

# Coumadin

## A Rat Poison Gets a Makeover



**Inservice valid for one (1) CEU for assisted living facilities in North Carolina**

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## Major Sections

**What is Coumadin?**

**What is Coumadin used for?**

**Side effects**

**Overdose**

**Special precautions**

**Interactions**

**Supportive therapies**

**Lab tests**

## Objectives

1. State the difference between *coumarin* and *Coumadin*.
2. Name two diagnoses for which Coumadin is used to treat.
3. Name the most common side effect from using this drug.
4. Identify the most common evidence of Coumadin overdose.
5. Discuss how a risk assessment can affect whether Coumadin is ordered or not.
6. Describe how a fall can be deadly for a person on Coumadin.
7. Name one medication that intensifies the effects of Coumadin.
8. List three foods or drinks that interacts with Coumadin.
9. Discuss how compression stockings decrease the risk for blood clots.
10. Identify two lab tests normally done to monitor residents taking Coumadin.

# Coumadin: A rat poison gets a makeover

## What is Coumadin?

Coumadin is the brand name of a drug known as warfarin. It is an anticoagulant commonly known as a “blood thinner.” A “coagulant” makes the blood clot faster, so an “anticoagulant” slows down clotting. Clotting time is increased. This can be desirable if the patient has a history of blood clots or is at high risk for one.

But Coumadin does not make the blood “thinner” as we normally think of thick or thin. It does not affect the viscosity, or thickness, of the blood. Coumadin decreases the amount of certain kinds of clotting proteins in the blood. This makes it harder for the blood to clot. This can be a good thing, if a patient or resident has a condition in which forming blood clots is more likely to happen.

A little about the history of Coumadin is helpful if you are to more fully understand the importance of careful administration and monitoring of this powerful drug.

In the early 1900s, many cattle began dying off in the northeastern part of the U.S., mostly after a minor surgical procedure, but not always. Cattle ranchers had no idea what “plague” was killing their cattle, but they did notice that the cows were often found lying in pools of blood that had not clotted. Cows were hemorrhaging (lots of bleeding) internally and externally, but they had no idea why this was happening.

The main feed source then was a plant called “sweet clover,” which had been imported from Europe. Sweet clover grew well in America. Cattle liked to eat it and they seemed to thrive on it.

In the early 1930s, a biochemist discovered that the sweet clover samples he and his team were testing contained a compound called “dicoumarol.” Sweet clover does not produce dicoumarol by itself, but it does contain *coumarin* (not to be mistaken for *Coumadin*, the brand name of the anticoagulant).

Coumarin is the same chemical that gives grass that summer time sweet smell when you mow your yard. It’s also found in many other plants.

It was discovered that lots of rain kept the sweet clover damp, which encouraged mold growth. It was the mold that helped the clover to make the dicoumarol compound from the coumarin that was naturally in the plant.

Plain sweet clover was fine for cattle to eat. So long as cattle did not eat molded sweet clover, they were not harmed. The “sweet clover disease” riddle was solved, but chemists saw no further use for the anticoagulant dicoumarol.

The same biochemist (who was also a professor) who discovered the cause of the cattle bleeding eventually thought of using it as a pest control against troublesome rat populations. He patented his dicoumarol formulation under the name of “Warfarin,” which is a mix of two different words: the first four letters from the foundation that funded his work, the Wisconsin Alumni Research Foundation (WARF), and the last four letters from coumarin (arin).

Warfarin was then mixed with a base, such as corn, which mice love to eat. The mice get a concentration of Warfarin, which greatly reduces the blood clotting capacity. Mice then die due to internal bleeding.

Although Warfarin is still used today in some places as a rat poison, there are later generation poisons that are often used instead. Part of the reason for this is because more recent generations of mice have become more resistant to the bait and more modern concoctions are more potent.

So how did Warfarin come into use by humans? It was not until a farm worker tried to commit suicide by eating the rat poison that doctors knew it could be used on people. The worker did not die, because doctors administered vitamin K to him in an effort to counter the effects of the Warfarin.

Doctors knew at the time that vitamin K promoted normal clotting, so they administered it to the farmer, hoping it would counter Coumadin’s effects. It did. Since then, vitamin K has been the standard antidote for Coumadin overdose.

Coumadin was approved for medical use on humans in the early 1950s. In fact, President Dwight D Eisenhower was one of the first to use this drug after having a heart attack in 1955.

There are many physicians who are hesitant to prescribe Coumadin today, even for “at risk” patients. They feel that the benefits normally do not outweigh the risks and that there are better, less dangerous meds and treatments that should be tried.

Others feel that Coumadin is a life-saving medication whose worth has been proven countless times. They are more inclined to agree with Aureolus Paraceisus (1493-1541), considered to be the grandfather of pharmacology, who once said: “All things are poisons, for there is nothing without poisonous qualities. It is only the dose which makes a thing a poison... a lot kills, a little cures.”

One problem with Coumadin is that there is a fine line between being therapeutic and being harmful.

### **What is Coumadin used for?**

Coumadin is often used when a patient is at high risk for forming blood clots. Four common conditions in which Coumadin might be used are *atrial fibrillation* (heart condition in which the top portion of the heart beats erratically), *deep vein thrombosis* (where a blood clot has formed or becomes lodged in a deep vein somewhere in the body), *pulmonary embolism* (blood clot in the lungs), and *heart valve replacements*.

In three of those cases (atrial fibrillation, heart valve replacement, and pulmonary embolism), a blood clot can form in the heart. The clot can then be ejected by the heart during its normal pumping cycle and carried through the circulation and where it can end up lodging in a smaller vessel.

A clot within a blood vessel is a dangerous thing and can be fatal if the clot is sufficiently large or limits blood flow to a vital organ. Damage occurs because of decreased blood flow. Organs affected could include the heart, lungs, kidneys, brain, any portion of an arm or leg, or any other organ where the clot might become lodged.

### **Side effects**

A side effect is any effect other than the intended effect of a medication. Sometimes a side effect can be unexpected, but sometimes it can be predicted. A side effect can be minor, a low risk to health or life. Other times, a side effect can be severe or life-threatening.

Coumadin has no known beneficial or pleasurable side effects. Coumadin is a powerful anticoagulant. And even though it is simple enough to give as an oral medication, caregiving for a person on this drug is complicated, partly because of the high risk of severe complications, mainly bleeding.

The only relatively common side effect of taking Coumadin is bleeding. It is important to understand that not all bleeding is obvious. A cut to the skin that does not stop bleeding within a reasonable period of time would be an obvious bleed.

Bleeding can also happen inside the body, where symptoms might not be obvious at first. One common evidence of internal bleeding is the increase in the number or severity of bruises, especially in the absence of trauma or other injury.

One of the more serious bleeding concerns would be within the brain, where bleeding (also called an intracranial hemorrhage) could cause a stroke.

Some studies do suggest that bleeding issues are more likely within the first month of treatment. But, to state a previous point in a different way, do not assume that a long term user is low risk for side effects.

Also, dangerous bleeding is more common with Coumadin than with aspirin, even when the clotting test results are within “therapeutic” values.

What specific bleeding problems are possible with Coumadin?

1. Increase or presence of bruises or severity of bruises with or without trauma
2. A laceration, skin tear, or cut that is hard to stop bleeding
3. Internal bleeding that could happen anywhere in the body, but is more likely with some traumatic incident, such as a fall
4. Blood in the urine or stool
5. Bleeding from the rectum
6. Vomiting up “coffee ground” appearing material
7. Purple or red pinpoint spots under the skin
8. Nosebleeds or bleeding from any other opening in the body
9. Bleeding from the gums
10. Coughing up blood

A bleeding risk assessment is often done before Coumadin is prescribed. Some of the factors that could affect the decision to order it would be:

1. Does the person have a history of bleeding when taking an anticoagulant?
2. Is there a history of hypertension (high blood pressure)?
3. Is the person prone to falls?
4. Are any other anticoagulants being taken at this time?
5. Is there a history of stroke?

6. Is there any abnormal kidney or liver function?
7. Is the person elderly (at least 65 years old)?
8. Does the person drink alcohol?
9. Does the person use any recreational drugs?
10. What other medications is the person on?

There are other, but far less common, side effects from Coumadin.

### *Osteoporosis*

There have been studies showing a link between Coumadin use and osteoporosis, the loss of bone density that makes it much more likely that a bone will break under stress. Osteoporosis-related fractures, in one study, seemed to be more common in men who took Coumadin, but not in women.

We know that vitamin K is important for bone health, and it might appear that Coumadin would naturally cause problems with bone mineral absorption. But studies have given some conflicting results. Osteoporosis is given special mention here because of concerns for falling, which can be life-changing for anyone who has osteoporosis or is on Coumadin.

Some of the less common side effects would include these:

1. Decreased white blood cell count
2. Diarrhea
3. Nausea
4. Excess gas
5. Hair loss

Some of the rare side effects would include these:

1. Abnormal liver function tests
2. Anemia
3. Bloody urine
4. Calcification of cartilage in the bronchus or windpipe
5. Gangrene

## **Overdose**

By far the most common and most serious sign of Coumadin overdose is bleeding. The same bleeding issues (such as where in the body the bleeding is occurring) in an overdose can happen even if blood clotting tests are within therapeutic range. But the risk of those bleeding episodes is much higher if a patient gets too much Coumadin.

For this reason, it is absolutely forbidden to give a double dose, which caregivers sometimes do when a previous dose was skipped for some reason. Never double up on a dosage to “make up” for an earlier missed dose.

Most people on Coumadin take a certain prescribed amount each day. The actual amount (always given as milligrams—mg) can vary from one day to the next, so it is extremely important that medication aides give precisely the amount that is ordered, at the right time.

Coumadin comes in a wide range of doses, namely, in 2, 2.5, 3, 4, 5, 6, 7.5, and 10 mg tablets. Therefore, it is easy to make a mistake in dosing.

If Coumadin was given in any way that was not according to the doctor’s orders or if a dose was missed for any reason, you must notify your supervisor and the physician must also be contacted.

Doctors will usually assume that residents get the medications and treatments that are ordered. Those doctors will review any blood tests and make changes as necessary to get the blood work at a level they need. If you fail to report any extra doses or any missed doses, the doctor might make a medical decision based on faulty information, as they assumed that each previous dose was given as ordered.

## **Special precautions**

There are several precautions to keep in mind when giving Coumadin and monitoring the resident. Here are some of the important precautions to remember:

### *Falls*

Falling is a serious issue with the elderly resident, but it’s even more serious for anyone who has prolonged blood clotting time. For this reason, a person who is known to be a high fall risk is usually not allowed to take Coumadin.



Of course, any resident could fall. And the resident on an anticoagulant who falls might sustain a cut whose bleeding is hard to stop. On the other hand, a fall might not even result in a scratch, but the resident could have significant internal injuries, so the bleeding might not be obvious at first.

One reason why many facilities have a policy to automatically send out any resident who has fallen and hit their head (usually a trip to the ER) is because of the potential of internal head injury with fracture or bleeding. Again, bleeding (internal or external) is more likely to happen during a fall if the resident is on an anticoagulant medication.

### *Illness or injury*

It is crucial that current blood disorders be taken into account whenever Coumadin treatment is considered. Giving Coumadin to a person who already has certain conditions will make clotting times harder to control and is more likely cause bleeding problems.

Some of the conditions that can cause problems for those on Coumadin include:

1. Recent accident or surgery
2. Anemia
3. Recent bleeding or hemorrhaging
4. Stomach ulcers
5. Alcohol or drug use
6. Liver disease
7. Vomiting or diarrhea for more than two days
8. Antibiotic therapy
9. Blood vessel disorders, like an aneurysm
10. Pregnancy

### *Stopping the drug*

Coumadin is safe to suddenly stop taking it. And it obviously should be stopped if bleeding is an issue. Lots of caregivers make the mistake of “letting their guard down” after stopping the drug. But it takes a while for the body to fully break down and excrete all traces of Coumadin from the bloodstream.

Please realize that the resident will still be prone to bleeding for as long as two weeks after discontinuing Coumadin. So be careful to continue to monitor for unusual or unexpected bleeding for that period of time.

## **Interactions**

One of the factors that makes Coumadin a complicated medicine to administer is that it interacts with many other medications and foods. Most of the interactions affect Coumadin's ability to interfere with blood clotting. Coumadin's effects can be either increased or decreased, depending on what is reacting with it.

Aspirin is one of the most important drugs that will increase the effect of Coumadin, since both will increase clotting time. If both meds are given to the same resident, extreme caution must be taken, since bleeding is even more likely.

Non-steroidal anti-inflammatory drugs (NSAIDS, like Ibuprofen or Naproxen) can also increase Coumadin's anti-clotting power and should be given with extreme caution. Even topical pain-relieving creams that are applied to the skin could contain one or more drugs that interact with Coumadin.

And it's not just synthetic medications that interact with Coumadin. Many natural or herbal products can be a problem, so the physician should be aware of any herbal food or beverage that a person consumes. Green tea, ginkgo biloba, ginseng, St. John's wort, coenzyme Q10, danshen, dong quai, fenugreek, goldenseal, and garlic are all herbal products that react with Coumadin.

Foods that are known to react or interfere with Coumadin include:

1. Brussel sprouts
2. Kale
3. Spinach
4. Collard greens
5. Mustard greens
6. Chard
7. Parsley
8. Green tea
9. Cranberry juice

Cranberry juice and alcohol will increase the effects of Coumadin, while the others from the above list will decrease the effects of it. Vitamin K will lessen the effects

of Coumadin, so any food with significant levels of vitamin K should be consumed in small amounts or not at all.

### **Supportive therapies**

Coumadin is taken to “thin the blood,” to reduce the chance of forming blood clots. A person’s legs can be fertile breeding ground for producing those blood clots. This is because of several factors.

As a person ages, blood to the lower extremities might not circulate as well as in younger years. Blood flow can be decreased from years of smoking or as a complication from diabetes. If the person has varicose veins, those veins will usually deteriorate as they age. Varicose veins can become tortuous, more “puffy,” or the valves within them don’t work as well.

Because blood flow in the legs of the elderly is not as efficient, swelling and blood clots are more likely. There are lifestyle choices and treatments that can be of great benefit and can help reduce the chance of forming clots in those veins.

Applying TED or compression stockings is a common treatment in assisted living communities. But it is also often neglected. Most people think that compression hose are meant for swelling. And while swelling is the most common reason why people wear them, support hose can also be effective in reducing the chance of clots forming, which can lower the need for anticoagulant medicines.

Devices such as lymphedema pumps and treatments like ace wraps to the lower legs can also help prevent the blood clots that could form in this area.

Unless otherwise indicated, exercise should be part of a resident’s daily activities. The resident should at least try to be active, walking (ambulating) at frequent times throughout the day. If the resident is not ambulatory (or minimally so), assist the resident to stand several times a day to help relieve pressure areas, which will help with blood and lymphatic circulation.

Even with these supportive treatments, a resident might require an anticoagulant medication. Your job is to safely prepare and administer it. It is also your responsibility to observe, to monitor the resident for any new onset or any increase in bleeding.

## Lab tests

A person taking Coumadin has to be closely monitored, both for side effects and for a proper blood level, which means routine blood work. Lab tests focus on measuring how long it takes for a sample of blood to coagulate, or clot.

The traditional, standard test was the PT time, or *prothrombin time*. It is still one of tests that's usually done, often along with the PTT, or *partial thromboplastin time*.

In modern times, heavier emphasis has been placed on the INR (*international normalized ratio*) test, which is based on the PT result, but is standardized, whereas the PT test is not. The PT result itself could widely vary, depending on what lab performs the test. But the INR will give consistent results, no matter where the test is done.

Most of the time, blood work will simply be ordered as a PT and INR, especially for routine monitoring of a resident who is already on Coumadin. The INR can be done as a fingerstick test and many patients test their own INR level at home. In assisted living facilities, though, a nurse (normally from a home health care agency) usually collects the blood sample. Or the resident has the blood test done during a doctor's office visit.

The average person's INR is around 1.00 but a person on Coumadin will usually strive to maintain a "therapeutic" level of 2.5 to 3.5, a longer clot time.

There is no set frequency for doing blood work. The doctor will take into consideration how steady past results have been, as well as the perceived risks of bleeding for that particular resident.

A stable resident will probably have tests done less frequently. But do not let that fool you. Even residents who have taken Coumadin for years without any issues could develop problems without any warning.

Sometimes blood work is done on a weekly basis. But once every two weeks or even once a month are also common.

**Thanks for taking this inservice. Understanding and applying the principles outlined here will help you administer Coumadin in the safest way possible.**