What do we mean by medications in this module?

Medications or Medicines are chemicals that can be 'natural' that is, occurs in the world without man's help; or 'synthetic' that is, man-made in a 'laboratory' or factory.

Anything that enters your body from the outside world is 'exogenous.' Whereas, chemicals our own body makes and releases inside our body are 'endogenous'.

'Placebo' medications tend to release our own 'endogenous' chemicals. Although 'placebo' is often thought of as a 'sugar' tablet, our body is wired to respond. Placebo medications can also help one out of five people reduce pain by up to 50%.

Different ways you can take medications

Medications now come in many different forms and maybe tablets, capsules or liquid (taken orally), patches or creams (put on the skin), capsules (to put under the tongue), or suppositories (put in the rectum).

- **Parenteral:** liquid medications that come in glass vials to be injected. these are not recommended for use in non-cancer care patients.
- **Nasal sprays:** liquid medications are not recommended for use in non-cancer care patients.
- **Oral medications:** tablets, capsules or liquid taken orally

Medicines that are swallowed go into the stomach and intestines. Here they cross our gut lining and enter the blood stream of the body.

The venous blood that drains from the “gut” goes into the portal vein and then gets filtered by the liver (which is on the right hand side of your upper abdomen), before it gets to the rest of your body.

Once the blood stream (with the medicine) has passed through the liver, it goes to right side of your heart. The blood then gets pumped through the lungs (which may also filter some of the medicine out or change it). The blood returns to the left side of the heart to get pumped to the rest of the body.

Importantly, not all medicines cross into the nervous system (spinal cord and brain) as these are protected by another barrier, called the Blood-Brain-Barrier (BBB).

Question: Do the non-steroidal anti-inflammatory medicines cross into the nervous system? Non-steroidal anti-inflammatory drugs are often just called NSAIDS (the initials of their group name).

Answer: Yes, this is why some people get side-effects such as dizziness, headaches and drowsiness.

Question: are all NSAIDS the same?

- No, they are not all the same.

Answer: Diclofenac (voltaren™) crosses the BBB very slowly, while Ibuprofen (nurofen™) crosses quickly, indicating it probably has help getting across the BBB (i.e. active transport system). Piroxicam (Feldene™) and Meloxicam (Mobic™) also cross quickly

Question: What are some of the pro's and con's of paracetamol?

Pro's

- Improves pain by 50% or more in one person out of 4 or 5.
- Can help reduce fever, but probably not as well as the NSAIDs like Ibuprofen.

Con's

- Doesn't tend to help swollen inflamed arthritis joints (although it may help the pain).
- Can upset the stomach lining if 4grams/day is taken regularly (less likely than Ibuprofen).
- Can cause significant harm to the liver if taken at 4grams/day for longer than a few weeks.
- Isn't that likely to harm the kidneys.

Question: How does Paracetamol work?

Answer: There is still debate. It inhibits the enzymes that convert prostaglandins (from the cell walls) into inflammatory compounds. It probably has a more reliable effect working on the brain and spinal cord once it has crossed the BBB, than its effects elsewhere in the body.

In the brain and spinal cord it also works on the cannabinoid receptors (TRPV1 receptor where cannabis or marihuana have an effect) and this is important in its pain modifying action.

Topical medications

A few pain medications can be applied to the skin. These may need a prescription by your doctor or may be available without a script (called "over the counter" (OTC)) from a pharmacy, health store or naturopath.

These medications can be:

- patches
- creams
- ointments

The important information you need to ask the doctor or supplier is whether the medication needs to be placed over the site of the pain (if it works locally), or whether it acts after it gets absorbed into the blood stream (that is works 'systemically').

Patches

- 5% Lignocaine patches creams (Versatis ™, Lidoderm ™ ** check). These need to be applied locally for neuropathic pain i.e. at the site of the pain, 12 hours ON, then 12 hours OFF. These need Therapeutic Goods Approval (TGA) via your doctor, and are not currently on the Pharmaceutical Benefits Scheme (PBS). In WA, the State Hospital's can supply this if recommended by your public hospital specialist.
- Opioid medications i.e. Morphine-Like medications for neuropathic pain.
    - Buprenorphine patch (Norspan ™)
    - Fentanyl (Durogesic ™)

Creams

- Non-Steroidal Anti-inflammatory Drugs (NSAIDs) like Voltaren ™. These work better applied locally. They still get absorbed into the blood stream and can still cause stomach ulcers and cause kidney problems. These are available "Over the Counter "(OTC).
- There is a wide range of alternative creams. Some contain aspirin like medications (willowbark). Also herbs, plant and other substances. These are available "Over the Counter "(OTC).

Ointments

- There is a wide range of alternative ointments. Some contain aspirin like medications (willowbark). Also herbs, plant and other substances. Ointments tend to stay on the skin longer, but also can be sticky. These are available "Over the Counter "(OTC).

Sublinguinal medications

Sublingual means “under the tongue”. Sublingual capsules are designed to be put under the tongue and left there whilst they dissolve and enter your blood stream.

The venous blood from under the tongue goes directly to the right side of the heart to get pumped straight to the lungs. This often means much less drug is needed because it bypasses the liver. Then back to the left side of the heart where it gets pumped around the rest of the body.

Importantly not all medicines cross into the nervous system (spinal cord and brain) as these are protected by another barrier, called the Blood-Brain-Barrier (BBB).

Question: Why do these sublingual medications have ‘mcg’ compared to oral tablets which are ‘mg’s’?

Answer: These indicate the amount of active chemical in the medication. The smallest dose is ‘mcg’ which is an abbreviation for microgram and 1000mcg equals 1 mg. For example 200mcg is equal to 0.2mg. Most medications use ‘mg’, which is an abbreviation for milligram and 1000mg equals 1 gram (or ‘gm’).

Question: What are some sublingual medications?

Answer: The most common medication used under the tongue is actually for people with heart pain (angina). The brand name is called Anginine and there is 600mcg of Glyceryl Trinitrate (=0.6mg) in the standard sublingual tablet. This is often seen in the movies, when the actor clutches the left side of his chest (usually after a "shock") and then opens a bottle and places a tablet under his tongue.

The most common pain medication used under the tongue is sublingual Buprenorphine (brand name is Temgesic ™ and there is 200mcg (0.2mg) in the standard sublingual pain tablet). This is often used in hospitals after people have had bowel operations, or if they are having trouble swallowing tablets.

Rectal medications

Rectal medications are one sort of 'suppositories'. Suppositories are a small plug of medication designed to melt at body temperature, and placed within a body cavity, other than the mouth. To put them in a rectum, they need to be advanced a few centimetres past the anus into the rectum. These are usually shaped like a "gun bullet" and look like they are made of solid wax. These medications are meant to stay in the rectum whilst they fully dissolve.

Rectal medications can be used even when a person is feeling sick or vomiting (not if they have diarrhoea). They are less likely to upset the stomach and rest of the gut.

Question: What do I do if they come out too quickly?

Answer: Inserting them 'blunt end first' usually helps them stay in the rectum whilst they are being absorbed. Putting the suppository well beyond the anal sphincter by at least 5 centimetres in an adult.

Once the medications cross the rectal gut lining, and enter the blood stream, the venous blood that drains from the rectum and the rest of the gut goes into the portal vein, which then gets filtered and processed by the liver.

Once the blood stream (with the medicine) has passed through the liver it goes to right side of your heart and then gets pumped through the lungs (which may also filter some of the medicine out or change it). The blood then returns to the left side of the heart where it gets pumped around the rest of the body.

Importantly not all medicines cross into the nervous system (spinal cord and brain) as these are protected by another barrier, called the Blood-Brain-Barrier (BBB).

Question: Does more of less of the medication get into the body compared to oral tablets?

Answer: In general, it is about the same amount as both oral and rectal medications pass through the liver where they are would be changed (metabolised) equally.

The amount of active chemical in the medication is usually the same in oral tablets and rectal suppositories.

Question: what are some common rectal medications?

The most common rectal medication for pain is Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) like Voltaren ™ or Diclofenac™. This reduces (but doesn't eliminate) the chance of stomach ulcers. It also means they can be used for migraine headaches (if the person is feeling like vomiting).

The most common rectal opioid pain medication is Prolodone™, which is oxycodone 30mg. The oral equivalent is Oxycontin™ 30mg.