

Mebendazole | Polymorph A, B C

Is there really a difference?

Drug Polymorphism:

The ability of active pharmaceutical ingredients with the same chemical formulation to exist in more than one crystalline form with different structural arrangements. Mebendazole exists in the solid state as three different polymorphic forms identified as A, B, and C.



Mebendazole: looking at polymorph efficacy in rodent brain tumors.

Mebendazole (MBZ), once an anti-parasitic agent, is being reintroduced as a possible treatment for various types of cancer. Mebendazole is the active pharmaceutical ingredient that allows for the therapeutic effectiveness and treatment of disease.

All three mebendazole polymorph formulations were studied in a trial on mouse brain tumors. MBZ polymorph A, B, and C were isolated, and then each individual polymorph was assessed to see the results and if they would be effective in this form of cancer. This study deemed polymorph A was ineffective, as the therapeutic concentration remained very low in the plasma. Polymorph A being unsuccessful is in-line with other studies, including looking at the success of MBZ in parasitic infections in humans, that have shown similar results of ineffectiveness. Interestingly, polymorph B and C showed similar results in efficacy, but more adverse events were associated with polymorph B. Because of the increased toxicity of MBZ-B, MBZ-C was determined to have the best outcomes.

A Worm Treatment Used to Cure Cancer?

Mebendazole has been used for parasitic infections in humans for over 40 years. This well-known anti-parasitic agent has proved to be safe for human use and worked well for treating these various infections. In recent years, this seeming one-purposed drug has caught interest in becoming much more than a drug used to treat pinworms.

Interestingly, researchers have noted that mebendazole displays anti-cancer effects. This correlation opened the door to pre-clinical studies testing the effects of mebendazole in multiple forms of cancer. Pre-clinical studies in rodents show promising results, but the different polymorphic structures of this drug could have a big factor in therapeutic efficacy.



How mebendazole is sold on the market

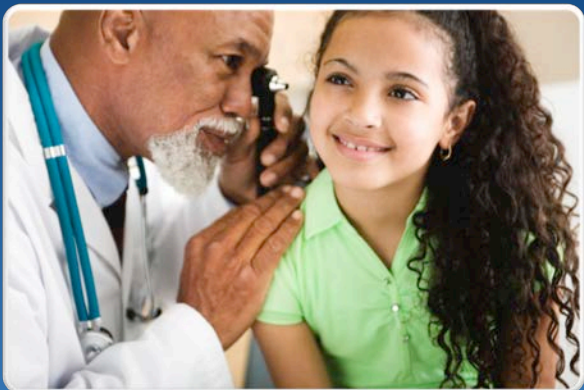
The solid form of mebendazole exists as three different crystalline structures identified as mebendazole polymorph A, mebendazole polymorph B and mebendazole polymorph C. Depending on the drug manufacturer, the percentage of polymorph can vary in each formulation. There has been recent literature that shows polymorph C is preferred clinically because it has decreased toxicities associated with the compound and has the most optimal bioavailability. Polymorph B is the most soluble, but comes with increased side effects. Under extreme conditions (temperatures above 100°C) and humidity, polymorph C was observed to crystallize into polymorph A and decrease the shelf life of the compound.

Because all formulations meet USP standards for dissolution, all three polymorphic forms are available on the market. All three polymorphic forms meet USP requirements, but when the surfactant sodium lauryl sulfate, a key component in getting mebendazole to dissolve is removed; none of the polymorphic forms were seen to meet USP criteria. Polymorph C was seen to dissolve into solution the most at 70% followed by B and A (37% and 20%, respectively). The clinical implication can be seen that the dissolution rate correlates more with the in vivo effectiveness rather than the solubility.



United States Pharmacopeia Standards

- According to standards by USP, no less than 75% of mebendazole should be dissolved in a 0.1 N hydrochloric acid solution containing 1% sodium lauryl sulfate in 120 minutes.
- All mebendazole preparations (A, B and C) meet this requirement.



Awareness, Stay Alert.

It is important to know what mebendazole polymorph or what percentage of polymorphs make up the mebendazole formulation. Stay informed and aware, to have the most success with this product.

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