

26. Coumadin® (and other coumarin drugs) - long-term use

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Q1: "Are we taking rat poison?"

A1: Yes and no. While warfarin (= coumadin) was developed as a rat poison, it is not used any more for that purpose. The modern rat poisons are much more potent and toxic than warfarin. However, coumadin and rat poisons belong to the same class of drugs (coumarins) and work the same way: they "thin the blood" by antagonizing vitamin K.

Q2: "I'm confused by one thing you said... you take K-DUR and eat lots of bananas, and are on coumadin? That's completely opposite of what I was told to do. I was told to eliminate potassium (vitamin K) by 85% and keep record of what I eat that contains large amounts of it, such as bananas."

A2: Vitamin K is not potassium. "K" is the element symbol for potassium. It is unrelated to the vitamin which is called K. Vitamin K is needed to produce our clotting factors. Coumadin and the other coumarins "thin the blood" by antagonizing vitamin K. Potassium is frequently prescribed to a person on a diuretic. Some people use it for leg cramps. K-DUR and bananas contain a lot of potassium, but no significant amount of vitamin K.

Q3: "I live in Germany and take Marcumar®. Is that the same as coumadin?"

A3: No. Marcumar (=phenprocoumon) and coumadin (= warfarin) are slightly different chemicals. However, they belong to the same class of drugs (coumarins), work the same, and are used for the same medical problems. For historical and marketing reasons some countries use more Marcumar, others more coumadin, and yet others coumarin drugs such as Sintrom® (=acenocoumarol).

"Blood thinners" in humans

In 1939 a chemical called dicumarol was discovered in sweet clover, after it was noted that in cattle feeding on spoiled sweet clover silage developed bleeding problems. In 1948, a similar, but more potent synthetic compound, warfarin, was produced and introduced to the market as a poison for rodents (=rodenticide). Its name was derived from the original patent holder: Wisconsin-Alumni-Research-Foundation, plus the suffix "-arin" used for these types of chemical compounds. After a person uneventfully survived an attempted suicide in 1951 with massive dosages of warfarin intended for rodent control, it was discovered that Warfarin could be used as a blood thinner in humans.

Several chemical compounds similar to warfarin exist. They all belong to the group of "coumarins".

- Warfarin (= Coumadin®)
- Phenprocoumon (= Marcumar®, Marcoumar®, Marcuphen®, Phenpro®, Falithrom®)
- Acenocoumarol (= Synthrome®, Sintrom®)
- Bishydroxycoumarin (= Dicumarol)
- Tiocloamarol (= Apegmone®)

The function of these agents is the same: they all "thin the blood" (= anticoagulate the patient) by impairing the production of clotting factors in the liver. Normally, the liver needs vitamin K to produce the clotting factors. The coumarin drugs block (=antagonize) the function of vitamin K. They are therefore also called "vitamin K antagonists". Warfarin is the most widely used oral blood thinner in the United States, Phenprocoumon the most widely used compound in Germany. The following facts are true for all coumarin drugs:

- their effect is measured with the INR lab test (=protime);
- dietary vitamin K can influence their effectiveness;
- they should not be used during pregnancy.

Regarding the safety of breastfeeding in woman taking a coumarin drug: studies have shown that women on warfarin can safely breastfeed, since only minimal amounts of warfarin are secreted into the breast milk. Phenprocoumon is likely also safe for the breastfeeding women, but less data on this drug exist. I am not aware of any data in the literature for the other coumarins.

In the U.S. the term coumadin is often used by physicians and patients as a generic term for the group of drugs called coumarins, even though that is not really correct. When patients and physicians on this www.fvleiden.org webpage talk

about "coumadin", the information is, in most instances, applicable also to the generic warfarin and to other coumarin drugs.

There is a class of drugs, called Indandiones, which are similar to coumarins and also function as "blood thinners" through vitamin K antagonism, but they are more toxic. They are mostly used in France. To this group belong:

- Phenindione (= Dindevan®, Pindione®)
- Fluindione (= Previscan®)

Rat poison

Rat poison and other rodenticides nowadays contain types of coumarins that are extremely potent and stay in the body much longer than the coumarins used in humans. They are therefore called "super-coumarins". Animals bleed to death after ingestion. "Brodifacoum" is one of these "super-coumarins" often used in rat poison. A single dose can elevate the INR for up to 3 months.