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ISSUE #070

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INTERESTING FACTS

32%

The proportion of Australians aged 18 years and over who had high blood pressure in 2011/12. Of these, 68% had uncontrolled or unmanaged high blood pressure (not taking medication).

31%

The proportion of New Zealanders aged 15 years and over who had high blood pressure in 2008/09. 15% of all surveyed reported taking antihypertensive medication.

Welcome to the June 2017 edition of ePathWay

It seems we woke a sleeping giant of chronic disease by highlighting the effects of high blood pressure (hypertension) from three pathological perspectives: biochemical, anatomical and forensic. The three pathologists interviewed all called hypertension an insidious silent killer, and after reading their articles, you'll see why.

By the way, hypertension doesn't only mean very high blood pressure readings. It kicks in at 140/90, and according to observational studies of over one million adults, systolic pressures (the top number) above 115 mmHg, and diastolic blood pressures (the bottom number) above 75 mmHg are associated with increasing risk of coronary heart disease and stroke.

Our fourth article is also in the cardiac domain and highlights how side effects of a group of blood pressure lowering drugs mimic coeliac disease.

As always, check in to our [Facebook](#) page, or review the latest tweets from our CEO Dr Debra Graves ([@DebraJGraves](#)) or the College ([@PathologyRCPA](#)), to keep up to date with the RCPA and new about pathology.

Hypertension may be a red flag that something else is going wrong

17 million

The approximate number of deaths globally attributed to cardiovascular disease. Of these, complications of hypertension account for 9.4 million deaths every year.

Source: National Heart Foundation of Australia, The New Zealand Medical Journal, World Health Organization

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HYPERTENSION

High blood pressure (hypertension) is common, and doctors mostly deal with a form called primary (or essential) hypertension. Its exact cause is unknown, but the complications of long-standing or severe hypertension include different types of strokes, heart failure, kidney damage and leg ulcers from blood vessel damage.

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Kidney damage may result from sustained high blood pressure

“Slow, insidious, silent killer” is how Anatomical Pathologist Dr Jeffrey Searle describes hypertension (high blood pressure). These are strong words, but he sees the damage it causes to the body’s tissues under his microscope, and the picture he describes is unsettling.



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Hypertension was (unfortunately) here!

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You can only have high blood pressure (hypertension) while you are alive, yet Associate Professor Neil Langlois discovers its damaging effects on the body when he conducts autopsies. "While hypertension is not often recorded as the primary cause of death, it is mentioned in some form in about 30% of coronial cases. The bottom line is that hypertension is an insidious disease," he explains.



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Sartan side effects mimic coeliac disease in some patients

Sartans are a group of drugs prescribed to manage high blood pressure (hypertension). They also have an uncommon side effect. Some patients develop symptoms that mimic coeliac disease after taking these drugs for about one year.



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Hypertension may be a red flag that something else is going wrong



High blood pressure (hypertension) is common, and doctors mostly deal with a form called primary (or essential) hypertension. Its exact cause is unknown, but the complications of long-standing or severe hypertension include different types of strokes, heart failure, kidney damage and leg ulcers from blood vessel damage.

Dr Lee Price, Chemical Pathologist and Endocrinologist at Sullivan Nicolaides Pathology in Brisbane, says primary hypertension is managed with lifestyle changes and antihypertensive medication to normalise blood pressure. He confirms that patients occasionally have an identifiable cause for their hypertension, and this is called secondary hypertension.

“Secondary hypertension occurs in pregnancy and kidney disease, but it may also be due to excess production of hormones. Many diseases can cause it including hyperaldosteronism (Conn’s syndrome), Cushing’s syndrome and pheochromocytoma, to name just three.”

Hyperaldosteronism is the most common hormonal cause for secondary hypertension. It occurs when the adrenal glands make too much of the hormone aldosterone.

“Aldosterone regulates the amount of salt and water reabsorbed into the bloodstream from the kidneys. Excessive secretion increases salt reabsorption into the blood and decreases blood potassium levels. The result is a higher blood pressure partly due to the extra fluid retained with the increased salt. Blood tests to diagnose hyperaldosteronism measure the levels of aldosterone, renin (a hormone made by the kidney) and potassium,” explains Dr Price.

In Cushing's syndrome, the adrenal gland produces excessive quantities of cortisol which swamps the aldosterone receptor in the kidney, resulting in hypertension.

"Excess cortisol production also results in diabetes, osteoporosis, weight gain and muscle weakness. A doctor can screen for Cushing's syndrome with specific blood, urine and saliva tests."

Dr Price says about 0.5% of hypertensive patients have a tumour called a pheochromocytoma that produces excessive amounts of the hormones adrenalin and noradrenalin.

"These patients have hypertension which can be very severe, as well as other features including headaches, racing heart and heart failure. This can be a dangerous condition and needs to be diagnosed as soon as possible. Cure can be achieved by removing the tumour that is most often found in the adrenal glands. The best screening test for a pheochromocytoma is measuring levels of metanephrines (by-products of the metabolism of adrenalin and noradrenalin) via a blood test," says Dr Price.

Hypertension can also rarely occur as a side effect of a medicine or chemical substance, including from an ingredient found in liquorice.

"The ingredient in liquorice that causes hypertension is glycyrrhizic acid. It essentially switches off a protective 'gatekeeper' enzyme to the aldosterone receptor in the kidneys. This protective enzyme opens the gate to allow aldosterone access to the receptor but prevents cortisol, which is in much higher concentrations in the body, from gaining access. The liquorice ingredient inactivates the gatekeeper allowing cortisol to flood the aldosterone receptor, and this causes hypertension."

Hypertension is clearly a red flag that something else is going wrong in the body, and the skill is in identifying what that 'something' is. Whether it's primary or secondary hypertension, the long-term consequences of this insidious disease are reason enough to investigate the cause and initiate treatment or preventive measures as early as possible.

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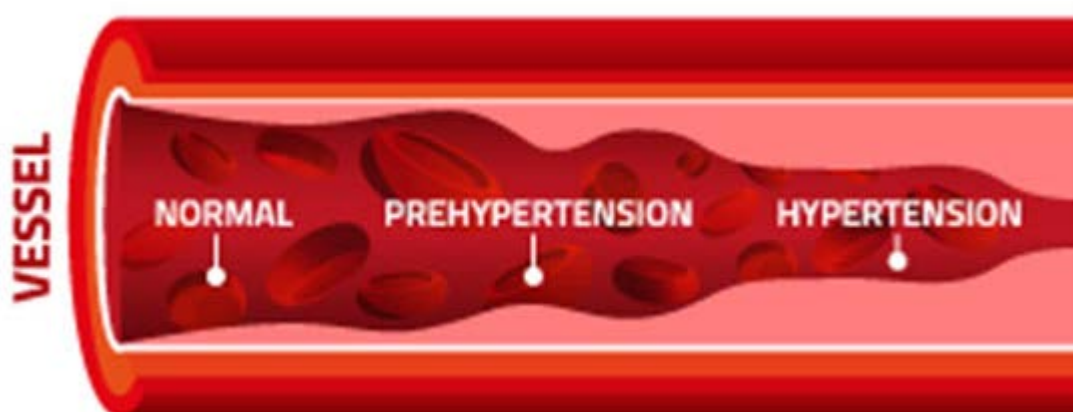
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Kidney damage may result from sustained high blood pressure



“Slow, insidious, silent killer” is how Anatomical Pathologist Dr Jeffrey Searle describes hypertension (high blood pressure). These are strong words, but he sees the damage it causes to the body’s tissues under his microscope, and the picture he describes is unsettling.

“If a person developed hypertension at age 30 that stays untreated until they are about 50, then it has had 20 or so years to cause usually irreversible damage to their blood vessels and other organs. The brain, kidneys and heart are the three organs that cop it, and symptoms don’t often show up until late in the course of disease.”

Dr Searle explained that blood pressure is controlled in the body at the level of the arterioles, which are small-diameter blood vessels that branch from small arteries to feed the capillaries. Arterioles have muscular walls, and are the primary site of blood vessel (vascular) resistance. As the blood pressure increases, arteriolar walls become thicker causing their internal diameter to become smaller, and this increases the pressure throughout the body’s vascular network.

While sustained hypertension is linked to numerous conditions, including vascular dementia, stroke and heart failure, Dr Searle used the kidneys to highlight its effects on the body.

“Hypertension is often accompanied by impaired kidney function, and a blood test may show that the patient’s electrolyte levels are abnormal. A biopsy of the kidney tissue can show the extent of damage that has occurred as a result of the high blood pressure, and this can be used in planning subsequent management,” he explains.

Dr Searle explained that when arterioles are damaged then less blood is able to reach the kidney tissue because it's harder for the heart to push blood through narrowed vessels. This results in the kidney not receiving the level of nutrients it needs, leading to decreasing kidney function and eventually renal failure.

“This damage shows up in biopsies of kidney tissue as patterns of scarring and as tissue that is quietly fading away. It is also irreversible. Once the tissue is gone, it's gone for good. The body still produces the same amount of wastes to be processed, but the kidney has less and less processing capacity to deal with it because it doesn't have as much functioning tissue to do the work.”

Dr Searle says patients can be asymptomatic while much of this damage is occurring, because kidneys have a functional reserve. But there is a limit to it.

“All of the cases I see are because there is some form of renal impairment. However, even if the purpose of the biopsy is to look for other diseases, I can look at it and tell if that patient also has high blood pressure from the pattern of damage observed.”

Dr Searle says while the damage usually occurs slowly, the higher the blood pressure, the faster the damage happens. And it's damage that was usually preventable.

“Most of the damage occurring in the body from untreated hypertension is irreversible, but it doesn't have to be that way. You can control blood pressure with antihypertensive drugs. A lot of people don't realise the damage high blood pressure is doing to their body until it's too late, and that's why it's a slow, insidious, silent killer.”

Dr Searle is an Anatomical Pathologist at Sullivan Nicolaides Pathology in Brisbane.

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Hypertension was (unfortunately) here!



You can only have high blood pressure (hypertension) while you are alive, yet Associate Professor Neil Langlois discovers its damaging effects on the body when he conducts autopsies. "While hypertension is not often recorded as the primary cause of death, it is mentioned in some form in about 30% of coronial cases. The bottom line is that hypertension is an insidious disease," he explains.

A/Prof Langlois says evidence of hypertension on autopsy might include an enlarged heart (cardiomegaly), early coronary artery disease and myocardial infarction (heart attack), a tear in the wall of the aorta (aortic dissection), an abdominal aortic aneurysm, and evidence of different types of strokes and kidney disease.

"For example, if a deceased person has a heart to body weight ratio above the 90th percentile, I suspect they had hypertension. I then go back to their clinical notes, and sometimes I find hypertension had been recorded, and sometimes I find no mention of it, nor even a blood pressure reading. But that doesn't mean they weren't hypertensive because I can see the evidence that they were."

(A high heart to body weight ratio indicates that the heart muscle was working harder than normal to pump the blood around the body, and this would usually have resulted from elevated blood pressure.)

While A/Prof Langlois' work as a forensic pathologist deals with the deceased, he clearly cares about the living. To prepare for his interview for this article, he assembled five and half pages of research about hypertension. Some examples from this include:

- In his practice, the mean age of deaths attributed to hypertensive heart disease is 69 years, with around one fifth of deaths occurring under the age of 60 years.

- Hypertension is the most common attributable risk factor for death worldwide, and is responsible for more than half of all stroke and coronary heart disease.
- Worldwide, 7.6 million premature deaths and 92 million disability-adjusted life years were attributed to high blood pressure.
- Normalising blood pressure using antihypertensive drug treatment doesn't eliminate the lifetime cardiovascular burden associated with the previous hypertension.
- Hypertension is positively associated with the risk of vascular dementia, and is possibly associated with Alzheimer's disease.
- Hypertension exacerbates complications associated with diabetes mellitus.

These facts are sobering, and on top of what A/Prof Langlois sees at work, are probably why he is so passionate about raising awareness of the effects of hypertension.

"Hypertension is a killer. I suspect many people don't know they have it when they are alive, but that doesn't mean it's not causing damage. When a person is in their 20s and 30s they probably don't think about their blood pressure. But if they have hypertension, and it's left untreated, then it is often too late when they find it later in life. The damage is done and it's usually irreversible by then. It is also a major contributor to disability and death," he explains.

"The effects of hypertension are also very draining on the health system. If more people who have hypertension were picked up earlier in life, and effectively treated, I suspect we wouldn't have as many people requiring care much later in life with conditions such as dementia, heart failure, strokes, kidney disease and so on."

A/Prof Langlois' final advice is to find hypertension early and treat it early before the damage is done. "It would just take a yearly blood pressure check which isn't hard to do." If that happens, then perhaps the time will come when he can start writing 'hypertension wasn't here' on his autopsy reports.

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Sartan side effects mimic coeliac disease in some patients



Sartans are a group of drugs prescribed to manage high blood pressure (hypertension). They also have an uncommon side effect. Some patients develop symptoms that mimic coeliac disease after taking these drugs for about one year.

The good news is the medical community is on the case. Dr Ian Brown, Histopathologist at Envoi Specialist Pathologists in Brisbane, has been studying sartan enteropathies (diseases of the intestine) under his microscope, and is about to start writing a scientific paper outlining his findings.

“Some patients develop quite a severe sartan enteropathy. Symptoms can include diarrhoea, nausea, vomiting, abdominal pain, bloating, tiredness and severe weight loss. It’s not uncommon for a patient to lose 20-30kgs very quickly. These symptoms develop after something causes an immune reaction, and unfortunately we’re not sure what that ‘something’ is at present,” explains Dr Brown.

The similarities between sartan enteropathy and coeliac disease aren’t confined to their symptoms.

“It can be difficult to tell the difference between the two diseases when examining tissue under the microscope. This is when other information is very important such as whether the serology test for coeliac disease is in the normal range, and if tests for possible causes of diarrhoea are also normal,” he explains.

Because sartan enteropathy mimics coeliac disease, Dr Brown is documenting diagnostic signposts to help differentiate these two disease processes.

“There is differentiating pathology. For example, sarten enteropathy commonly has collagen deposited beneath the surface of the epithelium, and this is very uncommon in coeliac disease.”

Treatment for sarten enteropathy is to take the person off the sarten drug. When this happens, Dr Brown says patients get better very quickly.

“As soon as they go back on the drug their symptoms start up again, but it’s very important that patients don’t take themselves off a sarten drug if they have intestinal symptoms. Instead, they should be reviewed by their doctor to make sure they are correctly diagnosed because there can be many other causes for these symptoms as well.”

Coeliac disease is also covered in the [June 2011](#), [February 2013](#) and [October 2015](#) editions of ePathWay.

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