Choline is the Key -
To a Normal Metabolism and Healthy Liver

VitaCholine®

Balchem’s VitaCholine is the premier brand of choline, an essential nutrient for all human life stages. Choline is critical to the healthy structure and function of the human body and plays multiple roles:

- **Building Block** – it is an integral part of cell development, maintenance and genetic regulation
- **Messenger** – as acetylcholine, it speeds messages in the brain and to the muscles
- **Metabolic Defender** – it helps prevent fat accumulation in the liver by moving it out for conversion into energy

Adequate choline intake is fundamental to good health, but **90% of people** do not get sufficient choline through diet alone. Prolonged choline deficiency can result in muscle damage and an accumulation of fat in the liver\(^1\), making it vital for people to get their daily requirements via dietary choices.

Choline: Managing Liver Fat

The good news is that fat accumulation in the liver can be controlled with the right choices. The most important thing a person can do is talk with his or her doctor about achieving a balanced, healthy diet and getting regular exercise. Adequate choline intake is a fundamental and irreplaceable part of good nutrition, as its functionality is unique.

Choline works behind the scenes to maintain normal liver function through the role it plays in fat metabolism. The liver produces very low density lipoproteins (VLDL) as a way to export fats out of the liver for storage or to muscles for immediate conversion into energy. VLDLs are composed of an inner core of lipids and an outer layer of phospholipids. As a precursor of the phospholipid phosphatidylcholine (PC), free choline is a required raw material to make VLDL. Without adequate levels of free choline, transport slows and fats will begin to build up within the liver.

Choline: Focus on Liver Health

According to a 2015 fact sheet from the World Health Organization, the worldwide prevalence of obesity more than doubled between 1980 and 2014. In 2014, about 39% of the world’s population aged 18 years and over were overweight and 13% were obese\(^2\). The negative impact of obesity on cardiovascular health is well-established, but far fewer are aware of the effect it has on the liver.

Various sources estimate that the incidence of non-alcoholic fatty liver disease (NAFLD) ranges from 11% to 19% of the U.S. adult population\(^3\). The challenge we face is that it is largely a silent epidemic, with few overt symptoms – NAFLD is typically diagnosed through sonography or abnormal liver enzyme readings and only when it has advanced. Based on current diet and exercise trends, researchers project that the incidence rate is likely to increase by 50% in the next 15 years\(^4\).
Choline: Balanced Metabolism

Choline plays a significant role in keeping both cells and bodily systems operating at their best. Another unique feature of choline is its trio of methyl groups which can be given to other molecules. Through methyl donation, choline is able to positively influence metabolic processes that fall out of balance.

One prime application of methyl donation is choline’s management of homocysteine, an oxidizer that accumulates in the body as part of normal cell metabolism. High plasma homocysteine seems to be associated with negative impact on both cardiovascular and cognitive function, though further research is needed to understand how. Choline’s donation of a methyl group turns homocysteine into the benign amino acid methionine, which is used to repair and build proteins.

VitaCholine®: For a Healthier You

The VitaCholine product line consists of a range of high quality choline salts which can be easily added during manufacturing to help fortify foods and beverages, infant formula and dietary supplements. These are just a few of the benefits that VitaCholine can bring to your products:

- Six structure-function claims in the U.S.; three in the E.U.
- Proven quality and safety
- Broad regulatory acceptance worldwide
- Stable from processing through finished product
- Flavorless and highly bioavailable
- Compatible with other nutrients
- SQF II, Kosher certified, and Halal certified

VitaCholine®: Essential Nutrition for a Healthy Liver

1 Zeisel and da Costa, Nutrition Review, 2009
3 Lazo, et al, American Journal of Epidemiology, May 2013