



# K10 METACRIN-DX™

Improves Phase I and II Hepatic Detoxification

## BENEFITS OF PRODUCT

- Provides herbal support for normal Phase I and II detoxification as well as healthy venous circulation
- Provides herbs that help encourage healthy hepatic cell growth and RNA synthesis
- Provides the vitamin substrates and amino acids required for Phase I and II detoxification

## USE OF PRODUCT

Healthy detoxification is of utmost importance, especially during any metabolic disorders. The management of thyroid, adrenal, or menopausal patterns will prove to be ineffective and ambiguous if detoxification imbalances are overlooked. If detoxification pathways are compromised or are down-regulated, the potential for metabolic disorders exist. For example, numerous studies have demonstrated the adverse impact of compromised detoxification on neurological disorders,<sup>1 2 3</sup> chemical sensitivities,<sup>4</sup> adverse drug reactions,<sup>5 6 7</sup> and fatigue.<sup>8 9</sup>

The ultimate goal of hepatic detoxification is to transform compounds that are fat-soluble or lipophilic chemicals from an endogenous source such as hormones, intercellular mediators, neurotransmitters, bacteria, intestinal bacteria endotoxins, and antigen-antibody complexes; as well as exogenous compounds such as drugs, pesticides, environmental toxins, and drugs into water-soluble compounds. Water-soluble compounds can then be eliminated as urine by the kidneys, as sweat by our sweat glands, and into fecal matter from bile. The steps involved to carry out this process have been named Phase I and Phase II. Phase I detoxification involves the cytochrome 450 enzymes. Phase I enzymes directly neutralize some chemicals, but most are converted to intermediate forms that are then processed by phase II conjugation enzymes.

Phase II detoxification typically involves conjugation of Phase I intermediates, however some toxins are directly acted upon by Phase II enzymes. This conjugation reaction either neutralizes the toxin or makes the toxin more easily excreted through the urine, sweat, or bile. There are six main Phase II pathways which include: glutathione conjugation, glycine (amino acid) conjugation, methylation, sulfation, acetylation and glucuronidation. This formula contains herbs, nutrients, and amino acids to support healthy Phase I and II detoxification.

## OTHER PRODUCTS

In addition to Metacrin-DX™, other formulas are helpful in detoxification. BileMin™ (K11) should always be used in conjunction with Metacrin-DX™ for healthy bile synthesis and elimination. Methyl-SP™ (K14) is a useful product to aid in additional phase II methylation support. Thyro-CNV™ (K09) is a useful supplement used to support healthy glutathione synthesis for Phase I and Phase II.

## Supplement Facts

Serving size 1 capsule  
Servings per container 90

Amount Per Serving	% Daily Value	
Vitamin C (as ascorbic acid)	25 mg	41%
Thiamin (as thiamin HCl)	5 mg	333%
Niacin (as niacinamide)	20 mg	100%
Pantothenic Acid (as calcium pantothenate)	25 mg	250%
Magnesium (as mag. citrate)	15 mg	4%
Zinc (as zinc glycinate)	10 mg	65%
Copper (as copper gluconate)	200 mcg	10%
Molybdenum (molybdenum chelate)	150 mcg	195%
Milk Thistle extract (seed)	100 mg	•
Dandelion (root)	75 mg	•
Gotu Kola Nut	50 mg	•
Panax Ginseng root	40 mg	•
L-Glutathione	10 mg	•
Glycine	75 mg	•
N-Acetyl L-Cysteine	55 mg	•
DL-Methionine	75 mg	•
Bromelain	350,000 FCC	•

Proprietary Blend: 54 mg of Trimethylglycine\*, Betaine HCl\*, Cellulase (plant enzyme)\*, Peptidase (plant enzyme)\*.

\*Daily Value (DV) not established.  
Other Ingredients: gelatin (capsule).

## DIRECTIONS

Take 1 to 2 capsules, 3 times per day, or as directed by your healthcare professional.

Statements in this flyer have not been evaluated by the Food and Drug Administration.  
This product is not intended to diagnose, treat, cure or prevent any disease.

Formula  
Info Page

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DIETARY  
SUPPLEMENT

**DANDELION (TARAXACUM OFFICINALE)** - Dandelion root has physiologic impacts on both the liver and gallbladder. It impacts the liver by promoting the production of bile and its delivery to the gallbladder. It impacts the gallbladder by causing contraction and release of stored bile.<sup>11 12 13</sup>

**MILK THISTLE (SILYBUM MARIANUM)** has the ability to increase the solubility of bile and its use has been shown to significantly reduce biliary cholesterol concentrations and bile saturation index.<sup>14</sup> It has potent antioxidant activity which supports phase I detoxification and prevents the depletion of hepatic glutathione which is important for phase II detoxification.<sup>15 16 17</sup> Silybum marianum has anti-inflammatory chemical properties that are inhibitors of inflammatory prostaglandins and leukotrienes as well as chemical properties that promote protein synthesis to replace damaged liver cells.<sup>18 19 20 21</sup>

**CENTELLA ASIATICA** has active constituents known as triterpenoid compounds that have impacts on cells and tissues that are important in detoxification. It has even shown the ability to improve histological findings of liver cirrhosis.<sup>22 23</sup> It also supports hepatic detoxification due to its physiological impact on enhancing venous circulation. Centella Asiatica has shown the ability to improve venous disorders such as chronic venous insufficiency and venous hypertension.<sup>24 25</sup> Improved venous circulation has influential roles in optimizing detoxification that are generally overlooked.

**PANAX GINSENG** has shown in several studies to have numerous positive impacts on hepatic function. It has shown to reverse fatty liver in animals, and demonstrate profound anti-hepatotoxic properties.<sup>26 27</sup> It has shown the ability to promote Kupffer cells and shown to increase nuclear, ribosomal, and messenger RNA biosynthesis. Its use in a formula to support hepatic detoxification appears mandatory.<sup>28 29 30</sup>

**GLUTATHIONE CONJUGATION SUPPORT** - Glutathione is a tripeptide amino acid that consists of glycine, cysteine, and glutamic acid and is hence also known as gamma-glutamylcysteinylglycine. In addition to playing an important part in phase II conjugation, it is

### GLUTATHIONE CONJUGATION SUPPORT (continued)

responsible as the main reducing agent and primary cellular agent of the cells. Glutathione helps maintain the structure of red blood cell membranes and other cellular proteins, it also helps maintain the cytoplasm in a reduced state. Glutathione is also responsible for the synthesis of leukotrienes and functions as a carrier in the transport of sulfur containing amino acids into the cell.

As a phase II detoxifier it conjugates with phase I substrates to produce water-soluble mercaptates that are excreted in the urine. Glutathione is a tripeptide amino acid that depends upon adequate levels of essential nutrients such as B6, riboflavin, choline, methionine, cysteine or n-acetylcysteine, vitamin C, betaine, glycine, glutamic acid, potassium, copper, zinc and selenium. Numerous studies have shown that taking these essential nutrients will enhance glutathione levels.<sup>31 32</sup>

**METHYLATION CONJUGATION SUPPORT** - Methylation involves conjugating phase I endproducts with single-carbon compounds. Methylation requires methionine, betaine, ascorbic acid, alpha tocopherol, choline, pyridoxyl-5-phosphate, trimethylglycine, magnesium, methylcobalamin and folic acid.

**ACETYLATION CONJUGATION SUPPORT** - Acetylation pathways conjugate toxins with acetyl-CoA and two carbon compounds. Acetylation pathways are dependent on pantothenic acid, thiamin, and vitamin C.<sup>33</sup>

### GLUCURONIDATION CONJUGATION SUPPORT

Glucuronidation involves combining toxins and end products with glucuronic acid. This pathway is supported by B-vitamins, magnesium, and glycine, which help support the uronic acid pathway that synthesizes glucuronic acid.

**SULFATION CONJUGATION SUPPORT** - Sulfation involves combining toxins and end products with sulfur-containing amino acids. An important step in sulfation is the conversion of sulfites to sulfates by the molybdenum dependent enzyme sulfite oxidase. Therefore, the mineral molybdenum and the sulfur-containing amino acids such as N-acetyl-cysteine, glycine, and methionine are important for sulfation conjugation support.

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