

# Formulating Beverages for Brain Health

Technology has sped up lives, putting the brain into overdrive. Like the body's other organs, the brain needs fuel to function at its best. Citicoline is one such brain nutrient. It supports levels of several important neurotransmitters that regulate cognitive function. It has also been shown to support the activity of nerves that respond to these neurotransmitters, helping to support memory function, focus and attention.

Cognizin® is Kyowa Hakko's branded form of pure, stable citicoline. It is produced by an innovative fermentation process and contains no food additives, artificial flavors or preservatives, and thus complements today's clean-label trends. It has self-affirmed GRAS (generally recognized as safe) status for many food and beverage applications.

## On Top of Mind

Energy and focus are top need states for consumers. About a third of consumers are choosing beverages for an energy boost and a fifth are hoping to improve focus, according to Chicago-based Mintel.

The research firm has identified key trends that will shape global food, drink and foodservice industries from now until 2030. One is the concept of "smart diets," where technology enables consumers to construct hyper-individualized approaches to physical and mental health. With this comes the expectation of living longer and the need for a diet that supports long-term cognitive health.



## What is citicoline?



**Watch this video to gain insight on how citicoline improves cognitive function. Cognizin® citicoline is a self-affirmed GRAS ingredient with application in select foods and beverages.**

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“The companies that will win in the next 10 years will be those that fuel the new era of conscious consumption,” said Alex Beckett, Associate Director at Mintel. “In order to succeed over the next decade, brands will need to offer more personalized product offerings, develop smart home solutions, and assist consumers in addressing mood and brain health.”

Kyowa Hakko commissioned Gallup to investigate cognitive health trends in adults (n=1,208). Research showed that two-thirds of adults experienced cognitive problems in 2018 and more than a half (57%) are concerned with improving their brain power. Memory loss becomes more prominent with age, while ability to concentrate and focus is more prevalent with younger adults. In fact, almost half (47%) of 18 to 34-year olds said they experienced such issues in the past year.

“While use of cognitive supplements has

increased dramatically over the past several years, there is a huge marketing opportunity in the functional beverage space,” said Danielle Citrolo, PharmD, Registered Pharmacist Scientific & Regulatory Affairs Director, Kyowa Hakko USA. “Citicoline may be used in everything from ready-to-drink tea and coffee beverages, which also supply natural caffeine for alertness, to trending cold-pressed juices and smoothies, flavored milks and yogurt drinks, protein drinks and meal replacements.”

Citicoline is often categorized as a nootropic, a term with the Greek translation of “towards the mind.” Nootropic is an umbrella term for compounds that directly or indirectly influence cognitive brain function. Citicoline may be used in beverages with other nootropics to provide enhanced function.

A randomized, placebo-controlled study published in 2015 in *Journal of Attention*

*Disorders* further validates citicoline's role as a nootropic<sup>3</sup>. McGlade observed an increase in both attention and psychomotor speed in adolescent males after 28 days of citicoline supplementation<sup>3</sup>.

"This study highlights the clinical support of citicoline in a growing demographic," said Dr. Citrolo. "Today's teenagers and college students are looking to get a mental edge, be it for school or gaming."

Citicoline is a promising nutrient for any beverage formulation targeting on-the-go Gen Z or Millennial audience.

## It Really Is All in the Head

People use nootropics for a variety of reasons. Younger consumers may be looking for improved focus and productivity. Weekend warriors and gamers want a mental edge to be more competitive. On-the-go working parents need help to juggle career, home and children without succumbing to stress-related mental burnout. Empty nesters and retirees are trying to defy cognitive and behavioral aging.

"Maintaining healthy brain function is critical to having a good quality of life," said Dr. Citrolo. "Research shows that



## Cognizin® Citicoline Structure-Function Claims

The following claims are provided for informational purposes and should be reviewed by your legal counsel prior to use in marketing materials, including product labels.

- Supports focus and attention (>250mg)
- Assists with ability to stay focused (>250mg)
- Supports focus to reduce errors while on task (>250mg)
- Supports energy utilization in the brain (>500mg)
- Functions as a brain health ingredient that supports attention, focus and brain energy (>250mg)
- Supports brain and cognitive health (>250mg)
- Helps support memory (>500mg)

Source: Kyowa Hakko

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





Cognizin® helps the brain stay sharp and supports memory.”

A study published in 2008 in *NMR in Biomedicine* showed the effects of Cognizin® on the human brain's cellular metabolism<sup>1</sup>. The study quantified the effects of citicoline on high-energy phosphate metabolites and constituents of cellular membrane synthesis in the frontal lobe of 16 healthy men and women. The data showed that citicoline improved frontal lobe bioenergetics and altered phospholipid cell membrane turnover. After six weeks of receiving citicoline, participants experienced an average 26% increase in phosphoethanolamine and a 13.6% increase in adenosine triphosphate.

The study also demonstrated that the area of the brain most affected by citicoline is the anterior cingulate cortex (ACC). The ACC is involved in cognitive functions such as focus and attention.

The researchers concluded that citicoline supplementation may help support cognitive health as we age by increasing energy reserves and utilization. It may also increase

the amount of essential phospholipid membrane components needed to synthesize and maintain cell membranes.

## Understanding Citicoline

Citicoline is an organic molecule produced endogenously and found in every living cell. When consumed, it is broken down during intestinal absorption and, after passing through the blood/brain barrier, is reconstituted in the brain as citicoline. Citicoline is needed to build cell membranes throughout the body. Its cognitive health benefits have been studied repeatedly.

To keep the brain healthy, it is paramount that it receives the fuel it needs to function at its best. Citicoline has been shown to assist.

“The brain makes up only 2% of a person's body weight, yet it consumes roughly 20% of the body's energy when at rest. Cognizin® helps supply the nutrition that the human brain needs to stay alert and focused throughout the entire day,” Dr. Citrolo said. “It is not a stimulant.”

Citicoline is an important cellular building block that is synthesized into two types of compounds vital to healthy brain function. First there are phospholipids, which make up approximately 30% of brain tissue and are essential constituents of cell membranes. Because cell membranes have a very high turnover rate, these phospholipids must be continuously synthesized to ensure adequate function of cells.

Citicoline is also an important component of neurotransmitters, including acetylcholine, dopamine and noradrenaline. All of these compounds play a role in healthy brain function, including focus and attention.



## Cognizin® Citicoline FAQs

### What is citicoline?

Citicoline is a naturally occurring nutrient found in the brain.

### What does it do?

Citicoline increases an important substance in the brain called phosphatidylcholine that is critical for healthy brain function.

### What is Cognizin®?

Cognizin® is a clinically tested form of citicoline that can supply the brain with the nutrition it needs to stay sharp.

### How does Cognizin® work?

This patented, branded form of citicoline is unlike artificial stimulants that ramp up energy and attention levels only to have those levels come crashing down later. Cognizin® provides nutritional support that helps fuel mental processes and enhance focus and concentration.

### Has Cognizin® been clinically studied?

Cognizin® Citicoline has been the subject of several human clinical trials. Two recent placebo-controlled trials demonstrated notable benefits of Cognizin® in healthy adults and adolescents<sup>2,3</sup>. A study published in *Food and Nutrition Sciences* in 2012 concluded that Cognizin® was effective at improving cognitive inhibition and attentional performance in healthy adult women<sup>2</sup>. Furthermore, the adolescence study published in *Journal of Attention Disorders* demonstrated significant improvements in motor speed and attention in healthy adolescent males taking Cognizin®<sup>3</sup>.

### Can it be used in beverage formulating?

Cognizin® achieved self-affirmed GRAS status in 2009 and is considered safe for food and beverage applications. It is a pure ingredient produced by an innovative fermentation process. Neutral in taste, it is water soluble, stable to heat, vegetarian and an allergen-free ingredient that is certified kosher.

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1. Silveri MM et al. Citicoline enhances frontal lobe bioenergetics as measured by phosphorus magnetic resonance spectroscopy. *NMR Biomed.* 2008; 21(10):1066-75.

2. McGlade E. et al. Improved Attentional Performance Following Citicoline Administration in Healthy Adult Women. *Food and Nutrition Sciences.* 2012;3:769-773.

3. Yurgelun-Todd D et al. The Effect of Citicoline Supplementation on Motor Speed and Attention in Adolescent Males. *Journal of Attention Disorders.* 2015; 1557-1246.

## Add Brain Health Support to Your Next Functional Beverage



Cognizin® Citicoline can support brain energy needs of modern consumers, whether they are at work, working out or leveling up in their favorite video game. Beverages are a logical delivery vehicle because they are a consistent purchase.

Research from Hartman Group, Bellevue, Wash., shows 62% of all consumers agree with “beverages play a very important role in my health and wellness” and 44% agree with the statement “I like my beverages to do something for me, such as provide energy, nutrients or other benefits.” Both resonate more with Millennials, with the figures rising to 65% and 55%, respectively.

Cognizin® citicoline can be added to all types of on-trend, as well as traditional beverage concepts. Drinks like kombucha, coconut water and plant/vitamin waters offer a highly appealing combination of refreshment and health benefits. Cold-pressed juices and smoothies sold in the product department are loaded with

antioxidants and often serve as an on-the-go snack or meal replacement.

Botanicals ingredients, e.g., flowers, herbs and spices, add sophistication to all types of beverages, often along with a healthful halo. They are often suggestive of mood states, depending on the ingredient, and may be strategically used to complement the promise of fueling the brain.

Probiotic shots are all the rage as they speak to the gut health trend. Why not make a combo product that delivers beneficial bacteria while also keeping the brain up to speed?

Coffee and tea are being used as flavors as well as base ingredients in beverages. Their flavor is suggestive of natural energy through their inherent caffeine content. Such natural energy complements the “less is more” trend that is driving the growth of clean-label drinks. Consumers are also embracing the healthful aspects of consuming tea antioxidants.

### About Kyowa Hakko USA

Kyowa Hakko USA is the North and South American office for Kyowa Hakko Bio Co. Ltd., an international health ingredients manufacturer and world leader in the development, manufacturing and marketing of pharmaceuticals,

nutraceuticals and food products. Kyowa is the maker of branded ingredients including Cognizin® Citicoline, Setria® Glutathione, Pantestin® Pantethine, and VELOX®, a patented L-Citrulline & L-Arginine blend.