

## what does isotonic mean?

Broken down to its roots, *iso* means "the same" and *tonic* means "pressure or tone." When used to describe solutions that are meant for consumption, isotonic means having the same fluid pressure as body fluids. Tears, blood plasma, lymph and other body fluids are all isotonic. When we ingest food, gastric (stomach) juice is secreted onto the food, and muscular contractions of the stomach mix the contents until a reasonably uniform solution is achieved. The solutions of food (chyme) that enter the small intestine for absorption are made isotonic by the action of the stomach in a time-consuming process.

The fluid pressure of food or isotonic solutions across semipermeable membranes, such as the walls of the small intestine, is generally referred to as having a particular osmolality or tonicity. Osmolality is measured in units referred to as milliosmoles/kilogram of water (mOsm/kg). It can be said that when solutions on opposite sides of a membrane have the same osmolality, they are iso-osmotic or isotonic. Normal human blood serum (the fluid portion without cells and platelets) has an osmolality of 288 mOsm/kg, as do most other fluids in the body. Therefore, in physiological terms, when a solution's osmolality is the same, or nearly the same, as that of normal human blood serum, it is referred to as isotonic.

## the Isotonix delivery system

Isotonix products are formulated with the proper balance of fructose, d-glucose, citric acid, potassium bicarbonate and other key ingredients to assure that they are isotonic when properly prepared. This combination of ingredients is necessary to maintain the flavor, isotonic character, pH and delivery efficiency of these nutritional supplements.

Isotonix®

Normally, when you ingest a daily vitamin or nutritional supplement tablet, your body must work for up to four hours digesting and absorbing the vitamins and nutrients. During this lengthy breakdown process, a percentage of the nutritive value is lost. But because Isotonix products are powders, none of the fillers, binders, coatings and lubricants that are common to tablet manufacturing are necessary. There are no gelatin capsules or fillers. As a result, the amount of time and work necessary to absorb a supplement is greatly decreased.

## concentration and absorption

Concentration and absorption are factors that go hand in hand for the proper use of nutritional supplements. Concentration — the amount of nutrient dissolved in a given amount of a solvent such as water or stomach fluid — is usually directly related to the efficiency of nutrient absorption. This is especially true in the process of passive diffusion. Passive diffusion works when the concentration of nutrients in the lumen of the small intestine is higher than the concentration inside the intestinal cells. The nutrients "flow" down the gradient from high to low concentration. Since Isotonix products experience little dilution in the gastrointestinal tract, they arrive at the absorption sites highly concentrated, ensuring efficient absorption.

Because of their physiological character, Isotonix solutions undergo very little dilution in the body before they reach the absorption sites. They are the ideal vehicle for rapid nutrient utilization. Isotonix are the world's most advanced nutraceuticals.

## why is gastric (stomach) emptying time so important?

The longer a supplement stays in the stomach, the longer the time before absorption can begin, because no appreciable absorption occurs from the stomach. Often the rate-limiting step in the absorption process is the time it takes for the tablet or capsule to disintegrate, and the nutrients to dissolve and equilibrate to the proper (isotonic) state to leave the stomach. When all this has been completed — up to 40 minutes after ingestion — the diluted, acid-attacked nutrients can enter the small intestine for absorption.

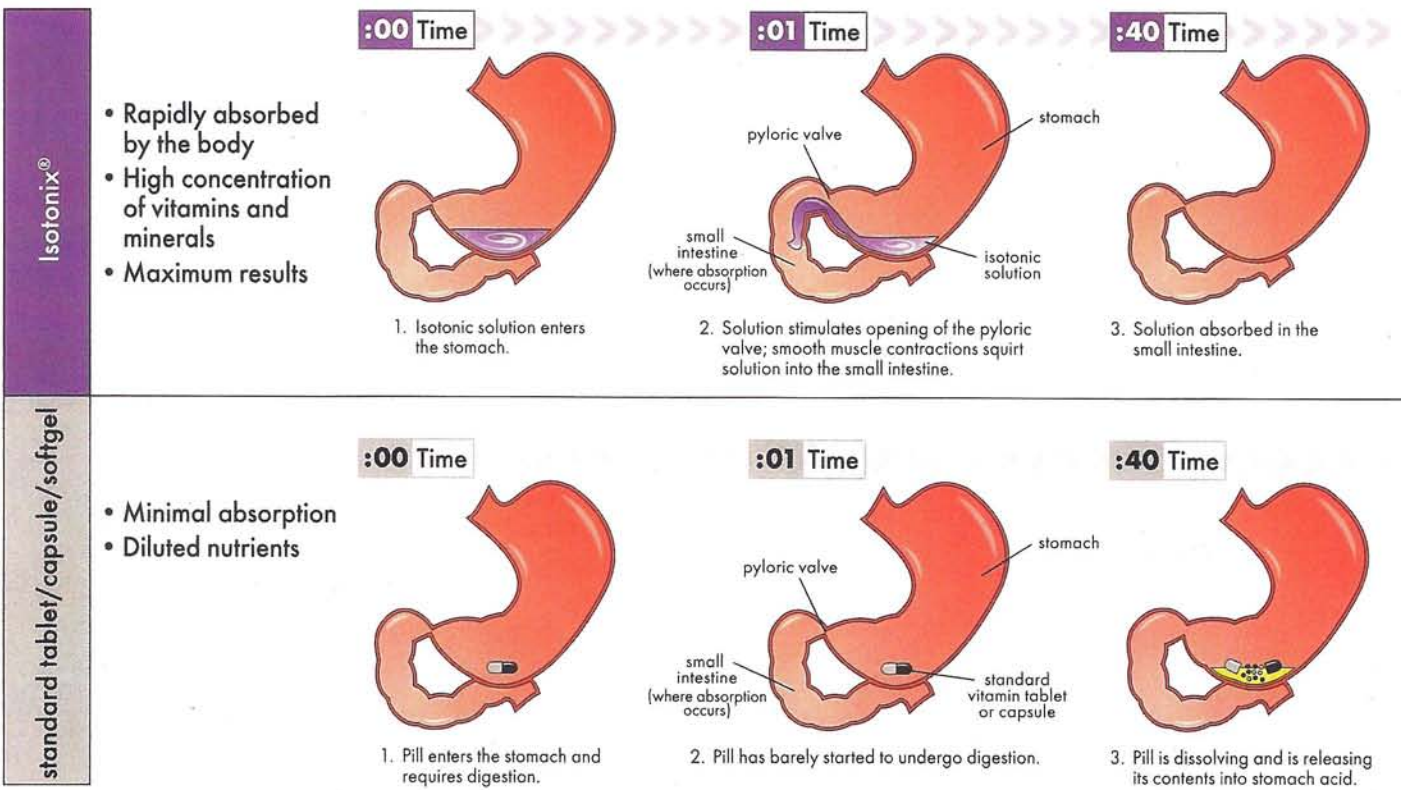
Rapid gastric emptying is the key to rapid absorption and maximum results.

J.N. Hunt, "Mechanisms and Disorders of Gastric Emptying," *Annual Review of Medicine* 34 (February 1983): 219-29.

## why is gastric emptying time stressed when talking about Isotonix?

Nutrients that are already isotonic do not need to be broken down into an isotonic state. Therefore, gastric emptying occurs more rapidly. Biological sensors in the gastrointestinal tract detect that the ingested solution is isotonic and at a correct pH. This causes the pyloric valve at the lower end of the stomach to remain open, allowing the concentrated solution to be squirted into the small intestine by stomach contractions. Absorption of the nutrients by the intestinal mucosa then starts to occur.

## Isotonix® vs. standard tablet/capsule/softgel



The world's most advanced nutraceuticals