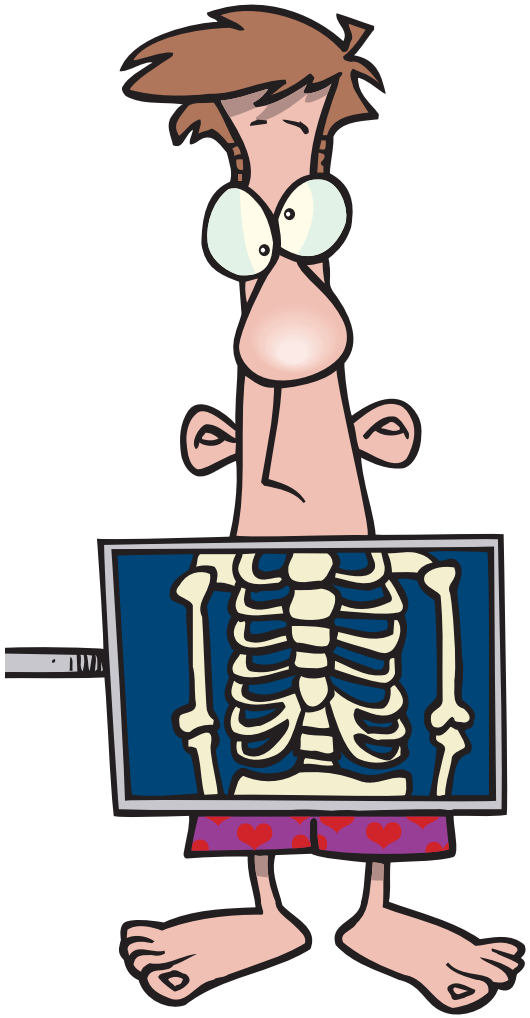

Health Commons Connect® Cancer

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Kathryn Alexander

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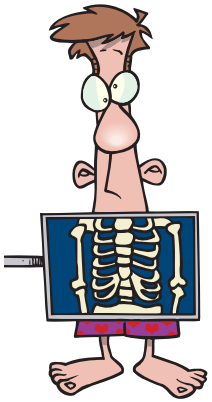


DIAGNOSIS

Where am I now?

Name, stage, grade

& special features

Blood tests

Scans

Biopsy

These will tell your specialist the likely outcome (prognosis) and what treatment they should

PROGNOSIS

What can happen and how fast?

Overall survival

Disease-free survival

Progression-free survival

Response rate

This will tell you what the outcome means to you for the recommended treatment/s

TREATMENT

How will treatment work for me?

Surgery

Radiotherapy

Chemotherapy

Targeted treatment

If your cancer has any special features then additional targeted

Understanding the diagnosis

When you have been diagnosed with cancer, your specialist will let you know what type of cancer you have along with its staging, or how far it has spread. CT scans determine the staging and a biopsy determines the name, the grade and any biological markers unique to your cancer. Blood tests can also give more information, such as the presence of tumour markers. This combined information will tell your oncologist where you are now (diagnosis), where you could be heading and how quickly (prognosis), and what treatments will best help you.

Understanding your diagnosis means that you will know how your cancer is likely to behave and you will be able to appreciate why specific treatment recommendations are made. The cancer diagnosis requires various tests and imaging scans. Diagnosis often follows this pathway:

- an initial appointment/physical examination with your GP;
- a blood test looking for cancer indicators (cancer markers such as PSA, CEA, CA 15-3), liver function, kidney function, complete cell count etc.;
- imaging scans: CAT/CT scan, PET scan, mammogram, ultrasound or MRI (to determine the location, size and spread of the cancer);
- a referral to a specialist who may undertake more tests; and
- a biopsy of the cancer tissue following surgical removal or fine needle aspiration (FNA) or punch biopsy. The microscopic examination (histology report) determines the name of the cancer, its behaviour and its potential rate of growth (degree of differentiation).

From this information the cancer can be named, staged and graded. These are the criteria upon which your specialist bases his diagnosis, prognosis and recommended treatment.

When you are diagnosed with cancer then it is important to ask for:

- the name and type of the cancer;
- the stage of the cancer;
- the grade of the cancer; and
- any features or biomarkers that are peculiar to the cancer.

It's a good idea to keep a copy of all the scan and histology reports since the date of diagnosis so that you and others have something to refer to when making informed decisions and monitoring your progress.

The Biospy

When your tissue is sent off to the lab it is viewed under the microscope and it may also be sent off for futher testing for biomarkers. Biomarkers for cancer involve specific abnormalities which may either have caused the cell to become malignant or, once malignant, cause it to grow more rapidly. The types of abnormalities that the pathologist will look for may be chromosomal changes, genetic changes (mutations) or an abnormal amount or type of cell product as with many cancers that express too many receptors on their cell surface and become overstimulated by growth factors.

1. Name and type of cancer: Where did it originate?

When the pathologist examines the tissue sample under the microscope they can tell which tissue it has originated from and which type of cells belonging to the tissue are affected. For example, you may have a biopsy done on a lymph node. The pathologist can tell if there are any cancer cells in that lymph node and what tissue they have come from. For example, breast cancer may either be ductal, where the cancer began in the milk ducts, or lobular where the cancer began in the milk producing glands, or lung cancer may be small cell lung cancer or non-small cell lung cancer, or brain cancer may either be a glioma or an astrocytoma. The tissue of origin combined with its tissue type defines both the prognosis and treatment for that cancer.

2. Grading or scoring: How fast is it growing?

The histology report will tell you how the cancer will behave, how quickly it is likely to grow and spread. Although there are different grading systems for differnet cancers, grading is usually from 1 to 3, with grade 1 being the least aggressive and slower growing, and grade 3 being fast growing.

When looking at the cancer cells through the microscope there are various features that display which will show how much the cancer cell has deviated from what it should normally look like. This is known as the degree of *differentiation* of malignant cells, or the extent to which the tumour cells differ from their normal tissue counterpart. A fully differentiated cell is a normal cell that has reached maturity and does not divide; the further the cell departs from its normal state and its normal architecture, the more rapidly it divides and the more aggressive it becomes.

Therefore an undifferentiated or poorly differentiated malignant tumour has a greater rate of growth than a moderately differentiated tumour and is said to be more aggressive. A grade 3 cancer has a poorer prognosis than a grade 1 cancer.

Scoring: sometimes a score is applied to the grade. For example, in prostate cancer the Gleason score is used and in breast cancer the Bloom and Richardson score is used. The grade is based on the score and will give the specialist further information about how the grading has been established.

Generally there are 3 scores, each being 1 to 3, and when these are added up they give the grade. A score is given to three different features of the cell: how quickly it can be seen to be dividing (mitoses); how normal the nucleus looks (nuclear grade) and how organised the cell structures look. The lowest score for each would be a 1 making a total of 3; and the highest score for each would be 3, making a total of 9. Total scores between 3 and 5 are classified as a Grade 1; scores of 6-7 are Grade 2; and scores of 8-9 are Grade 3.

		Fully differentiated	Normal, does not divide
Grade 1	Scores 3 - 5	Well differentiated	
Grade 2	Scores 6 - 7	Moderately differentiated	
Grade 3	Scores 8 - 9	Poorly differentiated	
Grade 4		Undifferentiated	Malignant, divides rapidly

Other predictive features that can be seen under the microscope which may influence the staging or prognosis, may also be mentioned on the histology report, such as:

- inflammation (inflammatory breast cancer has a worse prognosis);
- ulceration (in melanoma this increases the risk of spread);
- perineural invasion (PNI) or invasion into the nerves which may indicate a more aggressive behaviour;
- vascular invasion (invasion into the blood vessels) and
- lymphovascular invasion (invasion into the lymph vessels) which is a poor prognostic indicator in breast cancer.

The histology report: the microscopic details

Microscopic:

There is infiltrating ductal carcinoma which is macroscopically 85mm in maximal extent. It is Bloom and Richardson Grade 3 These cores of breast tissue contain invasive ductal carcinoma of no special type. The tumour is provisional Grade 3 (tubules 3; pleomorphism 3; mitoses 3). The tumour shows extensive areas of necrosis. It is 1mm to the closest anterior skin surface and 1.5mm to the deep surface. The remaining margins are greater than 10mm away. It does not invade the epidermis and it does not invade the underlying muscle. No calcification is seen within the tumour.

SYNOPTIC REPORT for INVASIVE CARCINOMA

SPECIMEN: Right breast and tumour right chest wall

LESION LOCATION: Superior 12 o'clock

INVASIVE CARCINOMA

Type: Ductal NST

Size: 85mm

Grade: 3 (nuclei 3, tubules 3, mitoses 3)

Resection margins: 1mm to anterior skin surface, 1.5mm to posterior, greater than 10mm from remaining.

LYMPH NODES:

Sentinel node (s): NA

Non-sentinel lymph nodes: 0/9

STAGE: pT3pN0M0 STAGE 2B

HORMONE RECEPTOR STATUS:

Oestrogen receptor : NEGATIVE

Progesterone receptor : NEGATIVE

HER2 : NEGATIVE

Ki67: 70% nuclei positive

3. Biomarkers: Does my cancer have any unique features?

The pathologist can run chromosome tests, gene tests or biochemical tests. When abnormalities are discovered, then a targeted treatment may be prescribed that can interrupt the signalling pathway.

Chromosome tests: looks for alterations in the 23 pairs of chromosomes which carry our genetic code. If you envisage the chromosome as a long string of pearls with each pearl being a gene. Each gene gives its own instructions to make a product, usually a protein. Cancer cells may display changes in chromosomes where a part of the strand may be deleted, expanded or switched (translocated). Translocation is where one piece of a chromosome becomes attached to another chromosome and where they join the genes fuse. The Philadelphia chromosome, the hallmark of chronic myelogenous leukemia, carries the BCR-ABL fusion gene.

Gene tests: look for extra gene copies (duplication causes double the instructions), missing genes, incorrectly placed genes or mutated genes (give the wrong instructions). Genetic mutations in genes that govern cell division, maturation and death become oncogenes, or cancer-causing genes. Examples of these genes are the BRAF gene, the HER1, 2 and 3/neu genes and the VEGFR genes. When tumour-suppressor genes that govern cell repair, such as TP53 (the guardian of the genome which determines whether DNA can be repaired or if the cell needs to die) or the BRCA1 and 2 variants, become mutated then these too become a risk factor for cancer.

Biochemical tests: these look for products or proteins that may be abnormal or expressed in abnormal amounts due to the cancer process. Many cancers express too many cell receptors at the surface of their cells that lead to overstimulation by growth factors or hormones. When these are activated they cause the cells to grow and divide. Examples of this are seen in oestrogen receptor positive breast cancers, or HER2 positive breast cancers or cancers carrying too many EGF receptors as in non-small lung cancers. Other cancers, such as the B-cell lymphomas, may express a specific family of antigens on their surface which not only help to classify the cancer, but become targets for specific immune therapy.

Tumour antigen tests, measure tumour markers/antigens that are related to a specific cancer, such as CEA, CA15, CA19-9, alpha-feto protein or PSA. These can provide some information about how fast a cancer may be progressing, and even be an indicator that a treatment is working.

Various blood tests will also indicate progression or improvement, such as red and white cell count (leukaemia); liver function tests and electrolytes.

COMMON BLOOD TESTS IN CANCER AND DURING TREATMENT	
Liver Function tests	What does it mean?
Albumin	decreased in liver failure and ascites
Bilirubin	elevated in bile obstruction and liver damage
Alkaline phosphatase (ALP)	elevated in liver damage, bile obstruction and bone metastases
GGTP	elevated in liver damage, bile obstruction
AST	elevated in liver damage, bile obstruction and heart attack
ALT	elevated in liver damage
LDH	elevated in liver damage, lymphoma, leukaemia
Electrolytes and kidney function	
Sodium (Na)	decreased in dehydration due to disease process
Potassium (K)	elevated in dehydration due to disease process
Calcium (Ca)	elevated in certain cancers and bone metastases
Urea	elevated in dehydration due to disease process
Creatinine	elevated in dehydration due to disease process
Complete Blood Count	
Haemogloblin	decreased with blood loss, cytotoxic destruction of red blood cells and in leukaemia
Red cell count	decreased with blood loss, cytotoxic destruction of red blood cells and in leukaemia
Haemocrit (PCV)	decreased with blood loss of destruction of red blood cells
White cell count	elevated in leukaemia decreased through cytotoxic destruction of white blood cells
Neutrophils	elevated in myeloid leukaemias and end-stage cancers decreased by cytotoxic destruction of white blood cells
Lymphocytes	elevated in lymphoid leukaemias decreased by cytotoxic destruction of white blood cells

Biomarker testing is useful for diagnosing (typing), monitoring and indicating which targeted treatments are most likely to improve outcome. Through knowing which genes and abnormal gene products are involved indicates which pathways can be targeted.

Common cancer markers and how they are tested

Tumour biomarkers	Primary cancer site	What's analysed
ALK gene	Non-small cell lung cancer and anaplastic large cell lymphoma	Tumour
Antidiuretic Hormone (ADH)	Small cell lung cancer, adenocarcinoma	Blood
Alpha-feto protein (AFP)	Liver, germ cell cancer of ovaries or testis	Blood
Bence Jones proteins	Multiple myeloma	Urine
B-cell immunoglobulin gene	B-cell lymphoma	Blood, bone marrow, tumour
Beta-2-microglobulin (B2M)	Multiple myeloma, chronic lymphocytic leukemia, and some lymphomas	Blood, urine
Beta-hCG (human chorionic gonadotropin)	Trophoblastic disease, Choriocarcinoma blood and urine	Blood, urine
BTA (Bladder Tumor Antigen)	Bladder	Urine
BRCA1 and BRCA2 gene	Ovarian and breast cancers	Blood, tumour
BCR-ABL fusion gene	Chronic and acute myeloid leukemia, acute lymphoblastic leukemia	Blood, bone marrow
BRAF V600 gene	Cutaneous melanoma, colorectal cancer, non-small cell lung cancer	Tumour
C-kit/CD117	Gastrointestinal stromal tumor, mucosal melanoma, acute myeloid leukemia, and mast cell disease	Blood, tumour, bone marrow
CA15-3 (carbohydrate antigen 15-3)	Breast	Blood
CA19-9	Pancreas, colorectal	Blood
CA125	Ovarian	Blood
CA 27.29	Breast (stage 2 or 3)	Blood
Calcitonin	Thyroid medullary	Blood
Carcinoembryonic antigen (CEA)	Colorectal	Blood
CD20	Non-Hodgkin lymphoma	Blood
CD22	Hairy cell leukemia and B-cell neoplasms	Blood, bone marrow
CD25	Non-Hodgkin (T-cell) lymphoma	Blood
CD30	Mycosis fungoides and peripheral T-cell lymphoma	Tumour
CD33	Acute myeloid leukemia	Blood
Chromogranin A (CgA)	Neuroendocrine	Blood
Chromosome 17p deletion	Chronic lymphocytic leukemia	Blood
Chromosomes 3, 7, 17, and 9p21	Bladder	Urine

Tumour biomarkers	Primary cancer site	What's analysed
CK (Cytokeratin) 19 fragment 21-1	Lung	Blood
Des-gamma-carboxy prothrombin (DCP)	Liver	Blood
DPD gene	Breast, colorectal, gastric, and pancreatic	Blood
EGFR gene	Non-small cell lung	Tumour
Oestrogen receptor (ER)/progesterone receptor (PR)	Breast	Tumour
FGFR2 and FGFR3 gene	Bladder	Tumour
Fibrin/fibrinogen	Bladder	Urine
FLT3 gene	Acute myeloid leukemia	Blood
Gastrin	Gastrinoma	Blood
HE4	Ovarian	Blood
Her2neu	Breast, ovarian, bladder, pancreatic, and stomach	Tumour
5-HIAA	Carcinoid tumors	Urine
IDH1 and IDH2 gene	Acute myeloid leukemia	Blood, bone marrow
JAK2 gene	Certain types of leukemia	Blood, bone marrow
KRAS gene	Colorectal cancer and non-small cell lung	Tumour
Lactic dehydrogenase (LDH)	Germ cell tumors, lymphoma, leukemia, melanoma, and neuroblastoma	Blood
Neuron-specific enolase (NSE)	Neuroblastoma, small cell lung	Blood
NMP 22	Bladder	Urine
PML/RARα fusion gene	Acute promyelocytic leukemia (APL)	Blood, bone marrow
Prostatic acid phosphatase (PAP)	Metastatic prostate, myeloma, lung, osteogenic sarcoma	Blood
Prostate specific antigen (PSA)	Prostate	Blood
ROS1 gene	Non-small cell lung	Tumour
Soluble mesothelin-related peptides (SMRP)	Mesothelioma	Blood
Somatostatin receptor	Neuroendocrine tumors affecting pancreas or gastrointestinal tract (GEP-NETs)	Tumour (by imaging)
Thyroglobulin	Thyroid	Blood
UGT1A1*28 gene	Colorectal	Blood, cheek swab
VMA and HVA	Neuroblastoma	Urine

Staging

The staging of your cancer is dependent upon imaging scans (CT/PET, MRI, Ultrasound) and the tissue biopsy and histology report. The scan will indicate how big the tumour/s are and how far they have spread and the biopsy will enable the pathologist to diagnose the cancer and its grade and determine any other features that are relevant to the prognosis. These combined findings are used for the final staging.

When you are given your staging it will be between Stage 1 and 4 and it will be followed by some letters and numbers, known as the TNM classification, which gives the specialist specific details relating to your cancer.

The basic staging is summarised below but, simply speaking, the higher the staging, the greater the spread and the poorer the prognosis.

- Stage 1: the disease is local and has not spread
- Stage 2: there is local spread to the local lymph nodes
- Stage 3: there is spread to distant lymph nodes
- Stage 4: there is distant spread to other organs

The TNM classification system

Staging is based on the TNM system.

- **T** refers to **T**umour size;
- **N**, regional or local lymph **N**ode involvement; and
- **M**, evidence of **M**etastases.

Staging using this classification enables the specialist to estimate survival time and compare treatment results in similar groups entered in clinical trials. Each cancer will have its own unique TNM criteria for staging. As the letters and numbers don't mean the same for every type of cancer this means that you can't compare one cancer's TNM with another cancer's TNM criteria.

For example, T3 in breast cancer means that the tumour is over 5cm, but in bladder cancer it simply means that it has invaded the fatty tissue around the bladder, or in melanoma it means the lesion is greater than 2mm, but less than 4mm in depth.

Once you have determined the tumour size, whether any lymph nodes are involved, where they are and how many, and how far the cancer has spread you will be able to stage the cancer. For example a Stage 1 breast cancer will be T0-T1 N0 M0 - meaning that the cancer is local, small with no lymph node involvement or spread.

Breast cancer TNM classification system

T = Tumour	N = Nodes	M = Metastases
T0 = no tumour	NX = can't be measured or found	MX = can't be measured or found
Tis = in situ (no spread to surrounding tissue)	N0 = no lymph nodes	M0 = no spread
T1 = < 2cm	N1 = <3 movable axillary nodes and/or internal mammary nodes	M1 = spread to other organs or distant spread to other lymph nodes
T2 = > 2cm < 5cm	N2 = 4-9 axillary nodes and/or internal mammary nodes	
T3 = > 5cm	N3 = ≥ 10 axillary lymph nodes and/or clavicular nodes	
T4 = any size with extension into chest wall and/or skin; or ulceration or inflammatory		

Stage	Tumour	Node	Metastases
Stage 1	T0 - T1	N0	M0
Stage 2	T0 - T3	N0	M0
Stage 3	T0 - any T	N1-N3	M0
Stage 4	Any T	Any N	M1

The staging may be divided into subsets which gives further information about the cancer. For example, stage 3 breast cancer may be stage 3A, 3B or 3C, where the difference in the description will relate to the relative combination of risk. So a stage 3A cancer will not have as much risk as a stage 3C cancer. Each stage subset represents a different mix and match of TNM classifications.

Breast cancer sub-set staging using the TNM system

Stage 3A	T0 - T3	N1 - N2	M0
Stage 3B	T4	N0 - N2	M0
Stage 3C	Any T	N3	M0

Understanding the prognosis

The prognosis in cancer relies heavily on survival statistics for your type of cancer, its stage and grade and other features, such as receptor status. Once a specialist has your full diagnosis they will know what treatment to recommend and what the survival odds are for that treatment.

It may not be easy for you to ask *How long have I got?* or *What could happen and when?* but it's important because these answers give you a benchmark for measuring progress and will also help you make an informed decision on how to act and when. If you are heading fast in the wrong direction then you know that you may not have time on your hands to wait too long before you make a decision.

As the prognosis is dependent upon an accurate staging and grading it is important that you obtain both so that you understand your starting point and your options.

Making a decision on treatment without all this information has many pitfalls:

- you won't have a realistic benchmark (starting point) against which to measure your progress;
- if your condition is worse than you believe it to be then you could deteriorate more rapidly than expected; and
- if the rate of deterioration is rapid then you could narrow your options on treatment. What may have been offered at the outset, such as a simple treatment/procedure, may no longer be appropriate and a more invasive and systemic treatment is offered which may carry additional risks and complications.

Getting the prognosis

Once you have your diagnosis, knowing the prognosis with and without treatment will help you make an informed decision. Start the ball rolling with these two questions:

- What is my overall survival if I take your recommended treatment?
- What is my overall survival if I do nothing?

Although your specialist is likely to offer clinical statisits you may wish to ask your specialist for their own clinical opinion of how well they would expect you to do given your individual case. Sometimes this differs from the statistical evidence.

It's a good idea to familiarise yourself with other terminology, such as disease-free survival, progression-free survival and response, so that you do not become confused over what you are being told and what treatments can offer you. Make sure you have figures for the percentage of people and the period of time they survived, or remained disease-free, both with and without treatment.

Overall survival, disease-free survival & response rates

1. Overall survival (OS) simply means still being alive. It is the percentage of people with the same cancer, staging and grade, on the same treatment, who are still alive after a specified period of time. It does not indicate whether these patients are well or disease-free.

Example: *This treatment gives a 93 percent, 4 year overall survival time for people with your condition.* This means that 93 percent of patients were still alive at 4 years following treatment and 9 percent died. This does not mean that those who survived were disease-free.

2. Disease-free survival (DFS) applies when the treatment delivers a complete response, that is no sign of cancer following treatment. The disease-free period is the length of time before the cancer is likely to recur.

Example: This treatment gives a Disease-free survival of 4 years for 86 percent of patients with your condition. This means that 86 percent of patients were still disease-free at 4 years following treatment and 14 percent of patients relapsed.

3. Progression-free survival (PFS) only measures how long the treatment can stabilize the disease and stop it from progressing. This may not have any bearing on overall survival or any other benefits especially if the side-effects of the treatment worsen the quality of life. In many cases stabilization may only be months. *"This treatment gives an PFS time of 9 months for 60 percent of patients with your condition."* From this example 60 percent of patients were stable for 9 months before the cancer started growing again.

4. Response is a term where you may need to qualify what is being measured: is it the percentage of people who responded to the treatment (response rate) or is it the percentage of shrinkage of the tumoural masses? When measuring shrinkage, a complete response (CR) means that there is no evidence of the cancer after treatment, and a partial response (PR) is at least a 50 percent reduction in the

tumoral masses. So if your specialist says that they expect a 50 percent response with treatment you would need to clarify whether that means a 50 percent response rate (50 percent of people responded) or a 50 percent shrinkage (partial response).

Medical events

Ask if there are any health risks for your condition in the short to medium-term both with and without treatment, and whether there is risk of an acute medical event. Being prepared means that you know what to watch out for and what action to take. You will also be able to investigate other therapies to find out whether they could help reduce or prevent these risks.

Researching your cancer and your test reports

Below is a list of useful websites for you to start your research. Some are easier to navigate and understand, such as patient.info and cancer.net - but as you become more knowledgeable and proficient in your searching then emdicine.medscape.com is also an excellent resource.

You will notice there are two websites recommended for understanding tests: labtestsonline.org where you can find out about most of your blood tests and what they mean, and a very informative page on histology. This will help demystify histology testing as it explains in layperson's terms the different techniques used and what they measure.

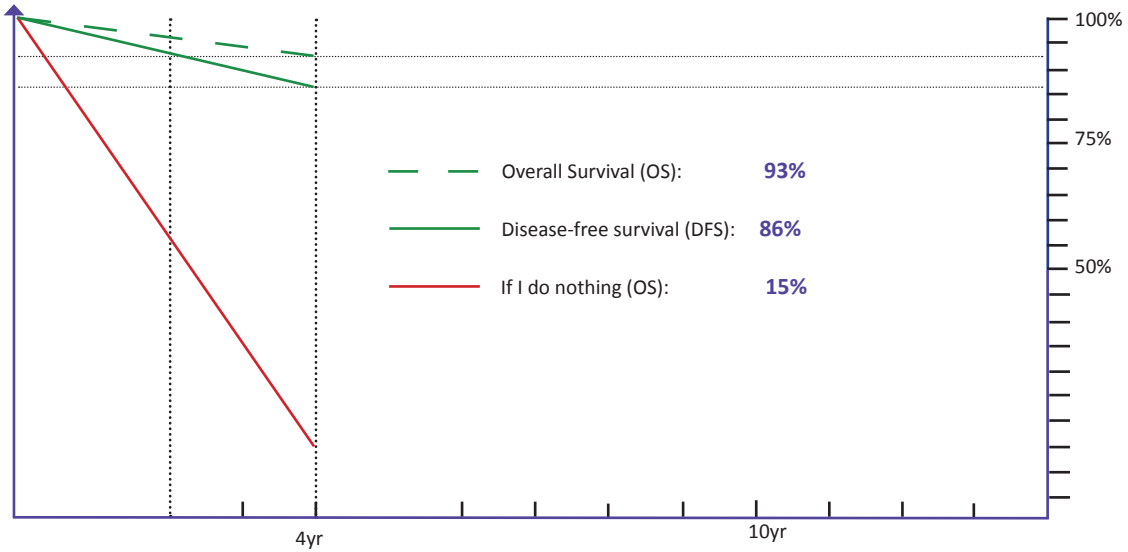
The last website *pathologyoutlines.com* can give you greater indepth details about your tumour markers, the tissues they are related to and an understanding as to why these are ordered for specific cancers. Once you have checked out your own tests from your histology report you can easily start this part of the research so that you can understand more fully how they fit with your picture and what they could mean to you.

Useful websites

- http://www.emedicine.medscape.com
- http://www.patient.info
- http://www.cancer.net
- https://www.cancer.gov/about-cancer
- http://www.medicinenet.com/
- https://www.labtestsonline.org
- https://www.labtestsonline.org.au/inside-the-lab/anatomical-pathology-in-detail/histopathology
- http://www.pathologyoutlines.com/

Using the graph to depict your outcome

Breast cancer: stage 2, grade 3, triple positive



These statistics are the clinical trial results for patients with stage 2, triple positive breast cancer treated with a combination of surgery, ACT chemotherapy, radiotherapy, Tamoxifen & Herceptin. They show that there was a 93 percent overall survival (7 percent died) at four years with 86 percent remaining disease-free. This means that of those that survived only a small percentage relapsed. Of those patients who did nothing only 15 percent were alive at 4 years.

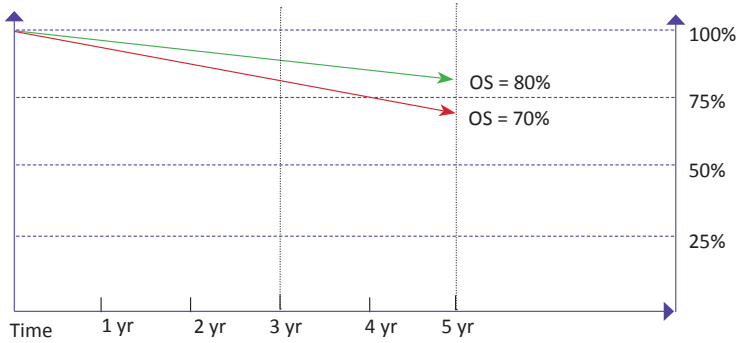
Understanding statistics

When choosing between various treatment options your specialist will be able to tell you what combination of treatments give the best outcome. The difference between two treatments will usually be presented like this: "Comparing ...[treatment A] with....[treatment B] we find that there is a much better outcome for ... [treatment A] as it reduces your risk by ....[33%]." However, this may give an inflated impression of the actual benefit. In order to work out the actual benefit we need to start with the absolute statistics.

Comparing the outcomes for treatment A and B

TREATMENT A ..... (eg surgery) →
TREATMENT B. ..... (eg surgery + chemotherapy) →

Plot the % survival over time for each treatment



Absolute statistics

You can see from the graph above that 80% of people on treatment B survived, while only 70% on treatment A survived. These are known as absolute statistics. We can work out how many died on each treatment.

So 20% died on treatment B and 30% died on treatment A.

Clearly, we can see that treatment B offers survival advantage to 10% of patients - the treatment helped 10% of patients that would have otherwise died. This means that the odds of treatment B helping you are 1 in 10 (you need to treat 10 patients to help 1).

Relative statistics

This same statistic may be presented as a relative statistic by saying "We can reduce your risk of dying by 33% with treatment B."

Relative statistics compare the difference between the number of people who died in both groups. On treatment A 30% died and on treatment B 20% died. This is a difference of 10%. 10% as a ratio of 30% = 1 : 3. (Even if you are not good at math you can see from the diagram below that 10% is a third of 30%).

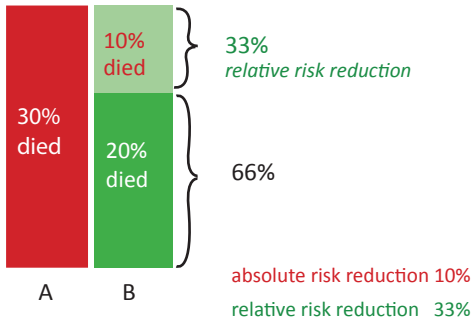
$$10/30 = 1/3 \quad (1:3)$$

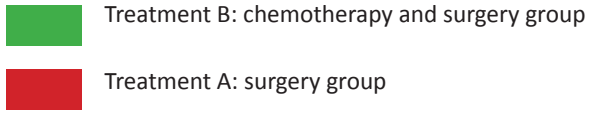
To make this a percentage you simply multiply 1/3 x 100:

$$1/3 \times 100 = 33\%$$

Although the absolute reduction of risk was 10%, you can see that by presenting it as a 33% relative reduction of risk, you may be persuaded that treatment B offers a far better survival advantage than treatment A. Or, if you look at from another perspective, you may feel that the majority of patients (70%) survived with treatment A in any event and that treatment B does not offer sufficient survival advantage particularly if there are any risks for that treatment.

Relative statistics: comparing death rates rather than survival rates





Understanding treatments

Information is continuously being updated and it is recommended that you view reputable websites, such as: https://www.cancer.gov/about-cancer/treatment

The following is a brief explanation about the various categories of drugs. It is by no means exhaustive but contains useful information for your understanding and discussion with your specialist when trying to determine what is best for you and how it will work to help you.

Chemotherapy

A drug cocktail that kills cells that are rapidly dividing. This means that it will give a good response for fast growing tumours. It will also destroy some healthy cells that are also rapidly dividing, such as blood cells, hair follicles and tissues lining the gastrointestinal tract. These will regenerate when chemotherapy is finished. It is given in cycles, usually every 3 weeks, so that the maximum number of cancer cells can be targeted over a prolonged period when they come out of hibernation. It is a cytotoxic treatment.

Radiotherapy

Using ionizing radiation to kill cells. It is a cytotoxic treatment. There are different types of radiotherapy. In addition to the external beam radiotherapy which treats large surfaces from an external source, there are minimally invasive forms that can locate small targets such as stereotactic radiosurgery and radioablation. There is also internal radiation therapy, such as brachytherapy where tiny radioactive seeds are implanted in the body near the tumour.

Immunotherapy treatments

These help your own immune system to fight the cancer

https://www.webmd.com/cancer/immunotherapy-treatment-types#1

Immune checkpoint inhibitors

How they work: cancer cells can turn off the immune system so that they can hide and avoid detection. Checkpoint inhibitors release the brakes so that your IS can do its job.

- PD-1 or PD-L1 inhibitors treat melanoma, non-small-cell lung cancer, kidney, bladder, cancers of the head and neck and Hodgkin's lymphoma
- CTLA-4 inhibitors: melanoma

Adoptive cell transfer

How they work: T cells are removed from your blood and reprogrammed so that they can find cancer cells more easily

- CAR-T-Cell therapy
- T-cell receptor therapy (TCR)
- Tumour-infiltrating lymphocytes (TIL) – your own TILs are taken from your tumour tissue and grown in a laboratory. Cytokines are added which prime and help your TILs find and destroy cancer cells. Used in colorectal, kidney, ovarian or skin cancer, such as melanoma.

Monoclonal antibodies that induce an immune-mediated response

How they work: these are immune system proteins produced in the laboratory and are designed to attach to specific targets found on cancer cells. Some monoclonal antibodies mark cancer cells so that they will be better seen and destroyed by the immune system, and these are a type of immunotherapy.

- Naked monoclonal antibodies, the most common type for cancer treatment. They tell your immune system to attack cancer cells or block proteins within tumors that help the cancer grow.
- Bispecific monoclonal antibodies are designed to bind to two different proteins at once. Some attach to both a cancer cell and an immune system cell, helping promote immune system attacks on the cancer.

Cancer vaccines

How they work: boost your immune system's response to cancer cells. Treatment vaccines are different from the ones that help prevent disease.They can be made of dead cancer cells, proteins or pieces or proteins from cancer cells, or immune system cells.

General immunotherapies

How they work: they boost the activity of your immune system in general, without targeting a tumor.

- Interferons (INF-alfa used for Hairy cell leukaemia, CML, follicular non-Hodgkin's lymphoma, cutaneous T-cell lymphoma, kidney cancer, melanoma, Kaposi sarcoma
- Interleukins (IL-2 used for kidney and metastatic melanoma)
- Colony stimulating factors boost production of white blood cells in your bone marrow
- Other drugs may kick-start immune system reactions, for example: Zyclara, Revlimid, Pomalyst, Thalomid

Targeted treatments

How they work: to stop/slow the growth and proliferation of cancer cells. These are cytostatic treatments.

They target molecules (proteins) that are over-expressed in cancer cells that are involved in cell growth, proliferation and survival. These drugs are designed to block these proteins in order to prevent growth.

https://www.cancer.gov/about-cancer/treatment/types/targeted-therapies/targeted-therapies-fact-sheet

Hormonal targets

How they work: Slow or stop the growth of hormone-sensitive tumors, which require certain hormones to grow. Hormone therapies act by:

- preventing or reducing the body's capacity to produce the hormones or
- interfering with the action of the hormones (modulate or downregulate hormone receptors, block receptors)

Hormone therapies have been approved for both breast cancer and prostate cancer.

Delivering chemotherapy to cancer cells: Conjugated Monoclonal antibodies

Conjugated monoclonal antibodies have a chemotherapy drug or radioactive particle attached to them. The antibodies attach directly to cancer cells. That means they deliver these drugs where they're needed the most. This lowers side effects and helps treatments like chemotherapy and radiation work their best.

Signal transduction inhibitors

A substance that blocks signals that are passed from one molecule to another either inside or outside the cell. Blocking these signals can affect many functions of the cell, including cell division and cell death, and may kill cancer cells. These drugs include the small molecule drugs that can enter the cell and stop pathways from activating inside the cell and the monoclonal antibodies that attach to cell surface receptors that block signals that originate outside the cell.

- Monoclonal antibodies block a specific target on the outside of cancer cells and/or the target might be in the area around the cancer. Drugs that inhibit cell membrane receptors, such as epidermal growth factor receptors (HER1, 2 and 3) and vascular endothelial receptors (VEGR) belong in this group.
- Small-molecule drugs can block pathways that may be overactive that help cancer cells multiply and spread. They interfere with pathways, such as kinase and mTOR pathways that stimulate tumoural growth or prevent cell death; antifolates, retinoic acid receptor targets.

Cross-checking treatments

- What is each treatment? Is it surgery, radiotherapy, chemotherapy or another targeted treatment? Add treatment name to the header row.
- Where will each treatment take me? This is the end point of treatment. Ask the specialist to choose from the list how their treatment will benefit you.
- How does each treatment work? Add the name of each treatment in the header, and ask the specialist to choose from the list how it will work.
- What are the short and long-term health risks, and side effects for each treatment? Next ask about any risks for each treatment that you need to watch out for and add these under each treatment.
- What are the potential interactions? Finally, make a list of any other medications you are taking, or other diagnoses that you have and check whether any of the cancer treatments could interact or negatively impact you.

Name of treatment (add name)	*surgery/radiotherapy/drug name/treatment name*		*surgery/radiotherapy/drug name/treatment name*		*surgery/radiotherapy/drug name/treatment name*	
Where will it take me?	Choose where each treatment will take you, how long the benefits lasted, and for what percentage of the population like you.					
	how long will this last	*how many (%)*	*how long will this last*	*how many (%)*	*how long will this last*	*how many (%)*
Make me disease-free						
Shrink or reduce size and number of tumours						
Stablise my tumours / slow the progression						
Symptom-relief only						
How does it work?	Check what each treatment does or how it will help you					
Kill the cancer cells						
Removes the cancer						
Stop the growth of cancer cells						
Slow the growth of cancer cells						
Block/inhibit tumour growth						
Stimulate/help my own immune system to fight the cancer						
Help my immune system recover its ability after treatment						
Helps chemotherapy to work better						
Helps radiotherapy to work better						

Cross-checking treatments

Name of treatment	*surgery/radiotherapy/drug name/treatment name*	*surgery/radiotherapy/drug name/treatment name*	*surgery/radiotherapy/drug name/treatment name*
Risks of treatment	From the list ask what the risks or side-effects are for each treatment		
Are there any side-effects or future health risks associated with any of these treatments? If so, what are these?	*add risks for each treatment*		
Which of my other current diagnoses could these treatments negatively impact? Make a list of your diagnoses and then check for interactions.			
list of other diagnosed conditions			
Are there any drug interactions with my current medications? Create a list of your medications and then check any interactions.			
list of medications			

A conversational approach

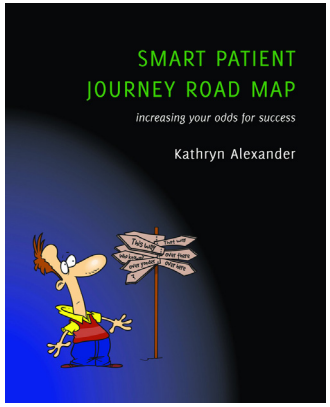
SECTION 1: DIAGNOSIS		
What is the name of my cancer?		
What is the stage of my cancer?		
What is the grade of my cancer?		
Does my cancer have any specific bio-markers?		

SECTION 2: TREATMENTS		
What treatments are recommend for my cancer and how long will I be on each treatment?	Treatments	How long will I be on treatment

SECTION 3: WHERE WILL EACH TREATMENT TAKE ME		
What is the overall survival for people like me if I do your treatment? *If you have a choice of options, such as surgery + chemotherapy or surgery + radiotherapy or surgery as a single option then give the overall survival time for each option. You will then be able to see which combination offers the best survival time.*	Overall survival	Add treatment option

SECTION 4: RISKS			
Does my cancer carry any **short-term** or **immediate risk**? Do any of my other **conditions** pose a risk for my recovery? Do any of my current or recommended **medications** pose a risk for my my recovery?	List short term or intermediate cancer risks	List current conditions that could impact your recovery	List current & recommended medications that could impact your recovery

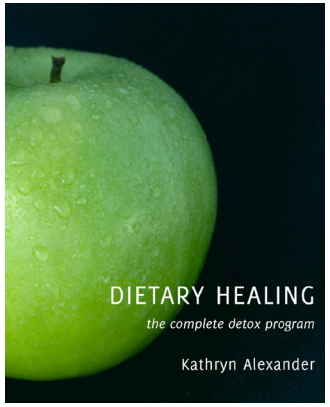
Must haves.....



Smart Patient Journey Road Map, increasing your odds for success

Kathryn brings her 30 years experience of helping people navigate their journey, make smart choices and stay on track, into this game-changing publication. Follow each chapter to plan your journey, use the surveys to ask questions and rapidly filter through practitioners and treatments, choosing only those that are can get you to where you want and need to be.

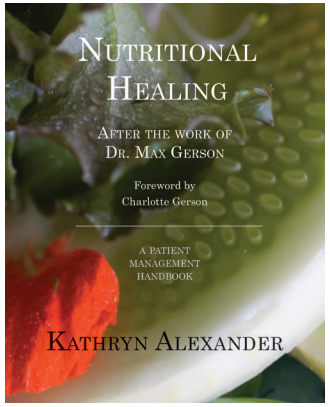
https://www.amazon.com/Smart-Patient-Journey-Road-Map/dp/0980376297



Dietary Healing, the complete detox program

Kathryn is a world leader in the field of detoxification and dietary healing. In this book she communicates the truly thrilling concepts of healing through detoxification – one of the most powerful means to recover one's own health. The information in this publication is the best to date; it covers how and why the diet works, how to make sense of your case, how to apply the program to your individual case, how to work with the laws of healing, how to bring the body to a natural healing and how to manage healing reactions. This book also has menu plans and many recipes.

https://www.amazon.com/Dietary-Healing-complete-detox-program/dp/0980376289



Nutritional Healing, after the work of Dr. Gerson

This comprehensive work brings the philosophy of the treatment according to Dr. Gerson into modern day practice providing an in-depth guide for both for health professionals and patients on the treatment and management of a dietary healing therapy. It is described by Charlotte Gerson as the "Bible" of the nutritional healer of the future.

https://www.amazon.com/Nutritional-Healing-after-work-Gerson/dp/0980376238

"It can be physically over-whelming to be diagnosed with a condition and then have to work it all out, particularly if it's hard to find someone you can trust. You have to have both if you are going to let your guard down and start to heal."