nodes 5 – 10 cms

Stage 3D – nodes > 10 cms

Stage 4

Spread to another organ

L1 Lung involvement – small volume disease

L2 Lung involvement – moderate volume disease

L3 Lung involvement – large volume disease

H+ liver (hepatic) involvement

Stage 4A – nodes <2 cms

Stage 4B – nodes 2 – 5 cms

Stage 4C – nodes 5 – 10 cms

Stage 4D – nodes > 10 cms

The letter after the 4 denotes the size of the lymph nodes involved.

An “S” after any stage (1S, 2S, 3S 4S) denotes the patient has raised markers. Very high marker levels might put a patient into stage 3 even though there may be no obvious lymph node involvement above the diaphragm.

S0 markers not raised

S1 markers slightly raised

S2 markers moderately raised

S3 markers very highly raised

[TNM Staging](#)

The TNM classification system is commonly used to stage tumours.

The “T” refers to the primary **T**umour

The “N” refers to the lymph **N**odes draining the bladder

The “M” refers to all other distant **M**etastases



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The primary testicular tumour is staged as follows:

Stages of Testicular Cancer - Tumour

T _{is}	Carcinoma in situ
T ₁	Confined to testis and epididymus
T ₂	Tumour shows signs of growing into lymph or blood vessels
T ₃	Spermatic cord involvement
T ₄	Scrotal involvement

Secondary node involvement is staged as follows:

Stages of Testicular Cancer - Nodes

N _x	Lymph node status unknown
N ₀	No lymph node metastases
N ₁	Metastases in lymph nodes < 2 cms
N ₂	Metastases in lymph nodes 2 – 5 cms
N ₃	Metastases in lymph nodes > 5 cms

Distant metastases are staged as follows:

Stages of Testicular Cancer - Metastases

M _x	Metastatic status unknown
M ₀	No distant metastases
M _{1a}	Distant metastases in the lung or very distant lymph nodes
M _{1b}	Distant metastases in other organs (liver bone or brain)

Testicular cancer often spreads to lymph nodes, lung, bone, liver and brain.



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Further Treatment

Radiotherapy

Radiotherapy kills cancer cells using high energy rays. This is given curatively and palliatively to involved lymph nodes

Chemotherapy

Testicular cancer is responsive to chemotherapy. Intravenous combination chemotherapy has dramatically improved the prognosis of this disease. Agents used include Cisplatin, Vinblastine, Etoposide and Bleomycin. Carboplatin is sometimes given as adjuvant treatment. Prior to any chemotherapy the patient will be offered sperm banking in case the effects of the treatment affect fertility. There are many different regimes incorporating different mixes of drugs.

Stage 1

Stage 1 teratomas are managed by surveillance after radical orchidectomy. The serum markers and CT scans are done serially. If any evidence of recurrence is found then the patient will receive combination chemotherapy. Stage 1 seminoma used to be managed with radiotherapy to the sub diaphragmatic lymph nodes. This was called inverted Y radiotherapy treating the nodes around the aorta and iliac vessels. More recently these patients are managed in the same way as stage 1 teratoma with surveillance. Occasionally both types of tumour receive adjuvant chemotherapy in the form of Carboplatin (usually 2 doses).

Stage 2

Stage 2 teratomas receive full combination chemotherapy. In seminomas radiotherapy was given for stage 2A. Combination chemotherapy is used to treat more bulky lymph node disease. Increasingly chemotherapy is used in preference to radiation.



Testicular Cancer

Stage3

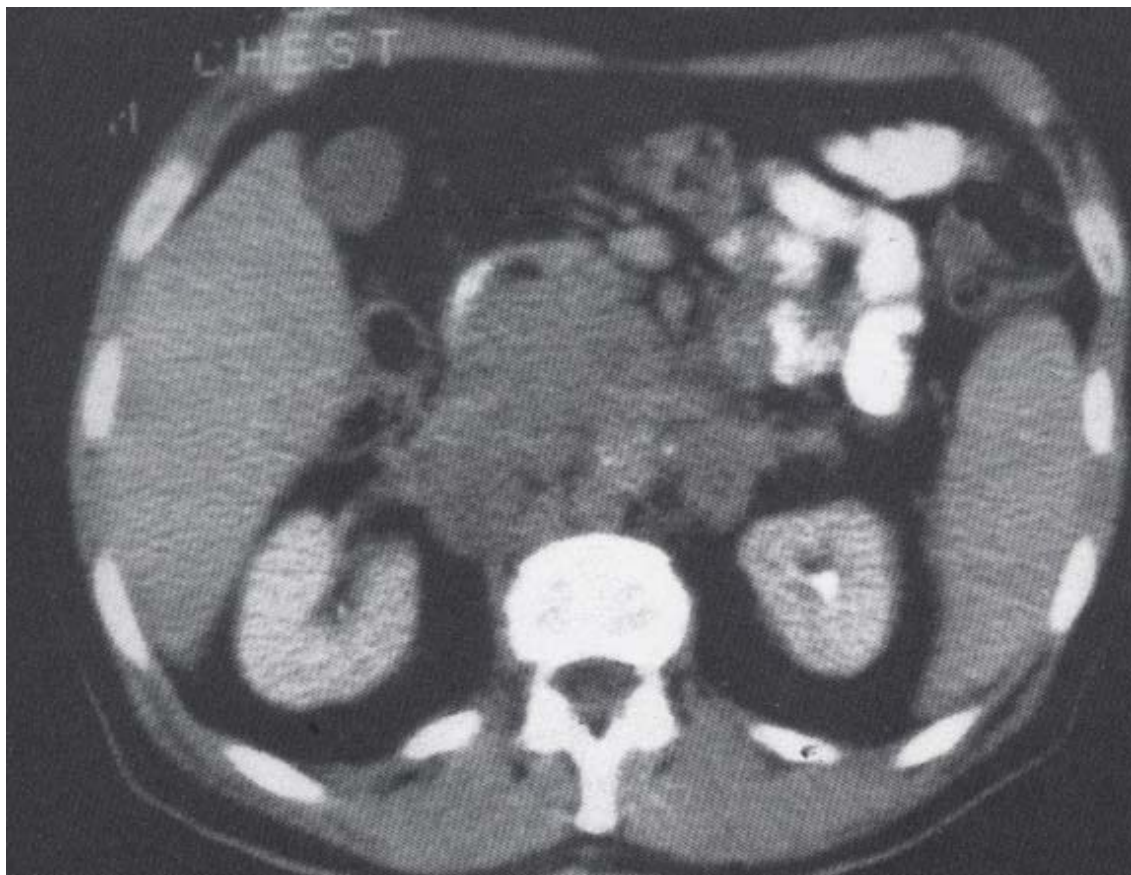
All testicular stage 3 cancers receive combination chemotherapy.

Stage4

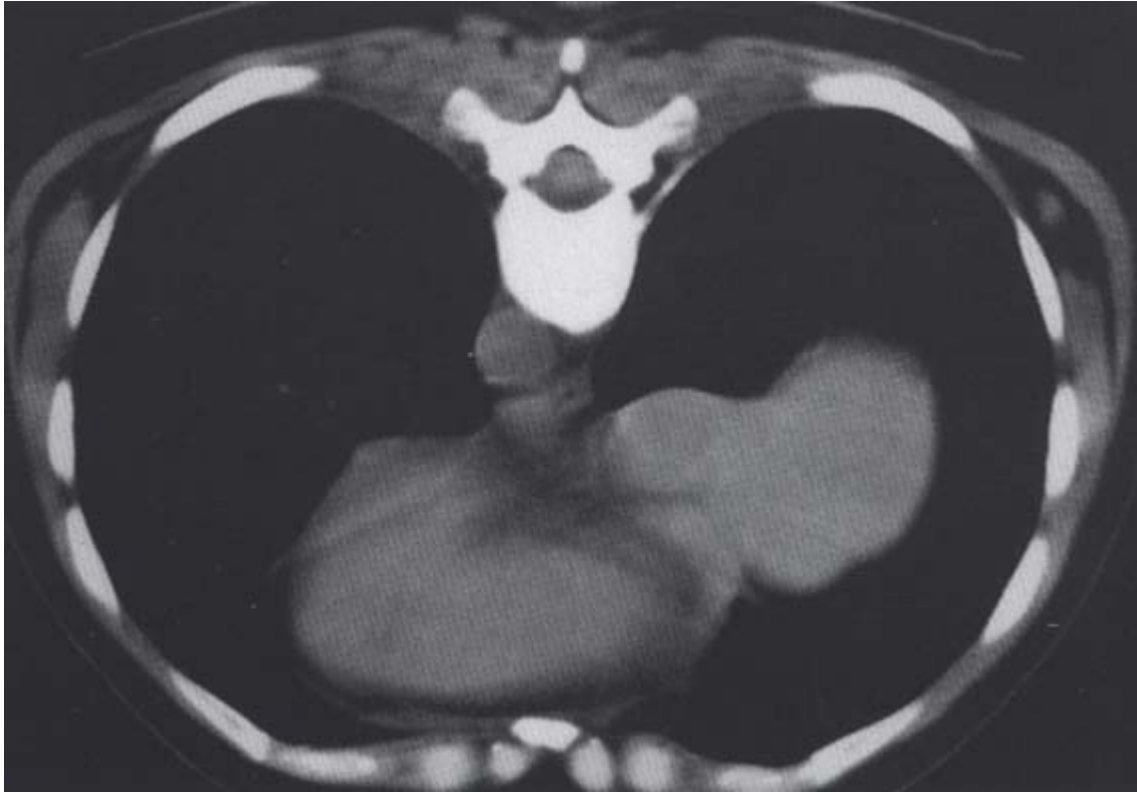
All testicular stage 4 cancers receive combination chemotherapy.

Surgery

Once the patient has had chemotherapy any residual lymph node masses can be removed surgically. Similarly any residual lung metastases can be removed. If at this point the serum markers are raised then surgery is not indicated but rather more chemotherapy.



Mass of para-aortic nodes in the abdomen



Mass of nodes in the chest

Prognosis

5 year survival figures relate to the percentage of patients alive 5 years after presentation. Tumours rarely recur after 5 years. Therefore the 5 year figures equate to a cure.



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The stage of the presenting tumour also affects the prognosis.

Prognosis of testicular cancer

Stage	Type	Spread to	Markers	5 year survival
1	Sem			Nearly all
2	Sem			Nearly all
3-4	Sem	Lung or lymph		86%
4	Sem	Bone brain or liver		72%
1	Ter			95%
2	Ter			80%
3-4	Ter	Lung or lymph	S1	92%
3-4	Ter	Lung or lymph	S2	80%
3-4	Ter	Lung or lymph	S3	50%
4	Ter	Bone brain or liver	Any S	50%

As can be seen stage 1 carries the best outlook. Seminoma has a better prognosis than teratoma. Metastases to the lung or lymph nodes carry a better outlook than metastases to bone, liver or brain. Combination chemotherapy has dramatically increased the survival rates and decreased mortality rates. The figures continue to improve.

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Testicular Cancer



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