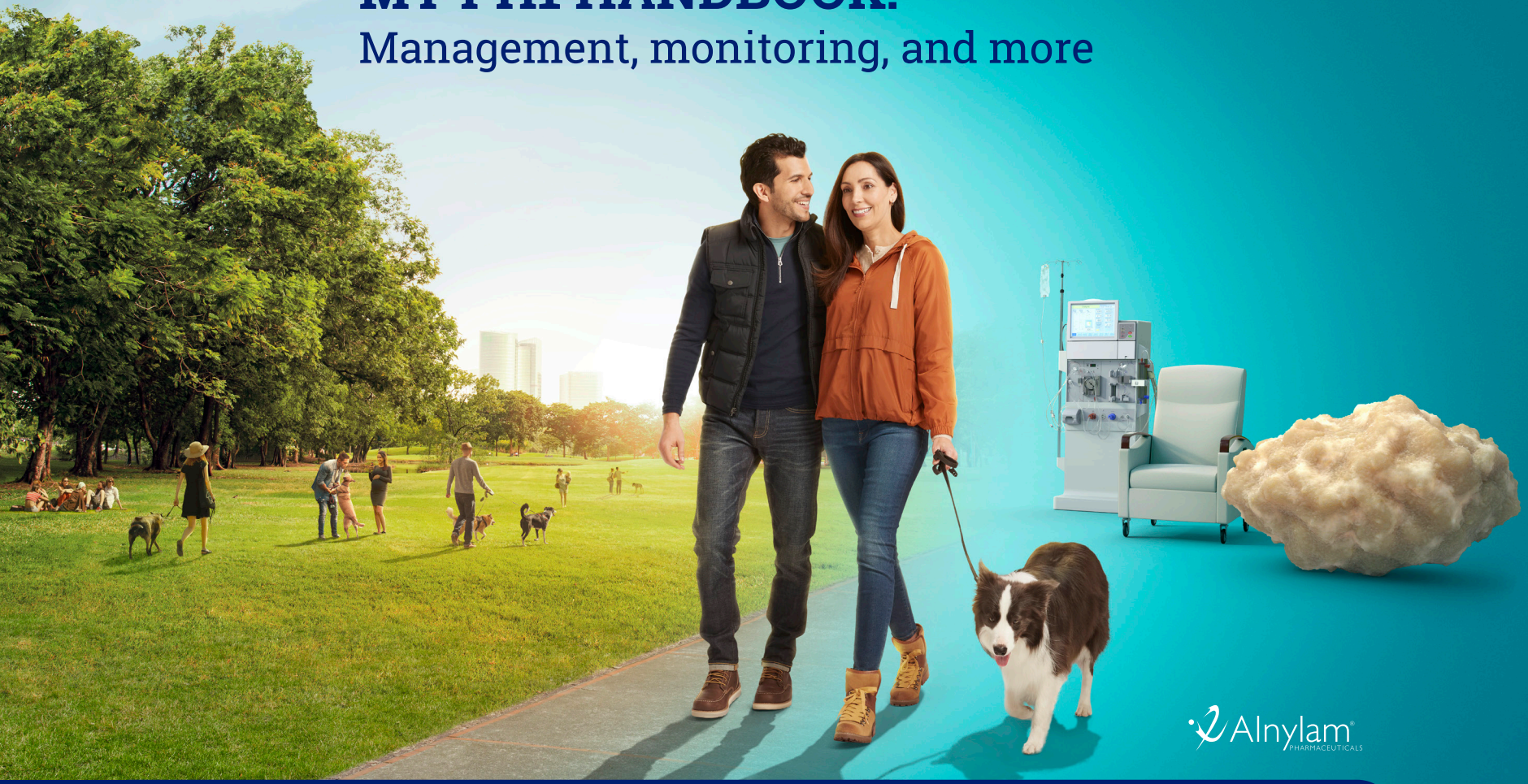
MY PH1 HANDBOOK:

Management, monitoring, and more



Welcome to your personalised guide* to living with primary hyperoxaluria type 1 (PH1).

living with PH1

NAME: _____

* Personalized guidance does not constitute personalised medical advice

Developed and funded by Alnylam Pharmaceuticals

What is PH1?

Primary hyperoxaluria type 1 (PH1) is a rare, inherited disease that causes the **overproduction of oxalate.**

PRIMARY	HYPER OXAL URIA	TYPE 1
inherited	too much oxalate urine	a certain kind
A disease you are born with	that causes too much oxalate in the urine	and has different types. Type 1 is the most common and severe.

What is oxalate?

Oxalate is a waste product normally present in small amounts. In a healthy liver, oxalate is present only in small amounts and, as it is not used by the body, it is removed by the kidneys. **In PH1, the liver makes too much oxalate,** and the kidneys can't keep up with removing it.

Too much oxalate can be a cause for concern

Oxalate overproduction can damage the kidneys and can affect your body's ability to filter waste from the blood and to create urine. With or without symptoms, this damage is progressive, meaning it will get worse over time, and the damage can be permanent. However, managing the condition can help to slow the damage to your kidneys.

Because PH1 gets worse over time, it's important that PH1 is diagnosed as early as possible, so that you can take proactive steps to manage your PH1.

PH1 puts your kidneys at risk.

Kidney stones that form due to oxalate overproduction in the liver are the most common symptom of PH1.

Symptoms of kidney stones can include:

- Pain in the side of the body
- Painful and/or bloody urination
- Urinary tract infections
- Passing stones in urine

Even if you can't feel it, oxalate can be causing harm

Not everyone with PH1 will get kidney stones. Even if you are not making kidney stones, your kidneys are still at risk of being damaged because oxalate is always being overproduced. Eventually, other body parts may start to be damaged as well.

PH1 symptoms (kidney stones or otherwise) can appear at any age.

Genetic testing

PH1 is an inherited condition, meaning that it is passed down within families. It is important that family members, especially siblings, of a person with PH1 consider getting tested for the disease via a genetic test.

HAVE FAMILY MEMBERS BEEN GENETICALLY TESTED FOR PH1? ☐ Yes ☐ No

ADDITIONAL INFORMATION: _____

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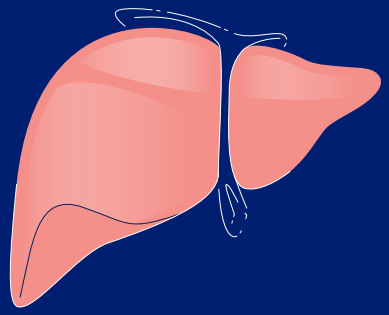
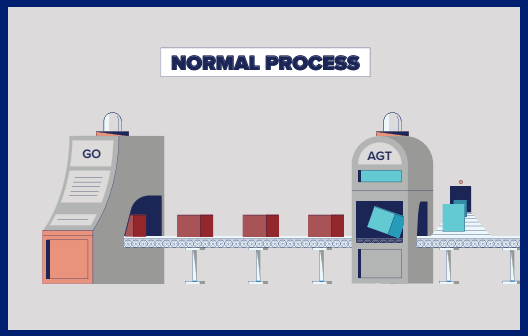
PH1 causes the liver to make too much oxalate.

In PH1, oxalate is overproduced due to a broken process that involves the liver enzymes called glycolate oxidase (GO) and alanine glyoxylate aminotransferase (AGT).

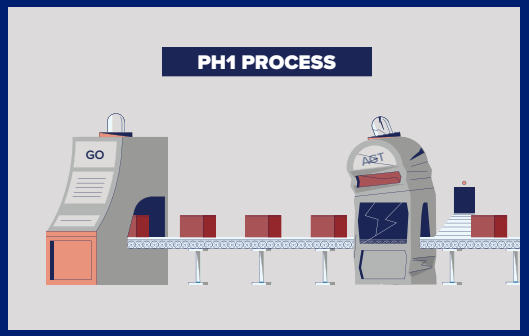
Think of your liver as a factory, and these enzymes that work there as machines that help your body make or break down substances.



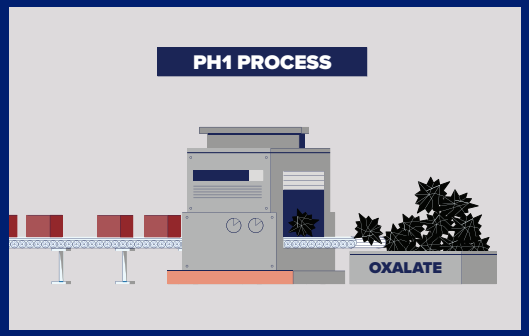
GO and AGT normally work together



In PH1, AGT is broken, but GO continues to work



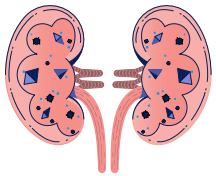
This results in oxalate being overproduced



Because PH1 is caused by oxalate overproduction, your doctor will monitor the levels of oxalate within your body.

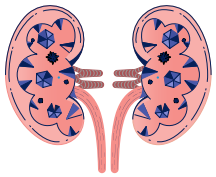
The kidneys try to get rid of oxalate, but it can still build up.

Typically, your body tries to get rid of oxalate by sending it to your kidneys, which act as filters for ridding the body of waste and toxic substances.



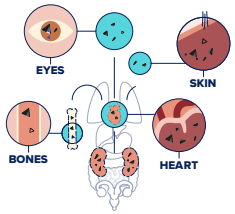
Oxalate forms into crystals in the kidneys

Once in the kidneys, oxalate combines with calcium in urine. When oxalate and calcium combine, crystals are formed. Over time, more and more crystals are made that get trapped in the kidneys.



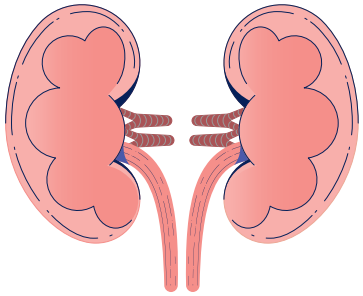
Oxalate crystals cause damage to the kidneys

Crystals can join together to create hard masses (kidney stones), or calcium can be deposited in the kidneys themselves (nephrocalcinosis).



PH1 tends to worsen over time

The build-up of crystals in the kidneys can lead to chronic kidney disease (CKD) or even kidney failure, also known as end-stage renal disease (ESRD). As kidney function worsens, the kidneys are no longer able to get rid of oxalate properly, and it starts to spread and form crystals throughout the body in a process called systemic oxalosis. Crystals cause damage where they are deposited. This can happen in multiple organs in the body, including the bones, eyes, skin and heart.



ESRD symptoms can include:

- Producing little or no urine
- Nausea or vomiting
- Pale skin colour
- Swelling of the hands and feet
- Feelings of extreme tiredness (called fatigue)
- Itchiness

If you think you are experiencing these symptoms, you may **consider contacting your healthcare professional or a nephrologist.**

Because PH1 gets worse over time, it is important for people with PH1 to stick to their management plan.

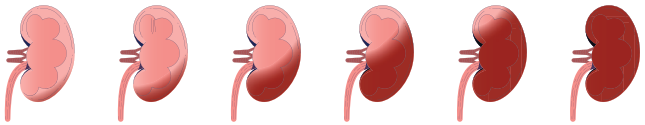
Making a plan to manage your condition.

There is a lot more to managing PH1 beyond removing stones. Most management options cannot keep up with the levels of oxalate being produced. However, consistent management of PH1 may help slow the damage to your kidneys which happens over time.

The goal: slow disease worsening

As part of your management plan, your healthcare professional may measure different things, including how much oxalate is in your urine and/or blood (known as your **oxalate levels**) and how well your kidneys are able to filter waste products (known as your **kidney function**). To check how well your kidneys are working, blood tests will measure your glomerular filtration rate (GFR).

When looking at your results, it's important to note that higher GFR numbers are associated with better kidney function. Because PH1 can lead to chronic kidney disease (CKD), it's important to check GFR levels and kidney function regularly. The stages of CKD range from low risk of kidney damage (stage 1) to kidney failure (stage 5).



† These values correspond to how many milliliters per minute the kidney is filtering, and is adjusted for body area.

You may be prescribed multiple PH1 management options at the same time. Your PH1 management may be altered over time, depending on how your disease and symptoms change.

Consistent management is important in PH1. Some of the options may seem challenging, but they can make a difference.

Your healthcare professional may consider these management options for your PH1:

HYPERHYDRATION (drinking lots of water):

Helps dilute oxalate in your urine

PYRIDOXINE (vitamin B6)

May help the broken enzyme in your liver try to work normally

ALKALI CITRATE (potassium citrate or sodium citrate):

May help reduce crystal formation

EMERGING THERAPIES:

Target and prevent oxalate production in the liver

DIALYSIS

Using a machine to remove oxalate from your body when your kidneys are no longer able to work properly

Managing PH1 takes a team.

PH1 requires lifelong management and monitoring. Since PH1 is a personal experience and affects everyone differently, your healthcare professional team will help you approach the different aspects that managing PH1 can involve, and work with you to create a personalised plan. Because your care plan is based on how your disease is changing over time, it is important that you attend all appointments with the various members of your healthcare team. You can use this page to help keep track of their names and their contact information.

Your nephrologist/paediatric nephrologist

A nephrologist specialises in diseases like PH1 that affect the kidneys. Typically, a nephrologist will take the lead role in the overall management of your disease. However, other specialists may be involved in your care as well.

NAME: _____

CONTACT INFO: _____

Your extended healthcare professional team

These are some of the other specialists you may meet in your journey with PH1.

PAEDIATRICIAN A paediatrician is a doctor who provides medical care and advice for babies, children and teenagers.	NAME: _____ CONTACT INFO: _____
UROLOGIST A surgeon who specialises in disorders of the urinary tract and often addresses kidney stones in patients with PH1.	NAME: _____ CONTACT INFO: _____
GENETIC COUNSELOR A specialist who can answer questions you might have about genetic testing and interpret your results.	NAME: _____ CONTACT INFO: _____
DIALYSIS NURSE A nurse specially trained to support and monitor a person undergoing dialysis. These nurses can work in hospitals or in separate dialysis centers.	NAME: _____ CONTACT INFO: _____
OTHER (Transplant Team, Primary Care, Radiology, etc) Other healthcare professionals who help along the way.	NAME: _____ CONTACT INFO: _____

As you are working with your healthcare professional team, your friends and family will also be able to help you keep on track with your PH1 management plan and support you emotionally.

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Taking control of your PH1 management plan.

It can be challenging to manage PH1 – from taking multiple medications, to drinking substantial amounts of water, to attending frequent dialysis sessions. However, there are techniques you can try to help you feel more in control when managing PH1 seems overwhelming. Always remember to discuss your management plan with your healthcare professional team before making any changes to your routine.

Tips for drinking enough water

Because dehydration can stop your kidneys from working properly, drinking lots of water (hyperhydration) is crucial. It's important to be aware of situations that can make you dehydrated, such as sickness (as with diarrhoea, vomiting, or fever), intense physical activity, and not drinking enough water.

> *My advice would be to just keep moving forward, to accept the support that so many people want to give you.*

PAT C.
MUM OF AN ADULT WITH PH1

Check off all of the things you are currently doing or would like to do:

PREPARATION

- ☐ Make sure you always have plenty of water available by keeping bottles filled up around the house, in your car, and in all your bags
- ☐ Bring water with you when going to a new place

REMINDERS

- ☐ Set alarms on your phone to remind yourself to drink water
- ☐ Set deadlines for yourself to drink a certain amount by a particular time

GET CREATIVE

- ☐ Eat foods with high water content, especially fruits and vegetables
- ☐ Though drinking water is the preferred way to staying hyperhydrated, you can ask your care team about including other fluids like milk

It can be useful to get your family and friends involved to help and support you to keep on top of managing your PH1.

Preparing for your journey with PH1.

Staying on top of PH1 management can help to slow the damage to your kidneys, but too much oxalate can cause permanent damage. Eventually transplant surgery may be necessary if the PH1 has become too advanced. Researchers are actively working to develop additional ways to treat PH1.

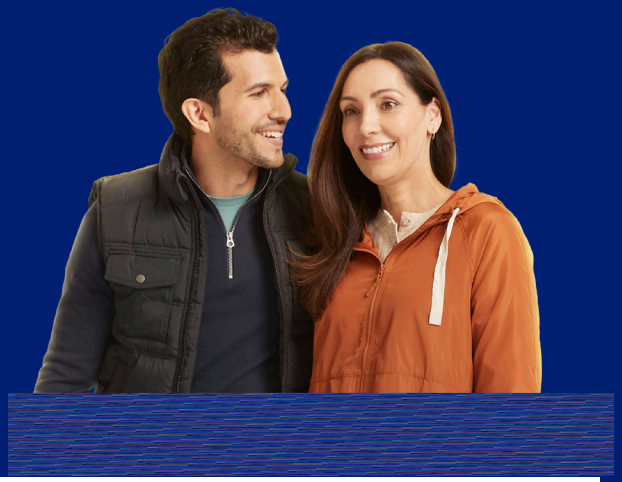
Understanding transplant surgeries

A liver transplant is a surgical operation where a donor liver is taken from a person without PH1 and is transplanted into a person with PH1.

A liver transplant therefore stops oxalate being over produced in the liver. Most other management options cannot do this.

Because PH1 causes damage to the kidneys, both the liver and the kidneys may need to be replaced, either at the same time or during separate surgeries. This is called a dual liver-kidney transplant.

Transplant surgeries are major operations that require preparation, long-term follow-up, and lifelong medications. Talk to your healthcare professional team about developing a detailed plan to help you recover from your surgery.



Wherever you are in your PH1 journey, you may have to teach others about your disease.

Not everyone will be familiar with PH1, and this may include some members of your healthcare professional team. However, you can play an important role in educating others about your disease. Try coming up with a quick description of PH1 that you can share with others. You can use the space to the right to jot it down.

IF ASKED ABOUT PH1, I'LL SAY:

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It's more than caring for your kidneys — it's caring for yourself, too.

Navigating your overall health is important as you continue to manage your PH1.

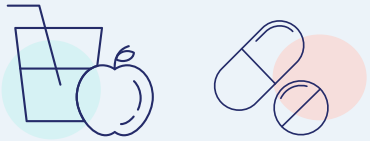
Nutrition

There is no particular diet for people with PH1 to follow. Strictly avoiding foods high in oxalate is not typically necessary in PH1, as it can have little or no impact on the disease. You should, however, talk to members of your healthcare professional team, as they may have some specific guidance. For example, eating foods with calcium is important. You may also be advised to avoid having too much C and D.

> *We're doing all we can to preserve her kidneys and do things that help to keep them going and not damaged. So, drinking water, eating the right diet, taking her medicine routinely and not forgetting.*

LAURA W.
MUM OF A CHILD WITH PH1

FOODS YOU MAY NEED TO EAT MORE OF BECAUSE THEY CONTAIN:	FOODS YOU MAY NEED TO AVOID BECAUSE THEY CONTAIN:
CALCIUM • milk, cheese and other dairy foods • green leafy vegetables – such as curly kale, okra and spinach • soya drinks with added calcium • bread and anything made with fortified flour • fish where you eat the bones – such as sardines and pilchards	**VITAMIN C** • citrus fruit, such as oranges and orange juice • peppers • strawberries • blackcurrants • broccoli • brussels sprouts • potatoes **VITAMIN D** • oily fish – such as salmon, herring and mackerel • red meat • liver • egg yolks



Rare does not mean alone.

Being diagnosed with a rare disease like PH1 might make you feel lost or lonely. But you are not alone.

Whether it is family, friends, your healthcare professional team, and/or local patient groups – there are different people you can talk to about how you are feeling.

If you have questions or concerns about how inherited conditions like PH1 might impact your family, you can speak to a genetic counsellor for support.

Mental health

For people with PH1, being unable to recognise when you're experiencing symptoms of kidney disease can make you feel as if you are not in control. It's been found that people with chronic kidney disease or end stage renal disease can experience symptoms of anxiety and depression. **If you are feeling overwhelmed, make sure you let your healthcare professional team know, and you can also consider speaking to a specialist mental health professional.**

If you are already working with a mental health professional, you can use the space below to write down their name and contact information.

MENTAL HEALTH PROFESSIONAL:

CONTACT INFO:

Caring for your mental wellbeing can help you cope with PH1.

Expand your circle of support.

Healthcare professionals, advocacy groups, and other people living with PH1 can be great resources for additional tips and guidance. Below are three resources that are just a search away.

CORD Canadian Organization for Rare Disorders

CORD is Canada's national network for organizations representing all those with rare disorders. CORD provides a strong common voice to advocate for health policy and a healthcare system that works for those with rare disorders. CORD works with governments, researchers, clinicians and industry to promote research, diagnosis, treatment and services for all rare disorders in Canada.

kidney FOUNDATION™

About The Kidney Foundation of Canada

Excellent kidney health, optimal quality of life for those affected by kidney disease, and a cure. This vision has guided us to be a collaborative, inventive and focused leader in the development of programs, services, research opportunities and awareness campaigns that have had a positive impact on the millions of Canadians living with, or at risk of developing kidney disease. The Foundation's national research program has grown to become one of the most important sources of funding for scientists conducting kidney-related research. The Foundation is committed to providing education, information and support about kidneys and kidney disease.

RQMO
REGROUPEMENT QUÉBÉCOIS DES MALADIES ORPHELINES

RQMO provides rare disease patients and their families with Information, resources and support to help with managing rare disease. We connect people with knowledgeable physicians, researchers and clinics specialized in the disease, and official sources of information on medical management and treatment. We help patients find government and community resources to help with medical services; financial and legal help; respite and home care; and psychosocial support. We provide basic genetic counselling and answers questions about genetic tests, possible risks, prenatal diagnosis, etc.

living with PH1

With the right information and management from your healthcare professional team, you can be supported to **live with and manage your PH1.**

 OXL-CAN-00001 March 2022

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