HEALTH BY PRINCIPLE™

Magnesium

Give Your Body the Boost It Needs

INTRODUCTION

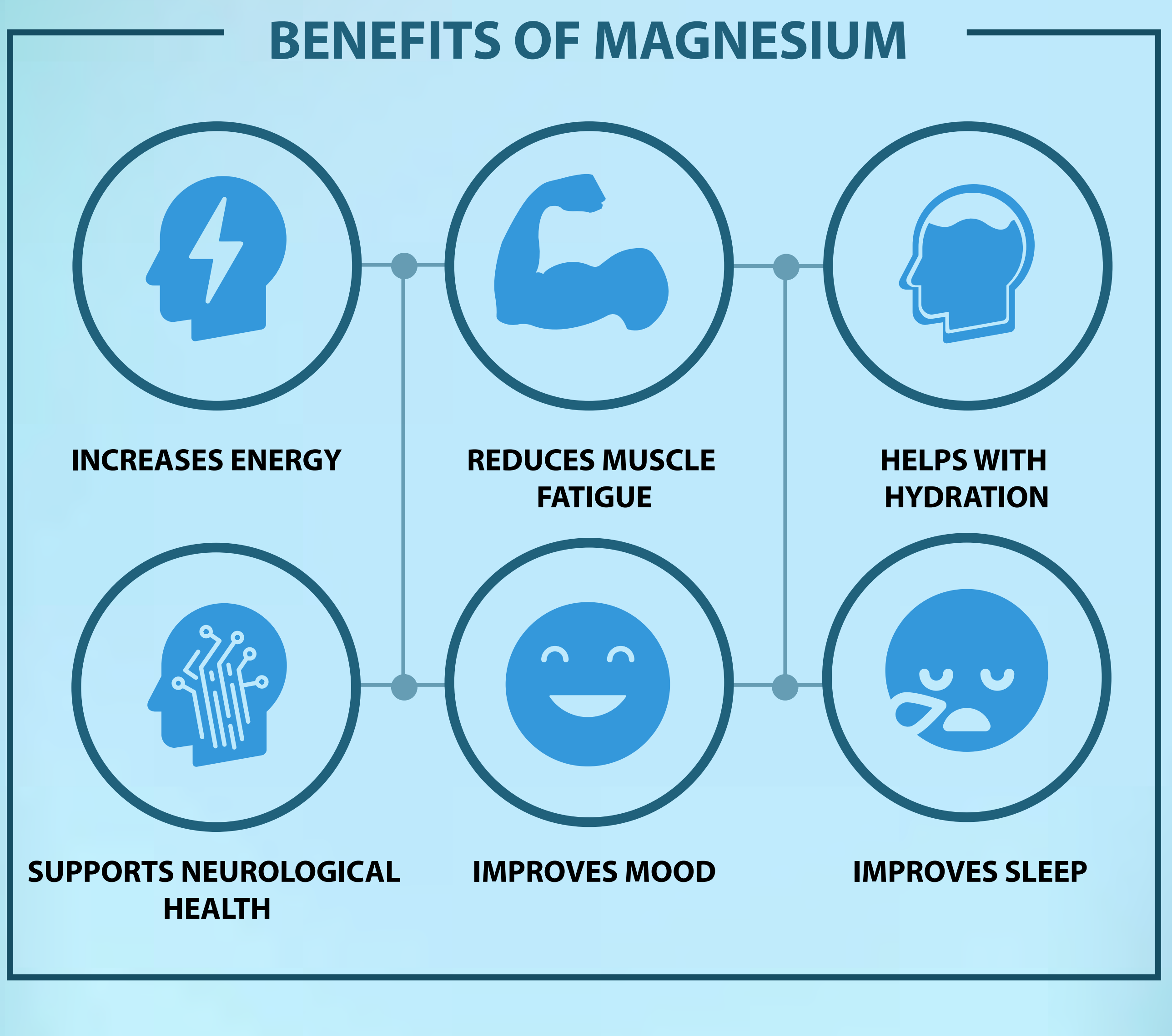
The element Magnesium is found in every single cell of the human body, more than half of it within bone cells. Perhaps the biggest testament to its importance is the fact that Mg is involved in more than 300 different enzymatic reactions. (Some sources even say that this number is above 600!) The human body goes through billions of chemical reactions every second, and most of these reactions are regulated by biological substances called enzymes. If enzymes weren't present to speed things up, many chemical reactions would not proceed at a rate fast enough to keep us alive. From energy production to nervous system regulation, these reactions play an important role in our daily activities and our health overall. (1)

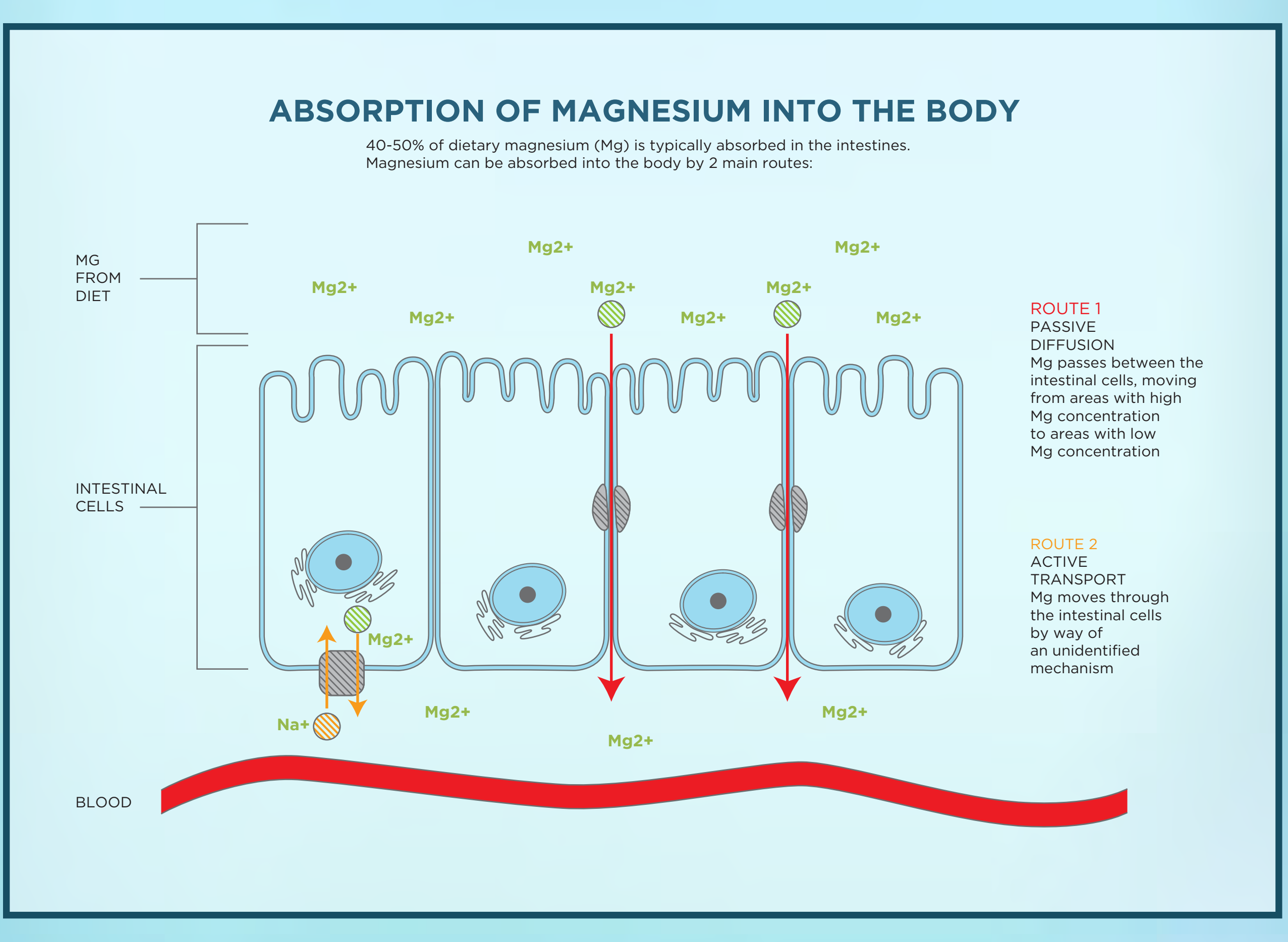
Even though it plays such a significant part in our health, almost **70% of American adults do not consume enough Mg in their diet** – that is, the recommended daily intake of 400 mg (2) .

This is partly due to the fact that the average American diet mostly consists of processed foods containing only a limited amount of Mg. Also, in most industrialized countries, drinking water is boiled and de-mineralized, further reducing the amount of Mg that people consume.

Since Mg cannot actually be synthesized within the body, you must take it in through your diet, whether from drinking water or eating food (3). Unfortunately, most of us do not consume foods that contain adequate amounts of Mg, so we need to figure out effective ways make up the difference. Increasing Mg intake through supplementation is the only way to help.

BENEFITS OF MAGNESIUM



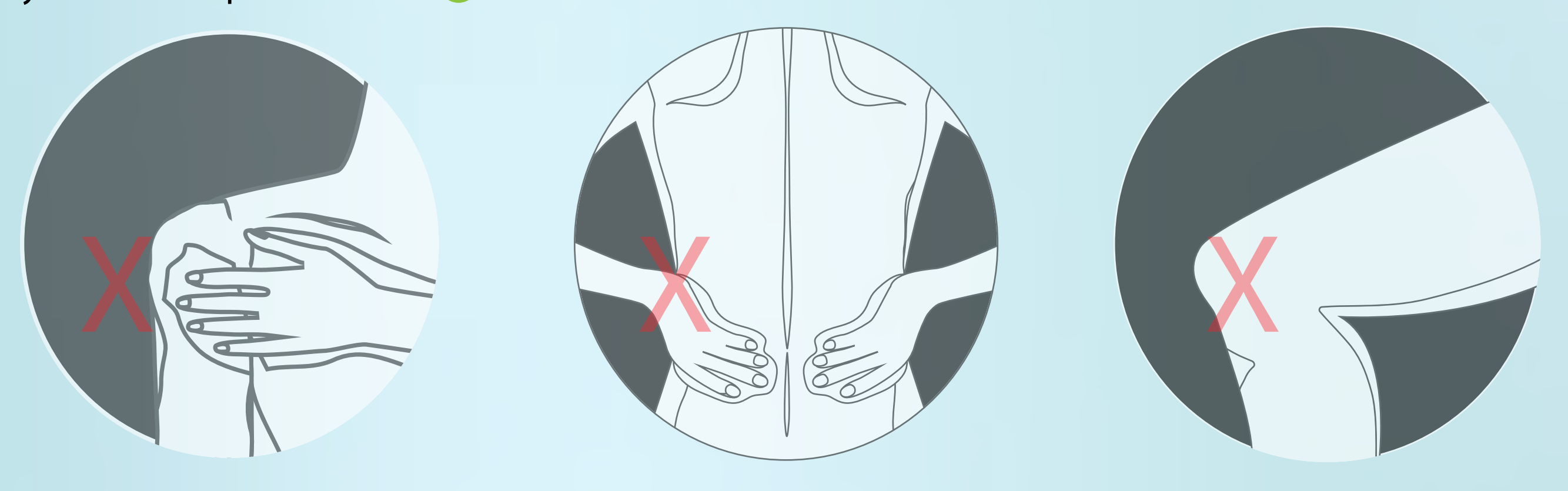


GOOD TO KNOW

BOOST YOUR PHYSICAL ACTIVITY & PREVENT JOINT PAIN

Mg plays a crucial role in turning food and other substances into energy during physical activity. When exercising, the body uses energy in the form of ATP (the energy molecule) at a higher rate than when it is resting. In order for ATP to become active, it must bind to a $Mg2+$ ion and form a complex called Mg-ATP. Mg serves to stabilize the connection and help create energy.

In addition, cells retain less oxygen during a workout, causing more Mg to move from the blood plasma into the red blood cells to offset energy loss. The body also quickly flushes out Mg (and other electrolyte ingredients) through sweat during exercise, or when experiencing hot temperatures. This means that your muscle cells (among others) enter a state of chemical imbalance when you are exercising or sweating excessively. Without enough Mg, your body will experience an energy deficiency and issues with muscle function, such as cramping. Taking a Mg supplement before, during, or after a workout helps you maximize your energy and improves your muscle performance (4).

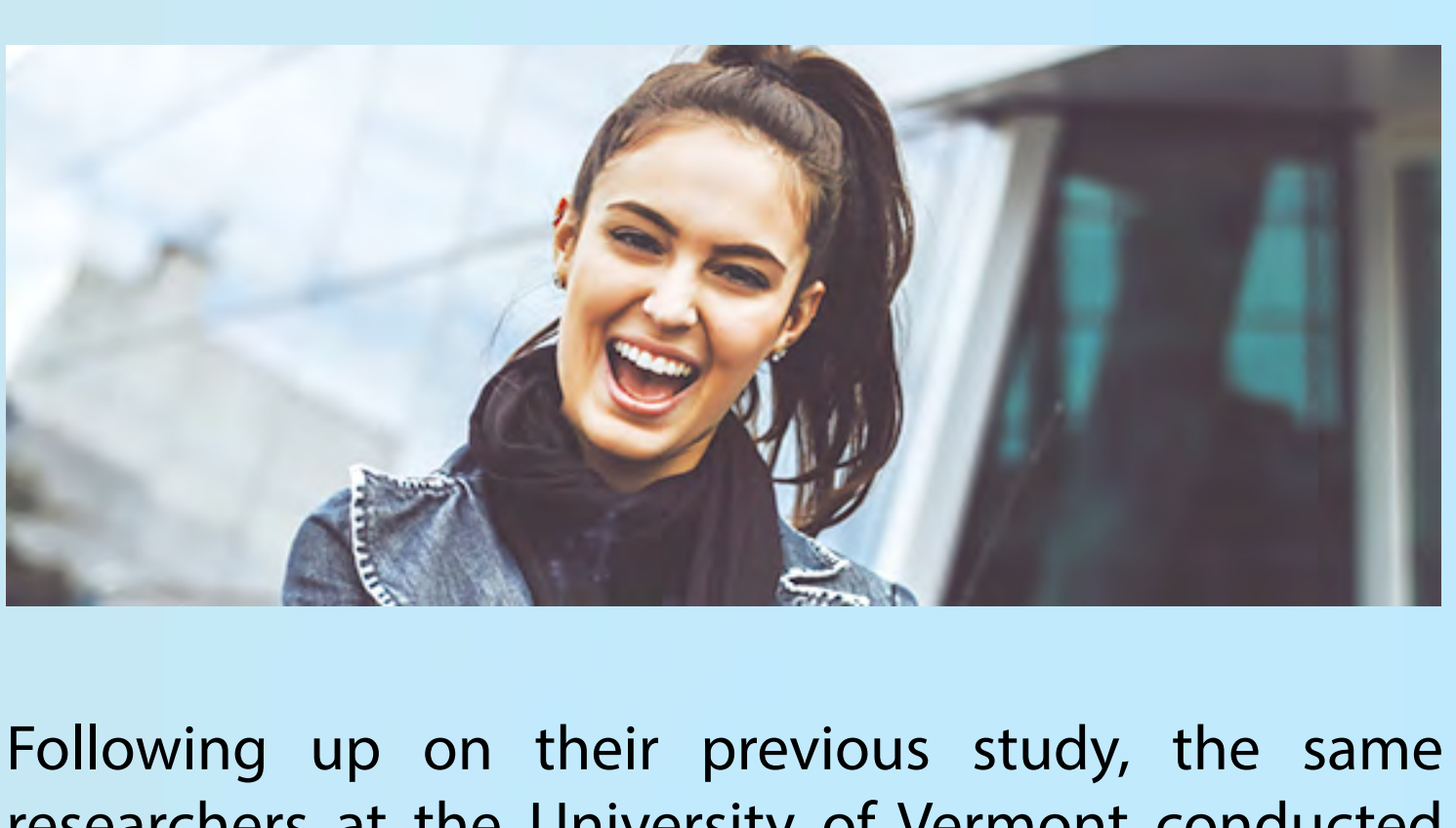


Various studies have found a connection between low Mg levels and joint pain. A study in 2018 found that **lower Mg intake was associated with more knee pain** among the study subjects. Researchers have hypothesized that the connection may be due to the role that Mg plays in inflammation response and calcification. Another study has determined that low Mg levels potentially result in joint problems such as chronic inflammation and joint degenerative disease (4). Mg supplementation may therefore lessen the risk of joint pain and other joint issues.

IMPROVE YOUR MOOD

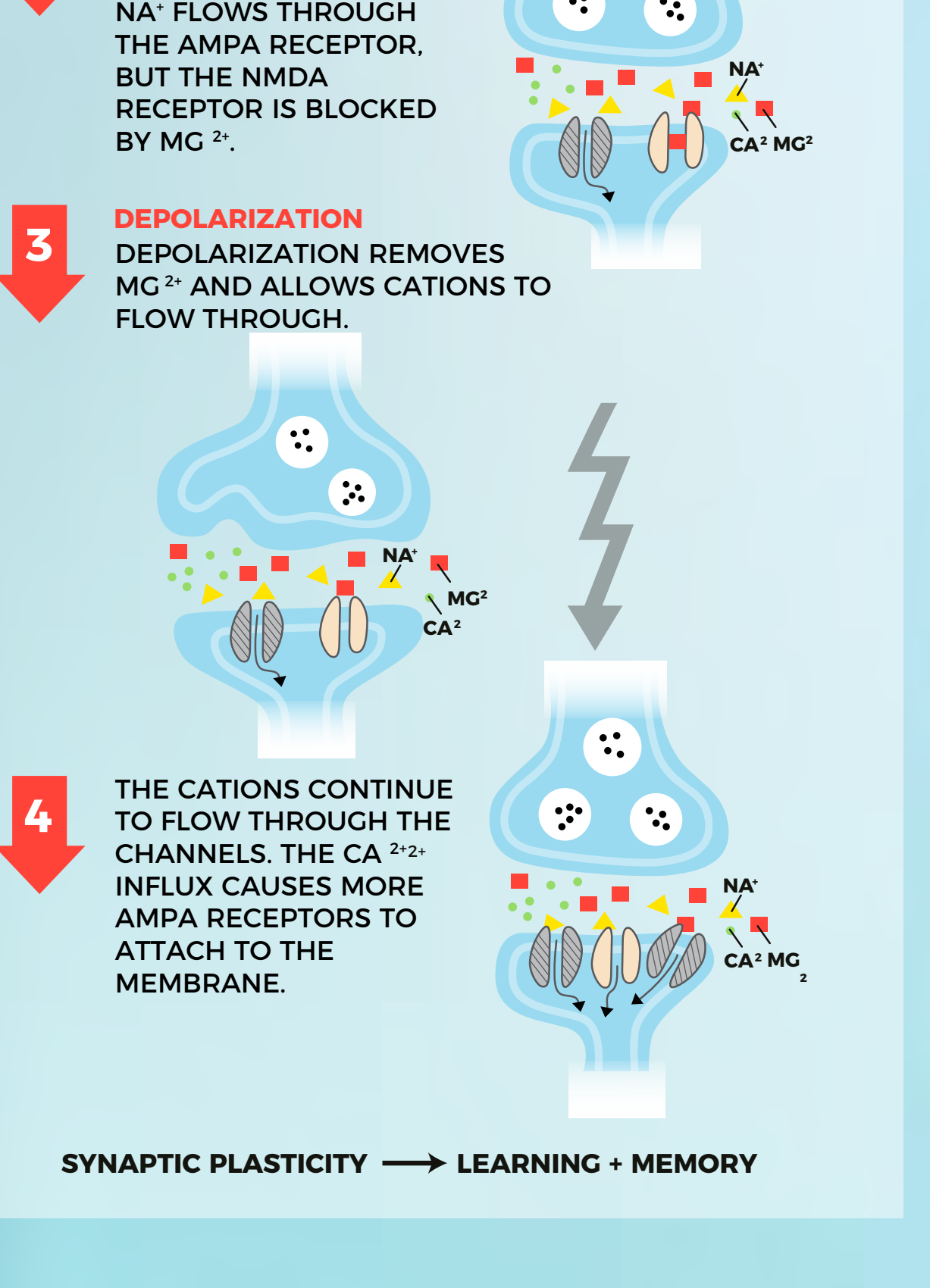
Due to its presence in hormones and neurotransmitters, Mg plays a significant role in mood regulation. Low Mg levels are associated with depression, although the exact mechanisms are not yet understood (5). Mg causes the nervous system to relax and slows down the activity of the hypothalamic-pituitary-adrenal (HPA) axis, a key player in the stress response system. As a result, Mg can help reduce the level of the stress hormone cortisol. This leads to lower anxiety levels and an increased ability to deal with stress.

Between 2007 and 2010, researchers at the University of Vermont conducted a survey about depression and Mg supplementation. Over those four years, they observed study participants and collected data on their food and supplement intake. The estimated average requirement of Mg in the study was 350 mg for men over 30, 330 mg for men under 30, 265 mg for women over 30, and 255 mg for women under 30. The researchers found that adults below age 65 who consumed less than 184 mg of Mg per day were 50% more likely to experience depressive symptoms (5).



HOW MAGNESIUM INTERACTS WITH NEURONS

This diagram depicts the role that Mg^{2+} plays in the functioning of human memory and learning in the nervous system. Both capacities are negatively impacted in individuals who suffer from depression and anxiety.



Following up on their previous study, the same researchers at the University of Vermont conducted more research in 2015 and 2016 to test whether over-the-counter magnesium chloride supplements could improve depressive symptoms. This was one of the first-ever clinical trials to address this question. The 126 participants in the 12-week-long trial were adults above the age of 18, diagnosed with depression, and receiving antidepressant medication, therapy, or no treatment at all. For the first 6 weeks, the participants took four 500 mg of magnesium supplements on a daily basis. At a later point, they spent another 6 weeks consuming no Mg supplements. This allowed the researchers – who monitored the participants' well-being with the help of questionnaires – to compare symptoms with and without supplements (6).

In the end, the research conclusively showed that Mg supplementation significantly decreased depression and anxiety, regardless of gender, age, severity of symptoms, or use of anti-depressant medication. These effects started to appear within two weeks. Even more encouraging was that two-thirds of the participants found Mg supplementation so easy and effective that they planned to continue with it after the trial (6) .

This suggests that Mg could be a fast, safe and easy-to-access way to help improve your mood. As always, before starting any new supplements, consult your healthcare provider.

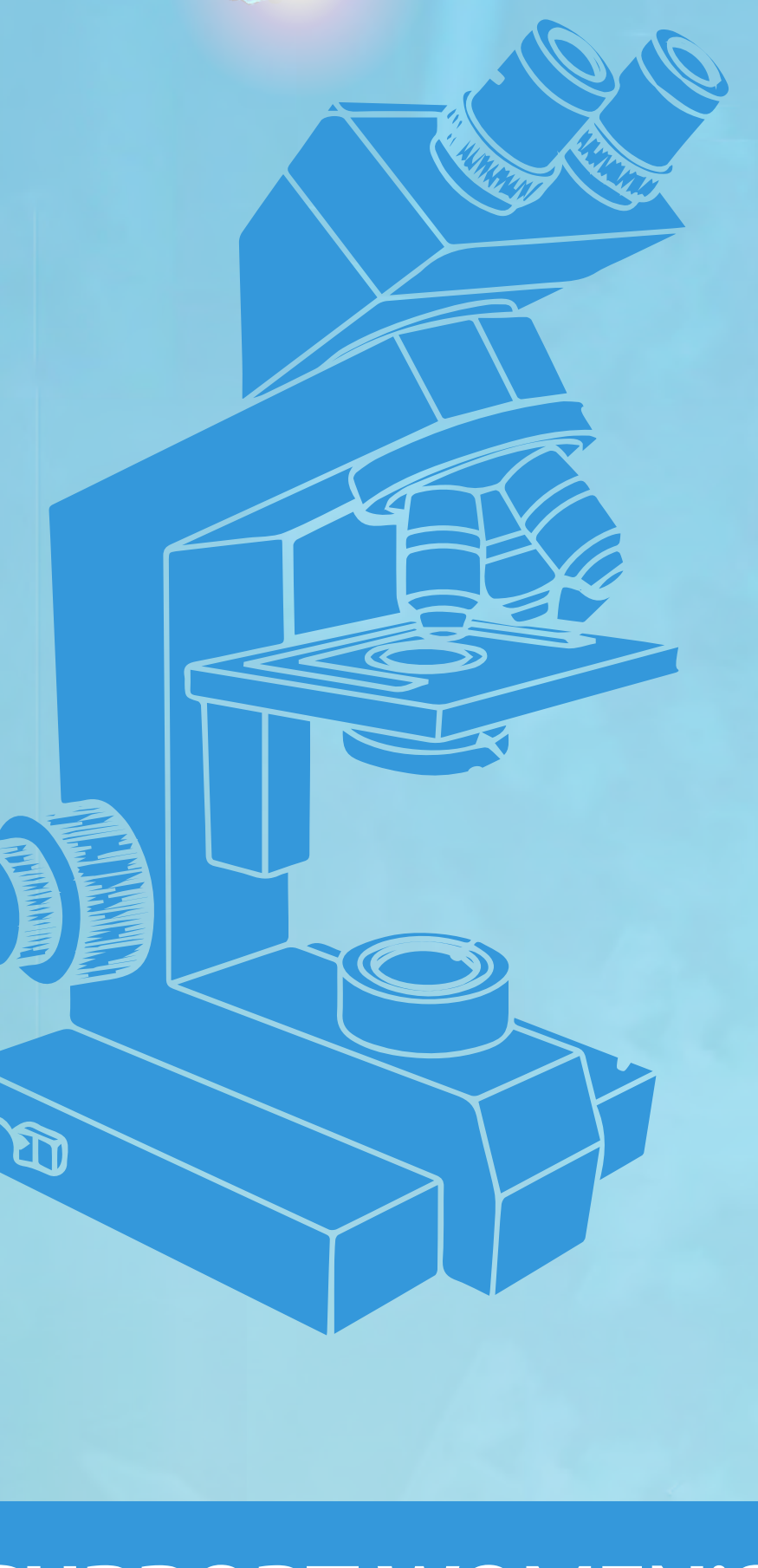
IMPROVE YOUR SLEEP QUALITY

One of the most important foundations of your well-being is sleep quality. Sleep makes you feel refreshed, influences your ability to remember things and helps you regulate your feelings. Missing out on good-quality sleep can lead to increased stress, anxiety and fatigue [7]. You can improve your sleep by making sure that you have enough Mg.

Mg acts as a natural muscle relaxant, helping prepare your body to go to sleep. It activates part of the parasympathetic (unconscious) nervous system, which then signals your body to relax. As a result, you may fall asleep faster and stay asleep longer. In addition, the mineral gives a helping hand in regulating your body's level of melatonin, a hormone that regulates the sleep cycle [8].

HELP RELIEVE YOUR MIGRAINES

Migraines can be tough to handle, especially if you do not know what to do about them. For migraineurs, it is even more important to monitor energy levels, diet and hydration. They need more neuronal energy than non-migraineurs and require more mineral-dense electrolytes. In addition, their bodies break down nutrients and utilize energy differently. This makes migraineurs more sensitive to weather changes, hormonal changes and electrolyte imbalances. In order to live a migraine-free life, many migraine sufferers modify their eating habits and take magnesium supplements.



THE RESEARCH

After years of research, Angela A. Stanton, PhD, has concluded that migraines are usually triggered by an imbalance in electrolyte homeostasis at the cellular level. Based on her findings she created The Stanton Migraine Protocol® to help prevent and manage migraine attacks without medication. One of the pillars of the protocol is to monitor and maintain balanced levels of electrolytes, including sodium, potassium and magnesium. The protocol provides clear hydration guidelines, dietary recommendations and helpful supplementation tips [9].

SUPPORT WOMEN'S HEALTH

Women have to pay more attention to their Mg levels due to the demands of their reproductive systems. Female bodies go through menstruation, pregnancy and other reproduction-related processes that change the way in which they handle Mg.

For instance, 80-90% of women in the reproductive age experience Pre-Menstrual Syndrome (PMS), and about 3-8% suffer from severe symptoms. This makes it one of the most common recurring disorders in women. Its causes have not been established definitively; however, Mg deficiency is a possible trigger. Women with PMS have lower levels of Mg in their red and white blood cells than women without PMS. Taking Mg alone or with vitamins (such as B6) can be a good way to relieve the symptoms [10]. Mg can lessen the pain, relax the smooth muscles of the uterus and decrease water retention in the body. Overall, this can reduce the pain and discomfort that women experience from menstrual cramps [11].

A common way in which women may lose a lot of Mg is through hormone-based birth control and hormone replacement therapies. In a 2010 study, researchers found that more than 34% of American women using contraceptives chose to use a hormone-based method. In addition, many women experiencing menopause tend to undergo hormone replacement therapy and take calcium supplements to manage their symptoms. This combination unfortunately decreases the amount of Mg available for their bodies to use [12].

Older women are also likely to have weaker bones and a higher risk of bone fractures. Various studies have shown that Mg may help to strengthen bones and reduce the risk of osteoporosis [13].

HOW TO MAKE SURE YOU GET ENOUGH MAGNESIUM

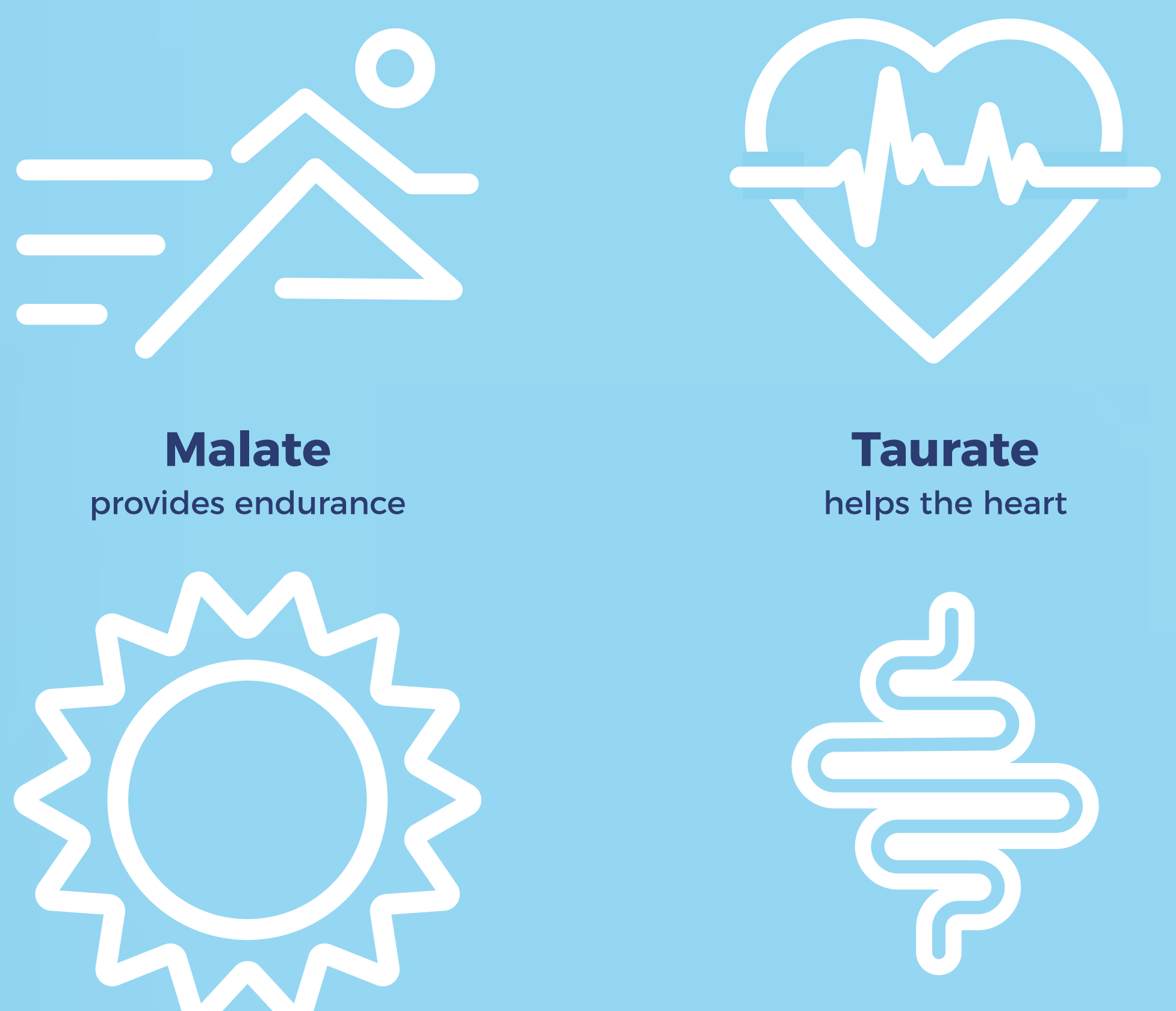
Some Mg is taken in through the foods you eat. The mineral has medium-level bioavailability — this means that it is only partially absorbed in the gut, and the excess is excreted as waste. Therefore, it is important to be mindful of how much Mg you consume in your diet.

Good sources of Mg include dark chocolate, almonds, tofu and vegetables such as spinach and broccoli. You can also enhance your diet with Mg supplements, such as the ones that Health By Principle offers.

We have combined four elemental Mg types for the benefits they offer:

- **Mg malate** helps with fatigue, due to the role that malic acid plays in energy production.
- **Mg glycinate** is highly soluble and readily absorbable. Glycinate also helps with the production of energy.
- **Mg taurate** is easily absorbed, promotes heart health and balances blood sugar levels.
- **Mg citrate** is readily absorbed in the body and improves digestion.

MAGNESIUM TYPES



Malate
provides endurance

Taurate
helps the heart

Glycinate
aids with energy

Citrate
absorbs in the body best and improves digestion

Sources

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HEALTH BY PRINCIPLE™ was founded in 2017 with the intention of creating a natural, non-medicinal aid that would provide relief to people suffering from migraines. Located in sunny Orange County, California, we care about motivating people to be their best. We always make sure our products are guided by science and effectiveness first.

In order to be your best, we believe in leading a lifestyle that promotes healthy living, in terms of nutrition, hydration, exercise, and other important measures. "Healthier living for all" is the vision we strive to achieve through our products.

Based on years of research, we were able to create something that we are proud of. Our consultant scientist Angela Stanton, PhD found a real solution to migraines that reduced its effects and made the condition easier to manage. Health By Principle released the Migraine Relief line of products (Magnesium and Electrolyte products) to make migraine preventives readily available to migraine sufferers around the world.

The magnesium supplement proved to be successful in not only the migraine space but also in supporting mental health, physical activity, and hydration. Various studies found that magnesium helped maintain energy levels and helped correct imbalances in the body. Because of these changes, customers noticed that they felt more energetic and their moods were lighter. We want to help more people feel that way as they go about their lives.

With the feedback and testimonials we've received over our first few years, Health By Principle has grown and improved our offering to the world. We now offer the Complete Magnesium Supplement, the Complete Electrolyte Supplement, and our most recent addition, the Complete Vitamin D3 Supplement. All of our supplements are made in America, using ingredients you can trust, backed by scientific evidence.

For more information, you can contact HEALTH BY PRINCIPLE™

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