

## Ursochol

Instruction for use-please read carefully

Ursochol 250 mg Capsules

Active ingredient: Each Capsule contains Ursodeoxycholic acid....250 mg (micronized)

Description

Ursochol 250 mg (micronized) is ursodiol available as capsules for oral administration. Ursodeoxycholic acid (UDCA) is a naturally occurring bile acid found in small quantities in normal human bile and in larger quantities in the biles of certain species of bears. It is a bitter-tasting white powder consisting of crystalline particles freely soluble in ethanol and glacial acetic acid, slightly soluble in chloroform, sparingly soluble in ether, and practically insoluble in water.

Important ingredients:

Beta-cyclodextrin, polysorbate 80, microcrystalline cellulose, (avicel ph101), povidone k90, croscarmellose sodium, (ac-d-sol), talc.

Capsules shell

Cannabis green

gelatin, titanium dioxide, brilliant blue, carmoisine, quinoline.

Body (opaque blue).

titanium dioxide, brilliant blue,

CLINICAL PHARMACOLOGY

Ursodiol is Ursodiol, (U.S.P. Ursodeoxy Cholic Acid) (UDCA) is normally present as a minor fraction of bile acids in humans (about 5%). Following oral administration, the majority of ursodiol is absorbed by passive diffusion and its absorption is incomplete. Once absorbed, ursodiol undergoes hepatic extraction to the extent of about 50% in the absence of liver disease. As the severity of liver disease increases, the extent of extraction decreases. In the liver, Ursodiol is conjugated with Glycine or Taurine, and these secreted into bile. These conjugates of ursodiol are absorbed in the small intestine by passive and active mechanisms. The conjugates can also be deconjugated in the liver by intestinal enzymes, leading to the formation of free ursodiol that can be absorbed and resecreted in the liver. Nonabsorbed ursodiol passes into the bile where it is mostly reabsorbed by active transport. Ursodiol also undergoes 7-dehydroxylation to form lithocholic acid. These metabolites are poorly absorbed and excreted in the feces. A small portion of lithocholic is reabsorbed, conjugated in the liver with Glycine or Taurine and sulfated at the 3 position. The resulting sulfated lithocholic acid conjugates are excreted in bile and then lost in feces. Lithocholic acid, when administered chronically to animals, causes cholestatic liver injury that may lead to death from liver failure in certain species unable to form sulfate conjugates. Ursodiol is 7-dehydroxylated more slowly than chenodiol. For equimolar doses of ursodiol and chenodiol, steady state levels of lithocholic acid in biliary bile are lower during ursodiol administration than with chenodiol administration. Humans and chimpanzees can sulfate lithocholic acid. Although liver injury has not been associated with ursodiol a reduced capacity to sulfate may exist in some individuals. Nonetheless, such as a deficiency has not yet been clearly demonstrated and must be extremely rare given the several thousand patients - years of clinical experience with ursodiol in healthy subjects, at least 70% of ursodiol (unconjugated) is bound to plasma proteins. No information is available on the binding of conjugated ursodiol to plasma protein in healthy subjects or primary biliary cirrhosis (PBC) patients. Its volume of distribution has not been determined. Ursodiol is widely distributed in the body and is excreted in the bile and small intestine. Ursodiol is excreted primarily in the feces. With treatment, bile excretion increases, but remains less than 1% except in severe cholestatic liver disease. During chronic administration of ursodiol, it becomes a major biliary and plasma acid. At a chronic dose of 13 to 15 mg/kg/day, ursodiol constitutes 30-50% of biliary and plasma bile acids.

### Clinical Studies

A U.S. multicenter, randomized, double-blind, placebo-controlled study was conducted to evaluate the efficacy of ursodeoxycholic acid at a dose of 13 to 15 mg/kg/day, administered in 3 or 4 divided doses in 180 patients with PBC (78% received QID dosage). Upon completion of the double-blind portion, all patients entered on open-label active treatment extension phase. Treatment failure, the main efficacy end point measured during this study, was defined as death, need for liver transplantation, histological progression by two stages or to cirrhosis, development of varices, ascites or encephalopathy, marked worsening of fatigue or pruritis, inability to tolerate the drug, doubling of treatment failure was significantly reduced in the ursodiol group compared with placebo. Treatment failure and resulted in a significant improvement in the following serum hepatic biochemicals when compared to baseline: total bilirubin, SGOT, Alkaline phosphatase and IgM. A second study conducted in Canada randomized 222 PBC patients to ursodiol, 14 mg / kg / day or placebo, administered as a once daily dose in a double-blind manner during a two-year period. At two years, a statistically significant difference between the two treatments, in favor of ursodiol, was demonstrated in the following: reduction in the proportion of patients exhibiting a more than 50% increase in serum bilirubin; median percent decrease in bilirubin, transaminases and alkaline phosphatase; incidence of treatment failure, and time to treatment failure. The definition of treatment failure included discontinuing the study for any reason: a total serum bilirubin level greater than or equal to 1.5 mg/dl or increasing to a level equal to or greater than two times the baseline level; and the development of ascites or encephalopathy. Evaluation of patients at 4 years or longer was inadequate due to the high drop out rate and small number of patients. Therefore, death, need for liver transplantation, histological progression by two stages or cirrhosis, development of varices, ascites or encephalopathy, marked worsening of fatigue, pruritis, inability to tolerate the drug, doubling of serum bilirubin and voluntary withdrawal were not assessed.

An international crossover study in 576 PBC patients compared efficacy of (ursodiol) in BID (twice daily QID) divided dosing schedules in 50 patients for 6 months in each crossover period. Mean patient changes from baseline in liver test results and Mayo risk score ( $n = 46$ ) and serum enrichment with UDCA ( $n = 34$ ) were not statistically significant with any dosage of any time interval.

This study demonstrated that UDCA (13 to 15 mg / kg / day) given BID is equally effective to UDCA given QID. In addition ursodiol was given as a single (once daily) versus TID (three) dosing schedules in 10 patients. Due to the Small number of patients in this arm of the study, it was not possible to conduct statistical comparisons between these regimens.

### indications and Usage

Ursochol 250 mg ursodiol capsules (micronized) are indicated for the treatment of patients with primary biliary cirrhosis.

### contraindications

Hypersensitivity or intolerance to ursodiol or any of the components of the formulation.

**WARNING AND PRECAUTIONS**

-Improved serum liver tests do not always correlate with improved liver disease status. Continue monitoring of GGT, alkaline phosphatases, AST, ALT and bilirubin every month for three months after start of therapy, and every six months thereafter.

-Treatment should be discontinued if the level of these parameters increases.

-Long term use of doses exceeding the recommended dose of ursodiol ( $x 13-15 \text{ mg / kg / d}$ )

was associated with improvement in serum liver tests but did not improve survival, and was associated with higher rates of serious adverse events (including death or liver transplantation) compared to placebo.

### Drug Interactions

Bile acid sequestering agents such as cholestyramine and colestipol may interfere with the action of Ursochol 250 mg capsules (micronized) by reducing its absorption. Aluminum-based antacids have been shown to adsorb bile acids in vitro and may be expected to interfere with Ursochol 250 mg in the same manner as the bile acid sequestering agents. Estrogens, oral contraceptives and clindamycin (and perhaps other lipid-lowering drugs) increase hepatic cholesterol secretion, and encourage cholesterol gallstone formation and hence may counteract the effectiveness of Ursochol 250 mg.

### Carcinogenicity, Mutagenicity and Impairment of Fertility

In two 24-month oral carcinogenicity studies in mice, ursodiol at doses up to 1,000 mg/kg/day (3,000 mg / m<sup>2</sup>/day) was not tumorigenic, based on body surface area, for a 50 kg person of average height. The maximum recommended dose is 5.4 times the recommended maximum dose of 15 mg/kg/day (555 mg/m<sup>2</sup>/day).

In a two-year oral carcinogenicity study in Fischer 344 rats, ursodiol at doses up to 300 mg/m<sup>2</sup> / day (1,000 mg / kg / day, 3.2 times the recommended maximum human dose based on body surface area) was not tumorigenic. In a life-span (126-138 weeks) oral carcinogenicity study, Sprague-Dawley rats were treated with doses of 33 to 300 mg/kg/day, 0.4 to 3.2 times the recommended maximum human dose based on body surface area. Ursodiol produced a significantly ( $P < 0.05$ , Fisher's exact test) increased incidence of hepatocarcinomas of the adrenal medulla in females of the highest dose group.

In 103-week oral carcinogenicity studies of lithocholic acid, a metabolite of ursodiol, doses up to 250 mg / kg / day in mice and 500 mg / kg / day in rats did not produce any tumors. In a 75-week rat study, intraductal instillation of lithocholic acid (1 mg / kg / day) for 13 months did not produce colorectal tumors.

A tumor-promoting effect was observed when it was administered after a single i.v. intracelular dose of a known carcinogen N-methyl-N-nitro-N-nitrosoguanidine. On the other hand, in a 32-week rat study, ursodiol at a daily dose of 240 mg/kg (1,440 mg / m<sup>2</sup>, 2.6 times the maximum recommended human dose based on body surface area) suppressed the colonic carcinogenic effect of another known carcinogen azoxymethane.

Ursodiol was not genotoxic in the Ames test, the mouse lymphoma L5178Y, TK+/- forward mutation test, the Chinese hamster ovary cell micronucleus test and the Chinese hamster bone marrow cell chromosome aberration test. In the Ames test, the mutagenicity of ursodiol was dose-dependent. Ursodiol decreased the mutagenicity of lithocholic acid, a metabolite of ursodiol, in the Ames test. In the forward mutation test, the mouse lymphoma L5178Y, TK+/- forward mutation test, the Chinese hamster ovary cell micronucleus test and the Chinese hamster bone marrow cell chromosome aberration test.

Ursodiol at oral doses of up to 2,700 mg / kg / day (16,120 mg / m<sup>2</sup>/day, 29 times the recommended maximum human dose based on body surface area) was found to have no effect on fertility and reproductive performance of male and female rats.

### Pregnancy, Teratogenic Effects, Pregnancy Category B

Teratology studies have been performed in pregnant rats at oral doses up to 2,000 mg / kg / day (12,000 mg / m<sup>2</sup>/day, 22 times the recommended maximum human dose based on body surface area) and in pregnant rabbits at oral doses up to 300 mg / kg / day (3,600 mg / m<sup>2</sup>/day, 7 times the recommended maximum human dose based on body surface area) and have revealed no evidence of impaired fertility or harm to the fetus due to ursodiol.

There are adequate or well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

### Nursing Mothers

It is not known whether ursodiol is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when ursodiol 250 mg is administered to a nursing mother.

### Pediatric Use

The safety and effectiveness of ursodiol 250 mg in pediatric patients have not been established.

### ADVERSE EVENTS (AEs)

The following table summarizes the AEs observed in the two placebo-controlled clinical trials.

	ADVERSE EVENTS		VIBAT 12 MONTHS		VIBAT 24 MONTHS	
	UDCA	Placebo	UDCA	Placebo	UDCA	Placebo
Diarrhea	—	—	1(1,32)	—	—	—
Elevated creatinine	—	—	1(1,32)	—	—	—
Elevated blood glucose	1(1,18)	—	1(1,32)	—	—	—
Leukopenia	—	—	2(2,63)	—	—	—
Peptic ulcer	—	—	1(1,32)	—	—	—
Skin rash	—	—	2(2,63)	—	—	—

Note: Those AEs occurring at the same or the higher incidence in the placebo as in the UDCA group have been deleted from this table. This includes diarrhea and cholectropathy at 12 months, transient fever and other toxicity.

UDCA = Ursodeoxycholic acid = Ursodiol

In a randomized, cross-over study in 60 PBC patients, four patients (6.7%) experienced one serious adverse event each (diabetes mellitus, cyst and breast nodule) (experience by two patients). No deaths occurred in the study. Forty-three patients (43.7%) experienced at least one treatment-emergent adverse event (TEAEs) during the study. The most common (5%) bilirubin level greater than or equal to 1.5 mg/dl or increasing to a level equal to or greater than two times the baseline level; and the development of ascites or encephalopathy. Evaluation of patients at 4 years or longer was inadequate due to the high drop out rate and small number of patients. Therefore, death, need for liver transplantation, histological progression by two stages or cirrhosis, development of varices, ascites or encephalopathy, marked worsening of fatigue, pruritis, inability to tolerate the drug, doubling of serum bilirubin and voluntary withdrawal were not assessed.

After a 6-month crossover period, Mean patient changes from baseline in liver test results and Mayo risk score ( $n = 46$ ) and serum enrichment with UDCA ( $n = 34$ ) were not statistically significant with any dosage of any time interval.

This study demonstrated that UDCA (13 to 15 mg / kg / day) given BID is equally effective to UDCA given QID. In addition ursodiol was given as a single (once daily) versus TID (three) dosing schedules in 10 patients. Due to the Small number of patients in this arm of the study, it was not possible to conduct statistical comparisons between these regimens.

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did not significantly affect survival, and was associated with higher rates of serious adverse events (including death or liver transplantation) compared to placebo.

Ursodiol is a bile acid sequestering agent that binds bile acids in the gut, thereby reducing the amount of bile acids available for absorption.

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