Natural vs. Synthetic Spermidine

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Polyamines, including spermidine, spermine and putrescine, are synthesized in every living cell and are contained in foods, especially in those considered to contribute to health and longevity. As nutraceuticals, polyamines have been growing in popularity due to their beneficial effects for autophagy/health aging[1] [2], healthy hair[3] [4], and cognitive health[5] [6] [7]. When used in dietary supplements, spermidine in particular is available in naturally occurring forms and as synthetic spermidine trihydrochloride—but the naturally occurring spermidine is a better option as explained below.

Other polyamines
First of all, synthetic spermidine does not come with the other polyamines that normally accompany spermidine in nature. This is significant since the presence of the other naturally occurring polyamines provides a recycling loop whereby the body is able to produce more spermidine, not just the amount given in the daily dose itself.[8] The basis for this is that within mammalian cells, spermidine is generated from its precursor polyamine putrescine (which itself is generated from ornithine) or by oxidative degradation of spermine[9]—both of which are present with naturally occurring spermidine in the form of Miricell™ rice germ polyamines.

Not the same molecule
It should also be noted that synthetic spermidine as commonly provided (spermidine trihydrochloride), is not the same molecule as natural spermidine:

Material	Source	Synonym	Molecular formula
Natural spermidine	Rice germ extract (and other plant sources)	N1-(3-Aminopropyl)butane-1,4-diamine	$C_{10}H_{26}N_4$
Synthetic spermidine	Spermidine trihydrochloride	N-(3-Aminopropyl)-1,4-butanediamine trihydrochloride	$C_7H_{22}Cl_3N_3$

While synthetic spermidine trihydrochloride will certainly yield spermidine, heretofore there has been no studies in which the synthetic form was directly compared with the natural form and shown to have equivalent efficacy.

So why use synthetic?
Since the natural form is a better option, why do some brands use the synthetic form? One reason appears to be that, since the synthetic form is cheaper, much higher doses can be used without as much cost. In fact, I've seen dietary supplements on the market offering as much as 22 mg of spermidine per serving—although it was an odd combination of mostly synthetic with some natural spermidine. In any case, it turns out that higher doses aren't really an advantage. The reason for this is that, in human research, the doses of spermidine used range between 0.5 and 5 mg:

Product category	Spermidine doses
Healthy aging	1.3 mg

Hair health	0.5 mg
Cognitive health	1.2-3.3 mg
Hormonal health	2.5-5 mg

Consequently, based upon human clinical research, there doesn't seem to be a good reason to use excessively high doses of spermidine.

Conclusion

Given these facts, it is sensible to consider the value of Miricell™ rice germ polyamines over synthetic spermidine if you want to formulate a new supplement or improve an existing supplement with spermidine. Miricell™ is available in a powder providing 1% or 2% spermidine. Consequently, if using the 2% material it would require 25 mg to yield 0.5 mg of spermidine, and 250 mg to yield 5 mg of spermidine.

Note: The information presented in this article is for educational purposes only. It does not constitute recommendations for structure/function claims.

Nutraland USA offers clean, plant-based and sustainable branded ingredients supported by science. Our nutraceuticals are good for you, and good for the planet. For more information about how you can use Miricell™ polyamines in your dietary supplements, contact gene.bruno@nutralandusa.com; 949-988-7615.

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