



X-RAYS—THE PROS & CONS By Craig Osborne, Chiropractor © 2010

There is probably a general feeling that x-rays are dangerous, and of questionable use. I'd like to take this opportunity to look at the issue and put it in perspective.

HOW THEY WORK

An x-ray machine works by using a high powered electrical charge to displace electrons off a spinning metal disc in the direction of the patient. These electrons pass through the patient, and hit the cassette containing the x-ray film. When the electrons hit the film they 'expose' the film, and create an image in much the same way as a normal photographic film.

With x-rays however the image comes out in grey-scale. Parts of the body which are dense (such as bone) don't allow as many electrons through so there is less exposure of the film and we get a white-ish image. As the body tissue gets progressively less dense, more electrons get through and expose more film and the image gets darker. Hence the film in the lung area is almost completely black. Metal jewellery lets no electrons through so they will be completely white on film. Thicker body parts such as the pelvis require more 'power' to generate a quality image, while the neck needs less power and therefore a shorter exposure time.

In the same way that visible light is an energy wave, as is ultraviolet and infrared, x-rays are another form of energy wave.

WHY ARE THEY DANGEROUS?

There are two ways in which x-rays are considered dangerous, one is single exposure risk, and the other is cumulative damage. With x-ray equipment it would be virtually impossible to cause radiation burn with a single exposure. The equipment would need to be set quite incorrectly for the body part. A radiation burn from

nuclear material (think disaster films) is an example of high dose single exposure burns. The difference here is that the dose can be fatally high.

As for cumulative damage, there is minimal risk now days with most x-ray equipment used. The problem earlier last century was that the power generated to displace the electrons was not as high as now. This meant that to create an image that was of clinical use, the exposure time was a lot longer. This meant there was a risk with repeated exposures of cumulative damage. Given that not all the electrons pass through the body – the denser tissues absorb more – if you keep exposing those tissues to x-rays at some stage there may a cumulative damage problem.

A simple comparison is the type of damage you can do to your skin with single dose sun-burn and the cumulative effects of repeated exposure. BUT, the big difference here is that it is calculated that you would need to have a full set of spine x-rays taken every day for a year for there to be a risk of cumulative damage problems for most tissues. In this context the risk / benefit of x-rays becomes clear.

The tissues most at risk are those which have a high turn-over of cells. Since a cell has to replicate itself, the possibility is that the radiation may cause some type of mutation in the cell renewal process. If it gets out of control, then this can become a tumour. The eyes and reproductive organs are especially at risk, so whenever appropriate shields are used to minimise exposure to these body parts.

Since children are typically growing quickly, x-rays are used judiciously to minimise the risk to young tissues.

BACKGROUND RADIATION

The sun generates a whole spectrum of radiation waves, many

of which get filtered out by the earth's atmosphere, and many get through. Background radiation is the level of exposure that we are exposed to on a daily basis simply by living. Sometimes this is increased by using equipment that increases exposure risk such as computer screens, mobile phones, overhead power wires etc. Yet one of the most regular problems comes from flying. A transatlantic flight is approximately equal to having a chest x-ray. The worst flight sector is London to Hong Kong as it passes over the Arctic circle where radiation is much higher. Regular flyers then, especially air-line crew are at a higher risk of developing health problems due to this increased level of increased background exposure.

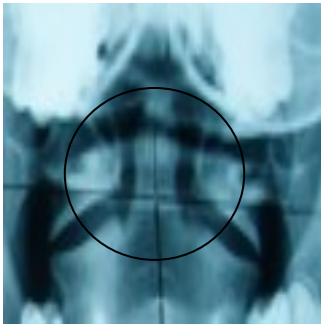
SO WHY TAKE X-RAYS?

Two reason—to rule out pathology, and to assess for biomechanics.

Although pathology has seldom been an issue for me to date in practice, and is not typically the reason why the x-rays are being taken, assessing the films for problems is an inherent result.

The biomechanical assessment becomes essential since the underlying issue being addressed is poor biomechanics. Research is showing more and more that disease is not just a chemical problem but also physical. With this knowledge we aim to provide more specific adjustments to gain better results in a quicker time.

Further to this is the issue of your safety. A perfect example is of a patient of mine who had been manipulated by her GP on many occasions, usually for low back pain, but who had never had x-rays taken. The first picture on the next page shows a normal peg of bone on C2 called the odontoid peg. On the second picture you'll notice a gap where this bone would normally form, this is called agenesis of odontoid peg. A rare but serious developmental abnormality.



A normal odontoid peg of C2

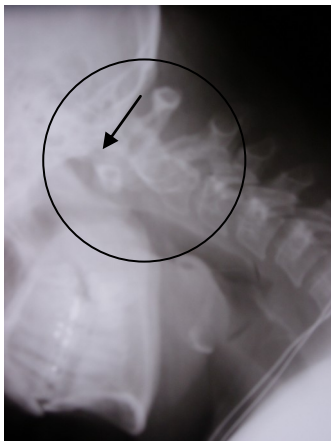


Agenesis of the odontoid peg

When I took flexion and extension views of her neck it was very obvious how the C1 and C2



Neutral—note lack of peg



Flexion—note C1 moving forward

vertebra move around a lot – this is chronic instability, and is potentially fatal. The base of the brain called the brain stem finishes around the middle of C1, so with instability in the area, a potential side

effect of incorrect force is death. This patient had no symptoms to suggest that this might be present, and I hate to think what might have happened had I not x-rayed her.

In research there is often some interesting results. One such work revealed that when a patient had some sort of investigation performed e.g. X-rays, CT, MRI then irrespective of the results of that investigation, the outcome of the patient was much better than if no investigations were performed.

This is hardly a reason to do x-rays but perhaps underlines how important it is for you to understand what is going on, and the power of the brain to help with healing when you have more information.

HOW OFTEN?

I usually look to get a spot x-ray taken of your most problematic area at around 6 months. This should be seen as a progress investigation, not a final one! Then again at around 12-18 months we'll look at getting a full set taken again for comparative reasons. I would not normally order any more x-rays for 4-5 years after that unless you experienced an injury or had a new problem that was not responding to care. There is probably less research that looks at the validity of this approach but it's coming.

SPECIALIST IMAGING

There are many other types of medical imaging—however I'm not licensed to order or use that equipment (I am for x-rays). The thing to remember is that most often, these type of tests are used to **confirm** a diagnosis, not to try and make one.

Ultrasound Used to assess soft tissue conditions e.g. tendinitis, cysts, obstetrics.

CT Scan A type of x-ray that gives a 3-D image. For this reason it helps with diagnosing a problem and identifying exactly where in the body the problem is. New studies are showing that CTs in the abdominal or



thoracic area have the potential of a 1 in 20 chance of leading to cancer sometime later in life. I think that knowing this that the question should always be asked if a CT is absolutely necessary, and is there an alternative. Will the results of the scan actually add to existing knowledge of what is wrong? A recent study recommended ultrasound for appendix concerns in the first instance rather than a CT as the first investigation.

MRI uses electrical / magnetic energy to assess primarily soft tissues conditions such as disc problems, tumours, as well as organ problems as it gives a very good image. There is no radiation risk. There is some flexibility for a



chiropractor to order these and are usually charged as a cash item outside of the Medicare system

Body Scans are also computer based x-ray systems which can build a very accurate 3-D image of the body. Having seen the results of one, it raises interesting questions about how far preventative and proactive health care should go. The specificity and accuracy related to radiation risk is still not fully resolved. Seek medical advice before considering one of these scans.

IN SUMMARY

If a recommendation is made for some type of imaging, you'll generally find that there is plenty of solid evidence to support such an action. My only reservation continues to be about using CT unless absolutely essential. For specialised scanning there are things like PET, and who knows where science will lead us in the next few decades. There is also some interesting commentary about the effect on cells of an MRI, but until research catches up on those early thoughts, for the best 3D investigation, where you have the option then go for MRI.