

Protecting Your Kidneys

HOW TO PROTECT YOUR KIDNEYS

1. Avoid medications that may damage the kidneys

There are several families of medicines that may cause damage to the kidneys. One such family is non-steroidal anti-inflammatory drugs (NSAIDs) which includes Ibuprofen. NSAIDs are often given for severe pain or high fever and are available over the counter without prescription. Others include certain injectable antibiotics such as aminoglycosides.

Injectable contrast or “dyes” used for Computed Tomography [CT] scans may also be damaging to the kidneys.

It is a good practice to highlight this to your doctors who may be unaware of your or your child’s kidney condition. While these drugs or contrast are discouraged generally, they may still be given in special situations. You can discuss this further with your doctor.



+ List of medications that can be damaging to kidneys

NSAIDs	Aminoglycosides
Ibuprofen (Brufen™ or Nurofen™)	Amikacin
Mefenamic Acid (Ponstan™)	Gentamicin
Naproxen (Synflex™)	
Indomethacin (Indocid™)	
Celecoxib (Cerebrex™)	
Diclofenac (Voltaren™)	
Etoricoxib (Arcoxia™)	
Ketoprofen	
Ketorolac	
Piroxicam	
Aspirin (High dosages only)	

Note: Paracetamol is safe for kidneys.

2. Keep a healthy lifestyle to prevent diabetes, high blood pressure or obesity.

Diabetes, high blood pressure, and obesity will add extra burden to the kidneys. Role-modelling and incorporating healthy lifestyles as a family will benefit you and your child. Here are some tips for a healthy lifestyle:

a. Maintain a healthy weight.

b. Have a healthy diet.

- Plan meals according to the My Healthy Plate diagram, with plenty of vegetables, fruits, wholegrains, lean meats, fish, poultry, beans and nuts.
- Use vegetable oils and avoid unhealthy oils like coconut, palm kernel or palm oils.



- Limit foods that are high in saturated or trans-fat and added sugars, including sweetened drinks and sweets.
- Limit salt intake unless otherwise recommended by your doctor. The general recommendation is less than 1500mg of sodium a day (about two-thirds teaspoon of table salt). Develop a habit of reading salt content in food labels.
 - Limit the intake of high-salt seasoning such as ketchup, barbecue or mustard sauce, to 1 tablespoon per meal.
 - Reduce salt in cooking and use natural seasoning such as spring onion, basil, parsley, lemon juice or chives.
 - Reduce intake of processed food such as sausages, canned food or tidbits.
- Be a good role model. Best results are achieved if the healthy diet is implemented across the entire family.



c. **Avoid smoking.**

d. **Avoid sedentary lifestyle and limit screen times.**

- Have a consistent bedtime routine to encourage good quality sleep. Recommendations based on age groups are:



Age	Physical Activity		Quality Sleep
	Type of Physical Activity	Recommended Duration	Recommended Duration in a Day
0-1 years	Interactive floor-based activities	At least 30 minutes a day	0-3 months: 14-17 hours 4-11 months: 12-15 hours
1-2 years	Variety of physical activities with any intensity, including daily outdoor play	At least 180 minutes throughout the day	11-14 hours
3-6 years		At least 180 minutes throughout the day. Include at least 60 minutes of moderate to vigorous activity	3-4 years old: 10-13 hours 5-6 years old: 9-13 hours
7-17 years	Structured and unstructured play Consider learning a sport, and joining a sports team	Average of 60 minutes in moderate- to vigorous-intensity aerobic activity per day across the week	7-13 years old: 9-12 hours 14-17 years old: 8-10 hours
> 18 years	Aerobic activities e.g. jogging, running, swimming, cycling Muscle-strengthening activities e.g. Tai Chi, pilates, weight training	150-300 minutes of moderate-intensity or 75-150 vigorous-intensity activity a week	At least 7 hours

Moderate intensity = one can talk in phrases or short sentences, but cannot sing
Vigorous intensity = one has difficulty talking

Adapted from Health Promotion Board guidelines.

3. **Monitor your blood pressure regularly.**

- Check with your doctor on the optimal blood pressure for you or your child as it may be lower than others.
- Ask for a blood pressure check whenever you or your child visits a doctor, where possible.
- Your doctor may advise regular blood pressure monitoring at home. You may consider purchasing a home blood pressure machine. Ask your doctor about the correct blood pressure cuff size for you or your child.
- You may refer to the following websites when buying a home blood pressure machine to ensure that the machine has been validated for accuracy.

Stride BP: <https://stridebp.org/bp-monitors>
Medaval: <https://www.medaval.ie/>

Home blood pressure machines should be serviced or changed regularly to ensure accuracy.

4. **Take note of the amount of fluids to drink a day.**

Different patients will have different fluid requirements. Speak to your doctor to find out the recommended amount of oral fluids a day. The fluid intake may be increased if you or your child are engaged in heavy exercise. Adequate fluid intake is important to keep the kidneys healthy. A rule of thumb is to ensure the urine is clear to light yellow most of the time.



Tips on Increasing Fluid Intake in Your Child:

- Consider star or sticker charts to cultivate good drinking habits. Reward or praise your child for the effort more than the outcome.
- Mark target levels on your child's water bottle in relation to the different time points of the day (e.g. recess).
- Use interesting bottles, cups or straws.
- Drink from cups or bottles with known capacity so that you can track the amount more accurately.
- You may consider adding flavours to the water using lime, lemon or other natural herbs, or having cooled or chilled fluids.
- Be playful and make it fun, for example, dramatising "cheers" or playing "bottoms up" games.
- Allow pre-teens and teens to explore their own ideas on how to drink enough water. Embrace a collaborative problem-solving attitude with them to build independence.
- Be a role model and have everyone in the family involved.

5. Go for regular health checks.

Regular health checks allow for early detection of any problems arising from the kidney condition. Medical interventions can be started early to delay or prevent deterioration of kidney function. We generally recommend health checks to be done at least annually.

During pregnancy, there may be an increased risk of deterioration of kidney function, high blood pressure or pre-eclampsia, all of which can affect the mother and unborn child. Close obstetric monitoring is important.



MEDICATIONS TO PROTECT THE KIDNEYS (for selected patients)

In addition to the five general steps, your doctor may also prescribe medications to protect the kidneys.

Three common groups of medications used are the angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARB) and the sodium-glucose cotransporter-2 (SGLT2) inhibitors.



Examples of these medications are shown here:

	ACE Inhibitors	ARB	SGLT2 inhibitors (Flozins)
Examples	Enalapril Captopril Lisinopril Ramipril Fosinopril Perindopril	Telmisartan Losartan Candesartan Irbesartan Valsartan	Dapagliflozin (Forxiga®) Empagliflozin (Jardiance®) Canagliflozin (Invokana®)
Potential side effects	<ul style="list-style-type: none"> • Dry cough (generally reversible with stopping of the medicine) • Increased potassium levels in the blood • Temporary slight decline of the kidney function • Low blood pressure or associated symptoms (e.g. headache or giddiness) • Fatigue • Loss of taste 		<ul style="list-style-type: none"> • Increase in urine output, which may lead to dehydration • Low blood pressure resulting in giddiness or lightheadedness • Yeast infections or urinary tract infections* • Low blood sugar* <p>* These side effects are more common in diabetic patients.</p>
Precautions	<ul style="list-style-type: none"> • Severe birth defects in the unborn child (if drug is taken just before conception or during pregnancy) • Your doctor may advise a blood test after starting these drugs or when the dose is increased to monitor for side effects. • Ensure adequate hydration. For those on SGLT2 inhibitors, take an extra 1-2 glasses of water every day (unless otherwise instructed by your doctor). • Monitor for low blood pressure or associated symptoms. • Consult your doctor if you are sick with an acute illness with symptoms such as severe vomiting, diarrhoea or high fever, as there is a risk of kidney injury as a result of these medicines. Consider stopping these medications during this period. Dehydration may aggravate the risk of kidney injury. • Females should stop these medications at least three months before conception, to avoid severe birth defects. Effective contraception should be used otherwise. 		

For parents and caregivers, it is never too early to teach a child about kidneys. Look for teachable moments in your interactions with your child. You can give age-appropriate information on the roles of kidneys, why they are important and how we can protect them.

Speak to your doctor for more information and for treatment specific for your or your child's condition.



The information in this brochure is meant for educational purposes and should not be used as a substitute for medical diagnosis or treatment. Please seek your doctor's advice before starting any treatment, or if you have any questions related to your health, physical fitness or medical condition.

APPENDIX: ADDITIONAL RESOURCES FOR DISCUSSION WITH YOUR DOCTOR

Risk of Progression of Chronic Kidney Disease (Children)

			Baseline Urine Protein:Creatinine Ratio (mg/mmol)		
		Stage	<56	56 - 226	>226
Baseline GFR Stage	≥90	G1	A	No data	No data
	60 - 90	G2	A	B	C
	45 - 60	G3a	A	B	D
	30 - 45	G3b	B	C	E
	15 - 30	G4	D	E	F
	<15	G5	-	-	-

Low risk of progression



Very high risk of progression

Non-Glomerular Diseases (Children)

Risk Group	Expected Time to Event (Years)		
	10 th percentile	25 th percentile	50 th percentile (Average)
A	5.1	>10	>10
B	2.8	5.5	>10
C	1.9	3.7	7.4
C	1.9	3.7	7.4
E	0.7	1.4	2.7
F	0.3	0.7	1.3

Event = 50% GFR decline, reaching Stage 5 or kidney failure

Glomerular Diseases (Children)

Risk Group	Expected Time to Event (Years)		
	10 th percentile	25 th percentile	50 th percentile (Average)
A	2.9	5.8	>10
B	1.6	3.2	6.2
C	1.1	2.1	4.2
D	0.6	1.1	2.3
E	0.4	0.8	1.6
F	0.2	0.4	0.8

Event = 50% GFR decline, reaching Stage 5 or kidney failure

Source: Furth et al. Am J Kidney Dis. 2018; 71: 783. doi:10.1053/j.ajkd.2017.12.011

Stages of Chronic Kidney Disease (Adults)

			Urine Albumin:Creatinine Ratio (mg/mmol)		
			<3	3-30	>30
			A1	A2	A3
Baseline GFR Stage	≥90	G1			
	60 - 90	G2			
	45 - 60	G3a			
	30 - 45	G3b			
	15 - 30	G4			
	<15	G5			

GFR = glomerular filtration rate




Source: KDIGO 2012

Low risk of progression



Very high risk of progression

Chronic Kidney Disease Risk Calculators

Children (2-18 years) All GFR	All Ages Ideal for GFR <60 ml/min/1.73m ²	Adults (20-80 years) GFR >60 ml/min/1.73m ²
Predict risk of kidney failure or 50% decline of kidney function	Predict risk of kidney failure	Predict risk of developing GFR less than 60
		
Scan for resource by National Kidney Foundation	Scan for resource by kidneyfailurerisk.com	Scan for resource by CKD Prognosis Consortium
Include high blood pressure, anaemia, blood albumin Optional: proteinuria, anaemia, use of ACEi/ARB Albumin 3.8 g/dL=38 g/L Triglycerides 130 mg/dL =1.5 mmol/L HDL 40 mg/dL = 1.0 mmol/L Non-HDL chol 160 mg/dL = 4.1 mmol/L	Optional: blood albumin, bicarbonate, calcium, phosphate	Include BMI, smoking, high blood pressure, diabetes, cardiovascular disease

About the National University Centre for Women and Children

National University Centre for Women and Children (NUWoC) is a national university specialist centre that aims to empower women, children and their families to lead healthier lives. We provide comprehensive medical and surgical services ranging from pre-conception to child and maternal health.

NUWoC comprises the Department of Obstetrics & Gynaecology (O&G) and Khoo Teck Puat - National University Children's Medical Institute (KTP-NUCMI) of National University Hospital. It focuses on the right-siting of appropriate services in the community and builds complementary services in National University Health System's (NUHS) centres of excellence — Ng Teng Fong General Hospital and Alexandra Hospital.

Through a generous gift from the Estate of Khoo Teck Puat, KTP-NUCMI established an integrated outpatient facility with medical, diagnostic and rehabilitation services for children. We are also the only public specialist centre in Singapore that offers paediatric kidney and liver transplant programmes.

For more information about us, visit www.nuh.com.sg/NUWoC.

Contact Us

Children's Emergency (24-hr)

Location: NUH Main Building, Zone F, Level 1
Contact: +65 6772 5000

KTP-NUCMI

Location: NUH Main Building, Zone E, Level 2
(Accessible via Kent Ridge Wing, Zone C, Level 2, Lift Lobby C)
Operating Hours: 8.30am – 5.30pm (Mon to Fri), 8.30am – 12.30pm (Sat)
General Enquiry: +65 6772 5736
Appointment Line: +65 6908 2222
Email: ktpnucmi_appt@nuhs.edu.sg

9a Viva-University Children's Cancer Centre

Location: NUH Medical Centre, Zone B, Level 9
Operating Hours: 8am – 5.30pm (Mon to Fri)
Appointment Line: +65 6772 5030
Fax: +65 6872 4314
Email: cbccapt@nuhs.edu.sg

NUH Children's Urgent Care Clinic @ Bukit Panjang

Location: Junction 10, 1 Woodlands Road, #01-22, Singapore 677899
Operating Hours: 9am – 11pm daily (including public holidays)
General Enquiry: +65 6219 1538
Email: childrenucc@nuhs.edu.sg
Website: www.nuh.com.sg/ucc

NUH Child Development Unit @ JMC

Location: Jurong Medical Centre, 60 Jurong West Central 3, Level 2, Singapore 648346
Operating Hours: 8.30am – 5.30pm (Mon to Fri)
Appointment Line: +65 6665 2530/2531
Fax: +65 6665 0158
Email: cdu@nuhs.edu.sg
Website: www.nuh.com.sg/cdu

NUH Child Development Unit @ Keat Hong

Location: Keat Hong Community Club, 2 Choa Chu Kang Loop, #03-01, Singapore 689687
Operating Hours: 8.30am – 5.30pm (Mon to Fri)
Appointment Line: +65 6769 4537/4637
Fax: +65 6665 0158
Email: cdu@nuhs.edu.sg
Website: www.nuh.com.sg/cdu

NUWoC Children's Clinic @ NTFGH

Location: Ng Teng Fong General Hospital, Tower A – Specialist Outpatient Clinics, Level 2
Operating Hours: 8.30am – 5.30pm (Mon to Fri)
Appointment Line: +65 6908 2222
Fax: +65 6716 2200
Email: appointment@nuhs.edu.sg



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Ng Teng Fong General Hospital &
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