

# TREATMENTS FOR ADULTS

## Glomerulonephritis

Depending on the type of GN a person has, there are different medicines to help manage it. In very serious cases of GN, treatment focuses on the immune system to stop it from damaging the kidneys.

### **In the short-term, GN treatment tries to:**

- Stop inflammation so the kidney filters (glomeruli) can repair themselves
- Manage complications such as high blood pressure, protein in the urine, swelling (edema), and high cholesterol

### **In the long-term, GN treatment tries to:**

- Maintain kidney function
- Stop GN from coming back

Some medicines that treat GN may interact with other treatments, foods, and medicines. Some medicines used to treat GN may affect a person's ability to get pregnant.

Always talk to the nephrology clinic healthcare team before making any changes to medicines.

# Kidney Health

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## Treatments for Adults

**Prednisone**

**Azathioprine**

**Mycophenolate mofetil**

**Cyclophosphamide**

**Rituximab**

**Cyclosporine**

**Tacrolimus**

**Plasma exchange**

## Prednisone

### ADULTS

Prednisone is an oral (you take it by mouth) corticosteroid medicine. It's often one of the first medicines used to treat GN. It weakens your immune system to stop inflammation (damage) in your body. Prednisone replaces a hormone called cortisol that your body makes when you're stressed or sick. When you take it, prednisone weakens your body's immune system to stop it from attacking healthy cells and tissues.

### Common side effects may include:

- Heartburn
- Nausea
- Trouble sleeping
- Mood changes
- Sweating more than usual
- Acne
- Thinned skin that bruises easily
- Weight gain (usually around the waist) and facial rounding
- Feeling hungry
- High blood pressure
- Swelling
- Changes to your period (menstrual cycle)

### More serious side effects may include:

- Muscle weakness
- Diabetes (or high blood sugar)
- Seizures
- Depression
- Confusion
- Serious infection
- Stomach ulcers
- Osteoporosis (thinning of the bones)
- Osteonecrosis (loss of blood supply to your bones)
- Cataracts (cloudy eye lens)
- Glaucoma (an eye disease)
- Slow wound healing

### Managing side effects

Your healthcare provider has prescribed this medicine because not taking it is more dangerous to you than any side effects. Talk to your doctor, pharmacist, or your GN healthcare team to learn more about prednisone. They can also help you manage any side effects.

You may need to take other medicines when you take prednisone to lower your risk of side effects. This may include medicines to protect your bones (calcium, vitamin D, and bisphosphonates), an antibiotic to protect against a rare lung infection called PJP (*Pneumocystis jirovecii*), or a medicine to protect your stomach from ulcers.

### HOW DO I TAKE IT?

It's best to take this medicine in the morning with food. **If you've been taking prednisone for a long time, do not stop it suddenly.**

Your healthcare provider will help you lower the dose slowly until it's safe to stop taking it.

### CAN PREDNISONE INTERACT WITH OTHER MEDICINES?

Talk to your doctor or pharmacist before you take any new medicines (non-prescription and prescription), herbal products, or vitamins.

Check with your healthcare provider before you get any vaccines. When you're taking prednisone, you could have a higher risk of getting an infection if you get a live vaccine. Inactive (not live) vaccines may not work as well.

### WHAT IF I'M PREGNANT?

If you're pregnant, thinking about getting pregnant, or breastfeeding, tell your healthcare provider before taking prednisone. They can help you decide if prednisone is safe for you and your baby.

 **Learn more about prednisone.**

[myhealth.alberta.ca/GN/treatments](https://myhealth.alberta.ca/GN/treatments)

## Azathioprine

### ADULTS

Azathioprine is medicine that weakens your immune. It stops your body from making white blood cells and prevents them from working. White blood cells help your body fight infections and diseases, and cause a lot of the damage (inflammation) in kidney disease. In high doses, azathioprine has been used to treat cancer and given to people after an organ transplant. In lower doses, it can weaken the immune system for people with GN.



### Common side effects may include:

- Nausea, diarrhea
- Muscle aches
- Fever



### More serious side effects:

- Low cell counts (white blood cells and platelets). Contact your healthcare provider if you have bleeding, bruising, or an infection
- Liver damage
- Higher risk of infection
- Higher risk of blood cancer and skin cancer



### Managing side effects

Your healthcare provider has prescribed this medicine because not taking it is more dangerous to you than any side effects. This is not a list of all the side effects. Talk to your doctor, pharmacist, or your GN healthcare team to learn more about azathioprine. They can also help you manage any side effects.

Stay out of the sun and don't use sunlamps or tanning beds because this medicine can make your skin more sensitive to the sun. Wear sunscreen, sunglasses, and cover up with clothing to protect yourself from the sun.

### HOW DO I TAKE IT?

Take this medicine with food. This makes it less likely to upset your stomach.

### CAN AZATHIOPRINE INTERACT WITH OTHER MEDICINES?

Don't take this medicine with gout medicines such as allopurinol (Zyloprim) or febuxostat (Uloric). They can make the effects of azathioprine stronger.

Talk to your doctor or pharmacist before you take any new medicines (non-prescription and prescription), herbal products, or vitamins.

Check with your healthcare provider before you get any vaccines. When you're taking azathioprine, you could have a higher risk of getting an infection if you get a live vaccine. Inactive (not live) vaccines may not work as well.

### WHAT IF I'M PREGNANT?

Ask your healthcare provider if it's safe to take this medicine when you're pregnant or breastfeeding. It's best to talk about it before you get pregnant, if possible.



Learn more about azathioprine.

[myhealth.alberta.ca/GN/treatments](https://myhealth.alberta.ca/GN/treatments)

# Mycophenolate mofetil

### ADULTS

Mycophenolate mofetil (MMF) is a medicine that weakens your immune system. It stops the body from making white blood cells and prevents them from working. White blood cells help the body fight infections and diseases, and cause a lot of the damage (inflammation) in kidney disease. MMF is most commonly used for people who have had organ transplants, but it's also used to treat people with GN. Your healthcare provider may also prescribe this medicine with other medicines that weaken the immune system, such as prednisone.



#### Common side effects may include:

- Heartburn
- Nausea or diarrhea
- Headache
- Swelling
- High blood pressure



#### More serious side effects may include:

- Low cell counts (hemoglobin, white blood cells, and platelets). Contact your healthcare provider if you have fatigue, bleeding, bruising, or an infection
- Higher risk of blood cancer and skin cancer
- Stomach ulcers or bleeding



#### Managing side effects

Your healthcare provider has prescribed this medicine because not taking it is more dangerous to you than any side effects. This is not a list of all the side effects. Talk to your doctor, pharmacist, or your GN healthcare team to learn more about MMF. They can also help you manage any side effects.

Stay out of the sun and don't use sunlamps or tanning beds because this medicine can make your skin more sensitive to the sun. Wear sunscreen, sunglasses, and cover up with clothing to protect yourself from the sun.



#### Learn more about mycophenolate mofetil.

[myhealth.alberta.ca/GN/treatments](https://myhealth.alberta.ca/GN/treatments)

#### HOW DO I TAKE IT?

You can take MMF with food or without food.

#### CAN MMF INTERACT WITH OTHER MEDICINES?

Don't take MMF at the same time as calcium or antacids. They cause your body to absorb less of the medicine.

This medicine interacts with many other drugs. Talk to your doctor or pharmacist before you take any new medicines (non-prescription and prescription), herbal products, or vitamins.

Check with your healthcare provider before you get any vaccines. When you're taking MMF, you could have a higher risk of getting an infection if you get a live vaccine. Inactive (not live) vaccines may not work as well.

#### WHAT IF I'M PREGNANT?

If you're pregnant or think you might be pregnant, you should not take this medicine because it can harm your baby (cause birth defects). If you're able to get pregnant and are sexually active, you need to use birth control while taking this medicine and for at least 3 months after you've finished taking it.

This medicine can also cause birth defects through sperm. If you could get someone else pregnant, use condoms while taking this medicine and for at least 3 months after you've finished taking it to make sure your partner doesn't get pregnant.

Talk to your healthcare provider about what type of birth control is best for you. Some types of hormonal birth control (like the pill or patch) may not work well while you're taking MMF.

## Cyclophosphamide

### ADULTS

Cyclophosphamide, in high doses, is a chemotherapy drug to kill cancer cells. In lower doses, it can also weaken the immune system in people with kidney disease. It does this by stopping the body from making white blood cells, and by preventing white blood cells from working. White blood cells cause a lot of the inflammation (damage) related to kidney disease. Your healthcare provider may also prescribe this medicine with other medicines that weaken the immune system, such as prednisone.



### Common side effects may include:

- Headache
- Feeling tired
- Nausea
- Hair loss (usually stops after you stop taking this medicine)



### More serious side effects may include:

- Low cell counts (hemoglobin, white blood cells, and platelets). Contact your healthcare provider if you have bleeding, bruising, or an infection
- Serious infections
- Problems getting pregnant or getting someone else pregnant (fertility problems)
- Bladder problems (toxicity)
- Higher risk of cancer



### Managing side effects

Your healthcare provider has prescribed this medicine because not taking it is more dangerous to you than any side effects. This is not a list of all the side effects.

Talk to your doctor, pharmacist, or your GN healthcare team to learn more about cyclophosphamide. They can also help you manage any side effects.

You may need to take other medicines when you take cyclophosphamide to lower your risk of side effects. This may include an antibiotic to protect against a rare lung infection called PJP prophylaxis.

### HOW DO I TAKE IT?

You can take this medicine intravenously (through a vein) or orally (by mouth). If you take it by mouth, take it in the morning with food. If you take it intravenously, your healthcare team will order other medicines along with the cyclophosphamide.

### CAN CYCLOPHOSPHAMIDE INTERACT WITH OTHER MEDICINES?

Talk to your doctor or pharmacist before you take any new medicines (non-prescription and prescription), herbal products, or vitamins.

Check with your healthcare provider before you get any vaccines. When you're taking cyclophosphamide, you could have a higher risk of getting an infection if you get a live vaccine. Inactive (not live) vaccines may not work as well.

### WHAT IF I'M PREGNANT?

If you're pregnant or think you might be pregnant, you should not take this medicine because it can harm your baby (cause birth defects). If you're able to get pregnant and are sexually active, you need to use birth control while taking this medicine and for at least 3 months after you've finished taking it.

Talk to your healthcare provider about what type of birth control is best for you. Some types of hormonal birth control (like the pill or patch) may not work well while you're taking cyclophosphamide.



### Learn more about cyclophosphamide:

- oral
- injection

[myhealth.alberta.ca/GN/treatments](https://myhealth.alberta.ca/GN/treatments)

## Rituximab

### ADULTS

Rituximab is biologic medicine. This means it's made from a living source. It's a special antibody (protein the body makes to fight infections and diseases) that targets certain cells and weakens your immune system. It can be used to kill some cancer cells and for some types of autoimmune disease (where your body attacks its own healthy cells and tissues). Your healthcare provider may also prescribe this medicine with other medicines that weaken your immune system, such as prednisone.



#### Common side effects may include:

- Headache
- Fever
- Nausea
- Mild or moderate allergic reactions when you get the medicine, including feeling itchy, getting a rash, or having a heavy feeling in your chest
- Low cell counts (hemoglobin, white blood cells, and platelets). Contact your healthcare provider if you have bleeding, bruising, or an infection



#### More serious side effects may include:

- Serious allergic reactions when you get the medicine, including throat swelling and low blood pressure (anaphylaxis)
- Serious infections, including from bacteria, viruses, and fungi, or long-term infections that come back (such as hepatitis)
- Very rare serious skin problems (such as Stevens Johnson syndrome)
- A rare nerve disorder that usually leads to death (progressive multifocal leukoencephalopathy)



#### Managing side effects

Your healthcare provider has prescribed this medicine because not taking it is more dangerous to you than any side effects. This is not a list of all the side effects. Talk to your doctor, pharmacist, or your GN healthcare team to learn more about rituximab. They can also help you manage any side effects.

You may need to take other medicines when you take rituximab to lower your risk of side effects. This may include an antibiotic to protect against a rare lung infection called PJP prophylaxis.

#### HOW DO I TAKE IT?

For kidney disease, you take rituximab as a series of intravenous infusions, where the medicine is put into your vein with an IV. Each infusion can take 4 to 8 hours.

#### CAN RITUXIMAB INTERACT WITH OTHER MEDICINES?

Talk to your doctor or pharmacist before you take any new medicines (non-prescription and prescription), herbal products, or vitamins.

Check with your healthcare provider before you get any vaccines. When you're taking rituximab, you could have a higher risk of getting an infection if you get a live vaccine. Inactive (not live) vaccines may not work as well.

#### WHAT IF I'M PREGNANT?

If you're pregnant or you think you might be pregnant, you should not take this medicine. You need to use birth control while you're taking rituximab. Ask your healthcare provider what type of birth control is best for you. If you're planning to get pregnant, talk to your healthcare provider before you start trying.



Learn more about rituximab.

[myhealth.alberta.ca/GN/treatments](https://myhealth.alberta.ca/GN/treatments)

## Cyclosporine

### ADULTS

Cyclosporine is a medicine called a calcineurin inhibitor. It weakens your immune system by stopping your body from making white blood cells, which help your body fight infections and diseases and cause a lot of the damage (inflammation) related to kidney disease. Cyclosporine is most commonly used for people after organ transplants, but it's also often used to treat people with GN. Your healthcare provider may also prescribe this medicine with other medicines that weaken your immune system, such as prednisone.



### Common side effects may include:

- High blood pressure
- Nausea, diarrhea
- Hair growth
- Tremors
- Headache
- High cholesterol
- Swelling
- Gums getting larger



### More serious side effects may include:

- Serious infection (from a bacteria or virus)
- Risk of cancer, especially skin cancer
- Kidney damage (if used for a very long time)



### Managing side effects

Your healthcare provider has prescribed this medicine because not taking it is more dangerous to you than any side effects. This is not a list of all the side effects. Talk to your doctor, pharmacist, or your GN healthcare team to learn more about cyclosporine. They can also help manage any side effects.

Cyclosporine can make your skin more sensitive to the sun. When you're taking this medicine, stay out of the sun and don't use sunlamps or tanning beds. Wear sunscreen, sunglasses, and cover up with clothing to protect yourself from the sun.

### HOW DO I TAKE IT?

Take this medicine regularly at the same time every day. You can take it with or without food, but try to take it the same way each time.

While you're taking this medicine, you'll need to have regular blood tests. Follow the exact instructions from your healthcare provider for how to do the blood tests, or the results may not be right.

### CAN CYCLOSPORINE INTERACT WITH OTHER MEDICINES?

Don't have grapefruit or grapefruit juice when you're taking this medicine. These fruits can change the levels of medicine in your body. Cyclosporine can interact with many other medicines, including some medicines for cholesterol, pain, seizures, blood pressure, antifungals, antibiotics, and blood thinners.

Talk to your doctor or pharmacist before you take any new medicines (non-prescription and prescription), herbal products, or vitamins.

Check with your healthcare provider before you get any vaccines. When you're taking cyclosporine, you could have a higher risk of getting an infection if you get a live vaccine. Inactive (not live) vaccines may not work as well.

### WHAT IF I'M PREGNANT?

Ask your healthcare provider if it's safe to take cyclosporine when you're pregnant or breastfeeding. It's best to talk about it before you get pregnant.



Learn more about cyclosporine.

[myhealth.alberta.ca/GN/treatments](https://myhealth.alberta.ca/GN/treatments)



# Tacrolimus

### ADULTS

Tacrolimus is a medicine called a calcineurin inhibitor. It weakens your immune system by stopping your body from making white blood cells, which help your body fight infections and diseases, and cause a lot of the damage (inflammation) related to kidney disease. Tacrolimus is most commonly used for people after organ transplants, but it's also often used to treat people with GN. Your healthcare provider may also prescribe this medicine with other medicines that weaken your immune system, such as prednisone.



### Common side effects may include:

- High blood pressure
- Nausea, diarrhea
- Hair loss
- Tremors
- Headache
- High cholesterol
- Swelling
- Diabetes



### More serious side effects may include:

- Seizures
- Liver damage (toxicity)
- Serious infection (from a bacteria or virus)
- Risk of cancer, especially skin cancer
- Kidney damage (if used for a very long time)



### Managing side effects

Your healthcare provider has prescribed this medicine because not taking it is more dangerous to you than any side effects. This is not a list of all the side effects. Talk to your doctor, pharmacist, or your GN healthcare team to learn more about tacrolimus. They can also help you manage any side effects.

Tacrolimus can make your skin more sensitive to the sun. When you're taking this medicine, stay out of the sun and don't use sunlamps or tanning beds. Wear sunscreen, sunglasses, and cover up with clothing to protect yourself from the sun.

### HOW DO I TAKE IT?

Take this medicine regularly at the same time every day. You can take it with or without food, but try to take it the same way each time.

While you're taking tacrolimus, you'll need to have regular blood tests. Follow the exact instructions from your healthcare provider for how to do the blood tests, or the results may not be right.

### CAN TACROLIMUS INTERACT WITH OTHER MEDICINES?

Don't have grapefruit or grapefruit juice when you're taking this medicine. These fruits can change the levels of medicine in your body. Tacrolimus can interact with many other medicines, including some medicines for cholesterol, pain, seizures, blood pressure, antifungals, antibiotics, and blood thinners.

Talk to your doctor or pharmacist before you take any new medicines (non-prescription and prescription), herbal products, or vitamins.

Check with your healthcare provider before you get any vaccines. When you're taking cyclosporine, you could have a higher risk of getting an infection if you get a live vaccine. Inactive (not live) vaccines may not work as well.

### WHAT IF I'M PREGNANT?

Ask your healthcare provider if it's safe to take tacrolimus when you're pregnant or breastfeeding. It's best to talk about it before you get pregnant.



Learn more about tacrolimus.

[myhealth.alberta.ca/GN/treatments](https://myhealth.alberta.ca/GN/treatments)

# Plasma exchange

Plasma exchange (also called plasmapheresis or apheresis) is a way to clean the blood. When you have certain types of GN—or other autoimmune diseases—the antibodies you make to fight harmful things like viruses attack your healthy cells and tissues. These antibodies are found in plasma (the liquid part of your blood). In plasma exchange, your plasma is taken out of your body, separated from the blood cells, and replaced with good donor plasma or a plasma substitute.



### What does it treat?

In the context of GN, plasma exchange is primarily used for the treatment of anti-GBM disease. Although it may be considered for certain cases of ANCA-associated vasculitis or other rare kidney diseases.

Your healthcare provider will talk to you about whether plasma exchange is the right treatment for you.



### How does it work?

During a plasma exchange, a needle or central line catheter (IV) is placed in a vein. Small amounts of blood are slowly removed. The blood moves through a machine that separates the plasma from blood cells. The plasma is thrown out and donor plasma (or a plasma substitute, like albumin) is returned to your body through the IV line.

One plasma exchange usually removes 65% to 70% of the problem antibodies. The treatment takes 2 to 3 hours. How often you need this treatment depends on the type of GN you have and how sick you are.



### What can I expect?

If you have a smaller IV catheter, your arms will be propped on pillows. Throughout your treatment, you'll be asked to pump a fist to help with blood flow. You may have bruising or discomfort where the IV goes in. If you have a larger catheter or port, your arms will be free during treatment.

You may feel a bit numb and tingly, have an upset stomach (nausea), or feel light-headed. Tell a plasma exchange team member if you have any side effects during your treatment. They can help you manage them.

You may feel tired for the rest of the day after treatment. Drink lots of fluids afterwards. It's best to have someone drive you home until you know how the treatments will affect you.



### How do I prepare?

Drink lots of fluids (non-alcoholic) for a couple of days before a plasma exchange. It's also a good idea to eat something before your treatment. Ask your doctor about when to take your medicines on the day of your plasma exchange, because this treatment can affect medicine levels in your body.

### WHAT ARE THE RISKS?

**There is a small risk (in 4-5% of people) of problems from plasma exchange.**

- Bleeding, blood clot
- Infection
- Collapsed lung or lung injury
- Bad reaction (fever, allergic reaction)
- Citrate toxicity—feeling sick to your stomach, throwing up, chills, twitching, spasms, seizures, and heart rhythm problems
- Low blood pressure, too much blood in part of the heart (volume overload), electrolyte imbalances

Your healthcare provider has prescribed this treatment because not having it is more dangerous to you than any side effects. Talk your healthcare team to learn more about plasma exchange. They can also help you manage any side effects.



**Learn more about plasma exchange.**

[myhealth.alberta.ca/GN/treatments](https://myhealth.alberta.ca/GN/treatments)