Science update: ampli-D® and mobility

3x faster and more effective form of vitamin D

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DSM

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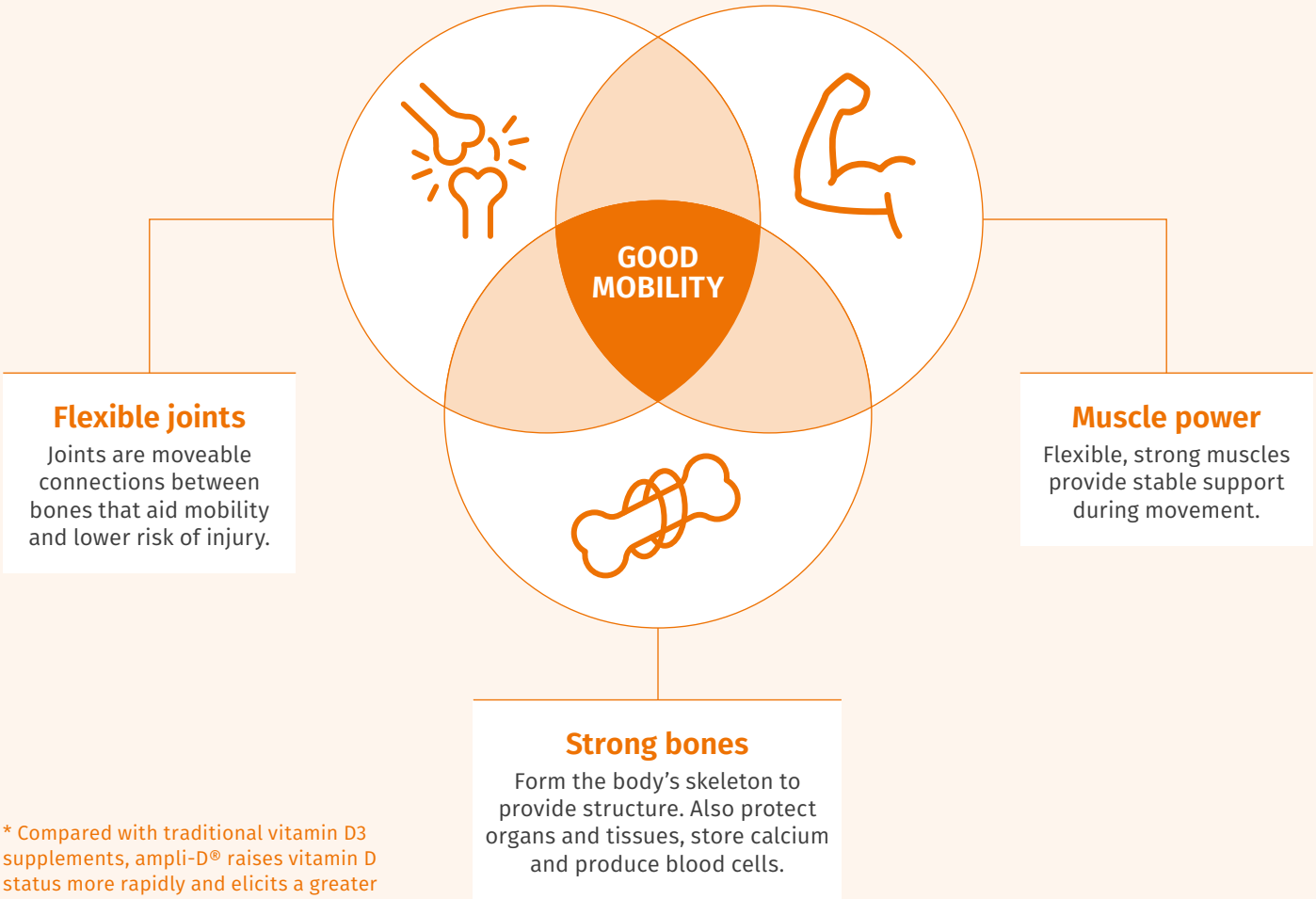
We are born to move. Good mobility is essential for an active lifestyle, healthy independence and a rich quality of life. The key pillars of mobility – bones, muscles and joints – work together, along with other important tissues, like cartilage, ligaments and tendons, to enable movement without limitations.[1]

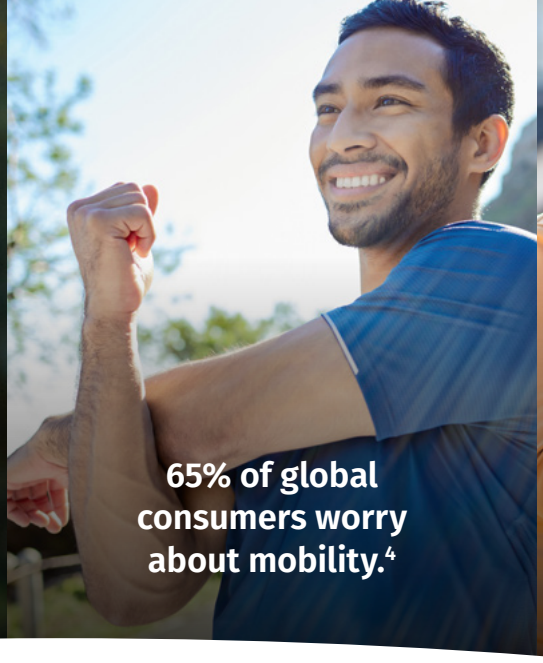
However, these pillars can change as a consequence of natural aging, poor nutrition, low physical activity, obesity, certain medications, chronic disease and more – resulting in weakness, reduced flexibility and slower movement.[2]

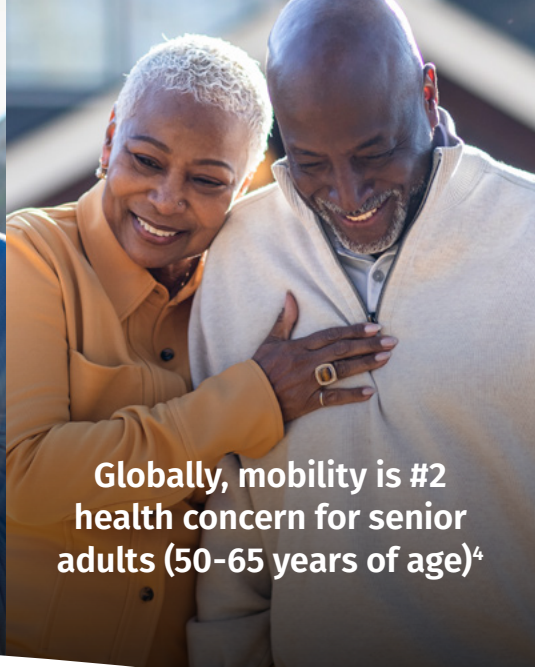
To stay active and independent for as long as possible, many consumers today – young and old – take a proactive approach to their health. For a growing number of individuals, this involves taking nutritional supplements to help strengthen bone, muscle and joint health; and ultimately overall mobility.

Figure 1. **The three pillars of mobility**



* Compared with traditional vitamin D3 supplements, ampli-D® raises vitamin D status more rapidly and elicits a greater peak in vitamin D status on an equal dose basis. Clinical studies show that sufficient vitamin D status is achieved on average 3 times faster and more effectively. [23, 26, 30, 31]





Make your next move with vitamin D

Balanced nutrition, in combination with daily physical exercise and weight management, plays an important role in maintaining mobility. Vitamin D, in particular, is well-recognized for its contribution to healthy mobility because of its important role in bone [5] and muscle health.[6]

The main function of vitamin D in the body is to maintain calcium and phosphorus levels in the blood – key minerals for bone mineralization and strength.[7] Without adequate vitamin D, only 10-15% of dietary calcium is effectively absorbed.[7] Low levels of calcium in the blood promote the release of calcium from bones. Due to its important function in calcium regulation, prolonged and severe vitamin D deficiency can lead to bone-related conditions, such as rickets in children and osteomalacia in adults.[8] Suboptimal vitamin D status is also linked to higher risk of falls and fractures, poorer gait and frailty.[9,10]

Similarly, because the muscles need calcium for nerve transmission and muscle contraction – vitamin D status is important for healthy muscle function too. The vitamin also supports muscle health directly by promoting muscle fiber synthesis, fiber size and strength.[10] Meanwhile, in the joints vitamin D is associated with improved discomfort and joint function.[11,12]

Mobility-related claims for vitamin D [5, 6, 13]

Bones

- Vitamin D contributes to the maintenance of normal bones
- Vitamin D is necessary for normal bone structure

Calcium

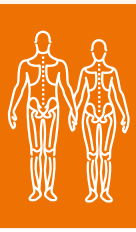
- Vitamin D contributes to normal absorption / utilization of calcium and phosphorus
- Vitamin D contributes to normal blood calcium levels

Muscles

- Vitamin D contributes to the maintenance of normal muscle function

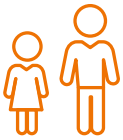
Bone-Appetit! Vitamin D nutrition for mobility support throughout life

Maintaining healthy bones is important at all stages of life, especially in children and teens going through periods of rapid growth, menopausal women who are more at risk of bone-related issues and older adults who experience decreased bone mass and strength.



The adult human skeleton has 206 bones[14] and is renewed by remodeling every 10 years.[15]

Table 1. **The role of bone health across the lifespan and the unique benefits of vitamin D.**

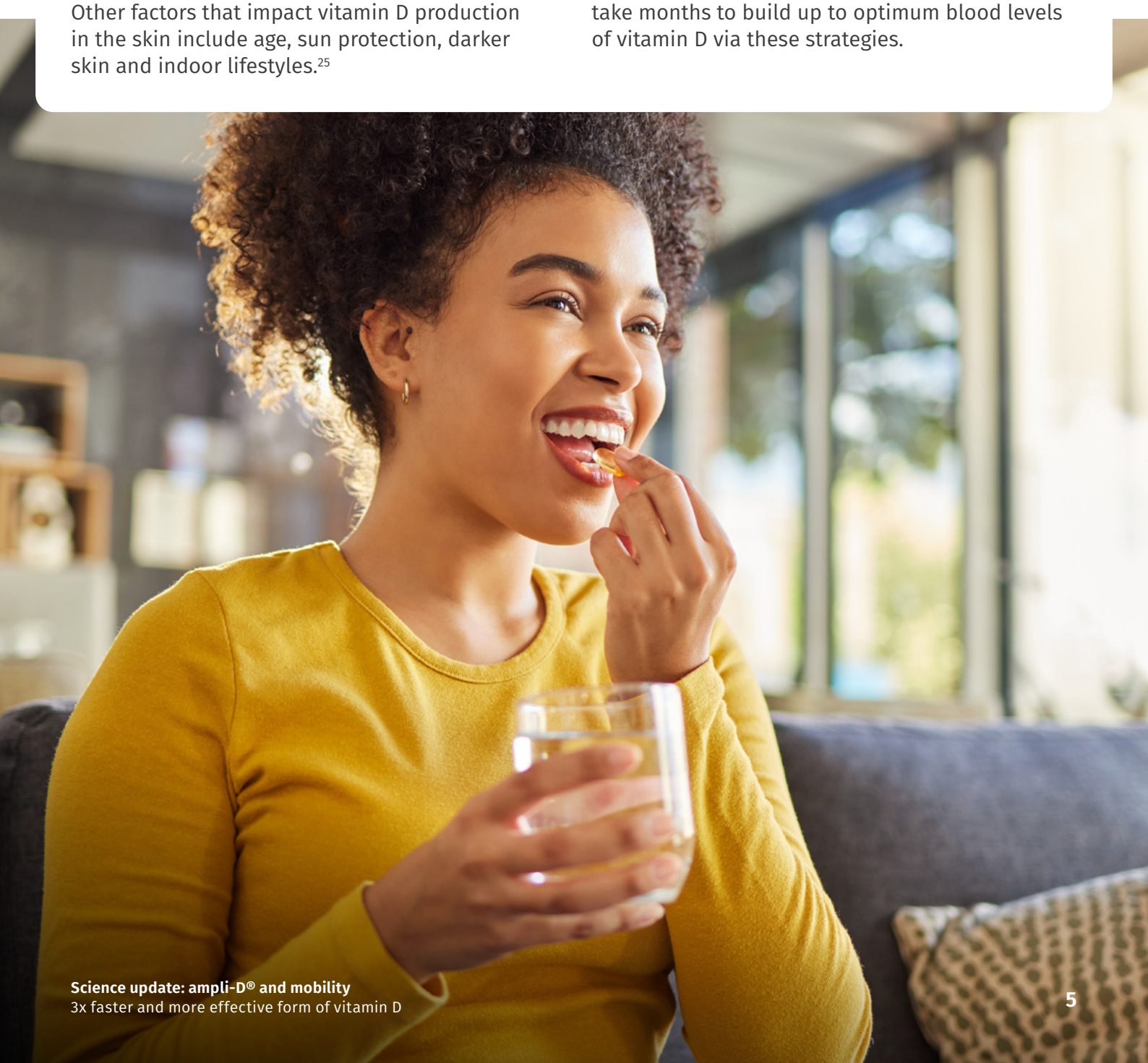
CONSUMER GROUP	BONE HEALTH STATUS	VITAMIN D SUPPLEMENT TARGETS
Kids & teens 	The best time to build bone mass is during periods of rapid growth – in childhood, adolescence and early adulthood.[16] Broken bones are common sports injuries as bone growth can outpace strengthening. Puberty is therefore a time to optimize the body's calcium stores.[17]	**Supports bone growth.**
Adults leading an active lifestyle 	Frequent exercise and sports activity can put pressure on the skeleton. This means active adults could benefit from additional nutritional support to maintain bone strength and health.	**Supports bone strength and muscle function.** Supplementation could help those consuming a low vitamin D diet (e.g. vegans) and those with low vitamin D status.
Menopausal women 	Around the time we reach 40 years of age, we slowly begin to lose bone mass, with bone breakdown outpacing formation.[16] As levels of estrogen drop, women undergo rapid bone loss – losing up to 40% of their spongy inner bone and 10% of their hard outer bone within 10 years of menopause.[16]	**Supports bone maintenance.** Supplementation is important in individuals consuming a low vitamin D diet or with low vitamin D status, in the case of selected medication use, and in adults exposed to less sunlight.[18]
Senior adults 	Bone density, muscle mass and strength, and joint flexibility all decline with age; increasing frailty, risk of falls and fractures.[19] Bones lose calcium and become more brittle. Muscle fibers reduce in number and size, with reduced tone. Joints become stiffer, less flexible and inflamed.[19] The overall impact is reduced mobility, independence and quality of life.	**Supports independence** – seniors need strategies to boost vitamin D status, due to limited sun exposure, certain medications, dietary choices and reduced vitamin D efficiency.[18,20] Some dietary guidelines recommend a higher intake of vitamin D for adults > 70 years, e.g. USA[8], Brazil[21], Australia[22].

Illuminating the challenges with vitamin D uptake

Despite its importance in the body, **88%** of the world's population has sub-optimal vitamin D levels.[23] [32]
So why is this?

Also known as the 'sunshine vitamin' – vitamin D is produced when the skin is exposed to sunlight. Because this is the source of most vitamin D in the body,[24] achieving sufficient levels of the nutrient is more challenging during the winter months when less natural sunlight is available. Other factors that impact vitamin D production in the skin include age, sun protection, darker skin and indoor lifestyles.[25]

Few foods naturally provide vitamin D. However, some food products – like some milks and cereals – have been fortified to increase vitamin D intake in the general population. Dietary supplements containing vitamin D (namely vitamin D3 and D2) are also widely available. The challenge? It can take months to build up to optimum blood levels of vitamin D via these strategies.



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ampli-D® is a 3x faster and more effective form of vitamin D

Vitamin D supplements on the market – namely D3 and D2 – need to be metabolized through a series of steps in the liver and kidney before they can be activated. In one of those steps, calcifediol (also called calcidiol), is formed.

ampli-D® is calcifediol, the form of vitamin D that is already naturally found in the blood – in other words, ampli-D® is closer to activation. **ampli-D® is a next generation solution powering innovation in the vitamin D space.**

Normally, it can take months for the body to reach optimal vitamin D levels

We get vitamin D from sunlight, food or supplements

It is first processed in the liver

Calcifediol

Calcifediol is a natural, potent form of vitamin D

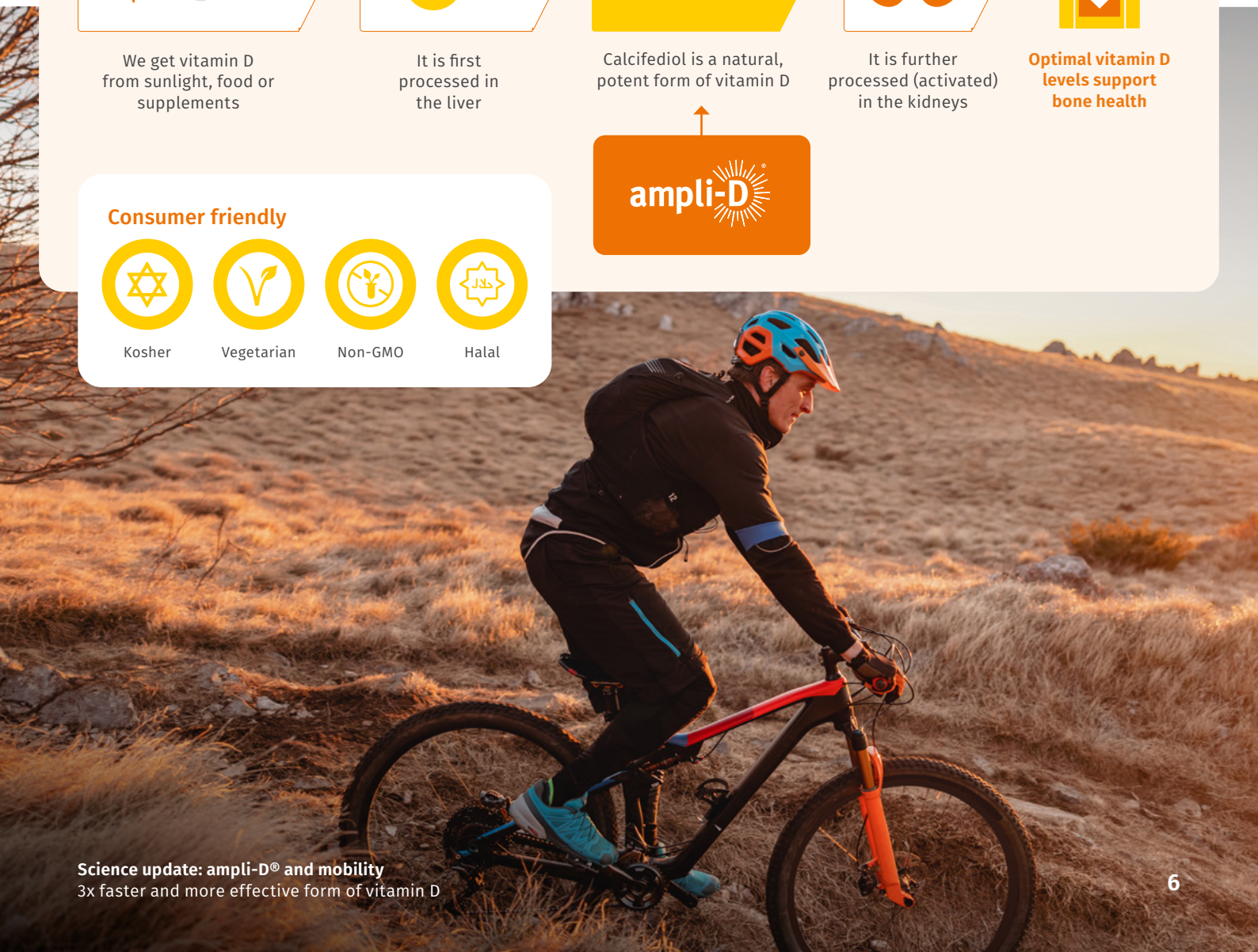
It is further processed (activated) in the kidneys

Optimal vitamin D levels support bone health

ampli-D®

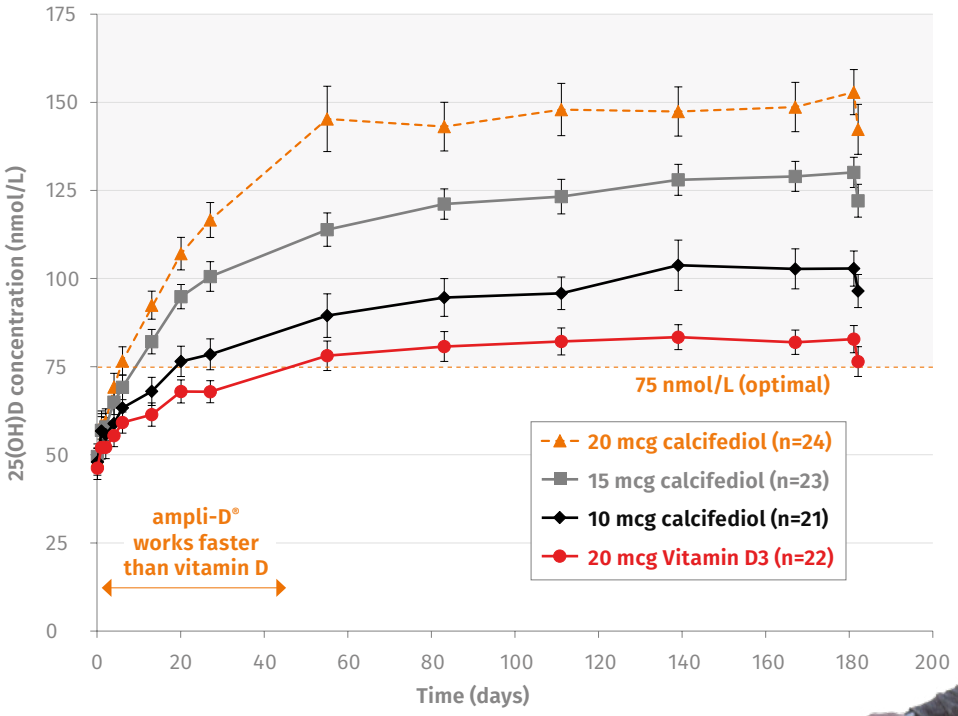
Consumer friendly

Kosher | Vegetarian | Non-GMO | Halal

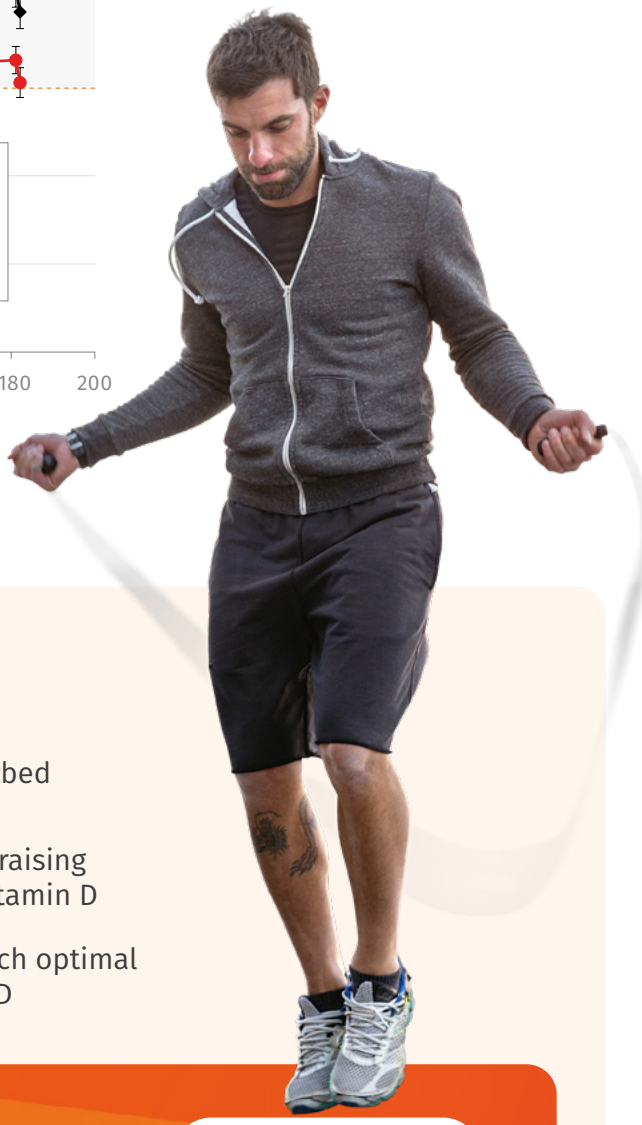


DSM's ampli-D® solution raises vitamin D status faster and more effectively – providing a ready source of vitamin D to help support bone and muscle health.

Figure 2.
Optimal levels of vitamin D reached faster with calcifediol compared with regular vitamin D3.[26]



Clinical study with 91 healthy older adults average age 63 years, who consumed calcifediol or vitamin D3 supplements daily for 6 months.



Compared with regular vitamin D3, ampli-D® is;

- More bioavailable
- More easily absorbed
- Easier for the body to use
- More effective at raising blood levels of vitamin D
- 3x faster at reaching optimal levels of vitamin D
- More likely to reach optimal levels of vitamin D

Discover the benefits of ampli-D® for mobility and more. Find out more

ampli-D® and mobility: Scientific insights for impact

Emerging scientific research highlights the promising potential of ampli-D® for mobility health.

Proven clinical study results in senior adults

One trial compared 20 µg/day calcifediol with 20 µg/day vitamin D3 in healthy postmenopausal women with an average age of 62 years and average 25(OH)D levels of 13 ng/ml.[28,29]

Following a four-month supplement period, calcifediol increased knee strength by 17%, gait speed by 18% and lower extremity function 2.8-fold.

Muscle strength
+17%

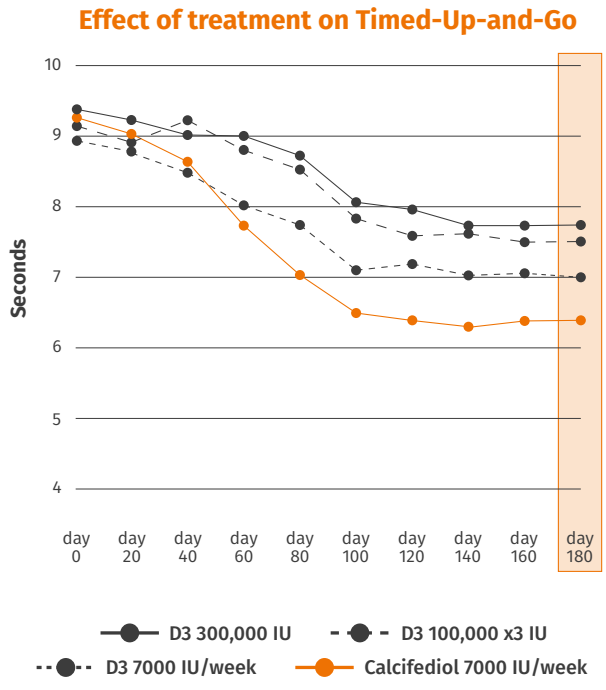
Gait speed
+18%

Muscular function
x2.8

Another study compared 7,000 IU (weekly) calcifediol with 7,000 IU (weekly) vitamin D3 in healthy postmenopausal women with an average age of 60 years and 25(OH)D levels <24 ng/ml.[27]

Lower extremity muscle strength and function

After a six-month intervention, significant improvement in muscular function with calcifediol, measured by reduced time to perform the Timed-Up-and-Go test, and increased number of Sit-to-Stand repetitions.

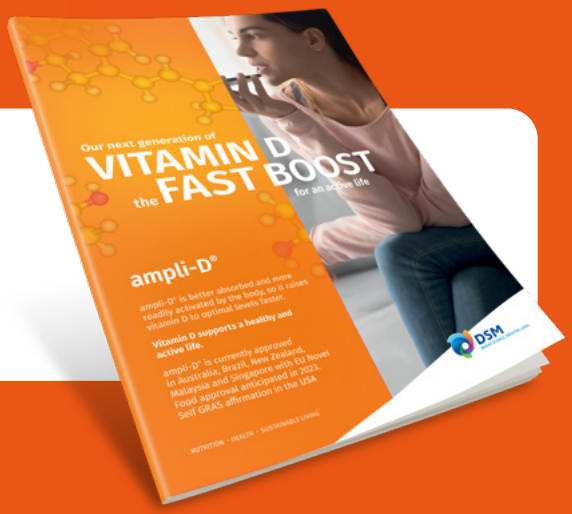


ampli-D® is currently approved in Australia, Brazil, New Zealand, Malaysia and Singapore with EU Novel Food approval anticipated in 2023. Self-GRAS affirmation in the USA.

Partner with DSM to develop next-generation vitamin D products with ampli-D®

It takes more than ingredients to launch innovative products. It takes an end-to-end partner to support you at every stage of your product development process.

From consumer insights to market ready solutions, DSM can co-innovate with you to bring new and innovative products, getting you to market faster.



Learn how we can deliver ampli-D® as a market-ready solution today.

Get started at **PartnerWithDSM.com**

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