FORGOTTEN FAT SUBSTITUTE FINDS NEW RELEVANCE

Laura Cassiday

Esterified propoxylated glycerol (EPG) is an undigestible fat substitute that allows food manufacturers to cut calories without sacrificing texture. It has found a niche application in high-protein bars, such as the popular David bar.

In the late 1990s, Olestra was developed as a fat substitute that promised guilt-free indulgence in unhealthy snacks like potato chips. But the dream soured quickly when customers reported unpleasant gastrointestinal side effects, such as stomach cramps, oily stools, and diarrhea. Even when improved formulations emerged, Olestra never recovered from the bad publicity.

Around the same time, another fat substitute, esterified propoxylated glycerol (EPG), was developed, tested, and quietly shelved in the wake of Olestra's public fallout. Now, EPG is making a comeback in David bars—high-protein snacks wrapped in flashy gold foil whose sales are projected to reach $180 million in 2025. EPG is the not-so-secret ingredient that lets David's manufacturers pack in the protein while slashing fat and calories — without sacrificing the rich, creamy texture consumers crave.

Studies dating back to 1997, indicate that EPG is unlikely to cause digestive distress at recommended levels. And EPG does not significantly impair absorption of most fat-soluble vitamins. But the fat substitute faces other hurdles: limited supply and a public increasingly wary of synthetic-sounding ingredients. Whether EPG can succeed where Olestra failed may depend on its ability to carve out a niche in the booming high-protein food market.

PACKING IN PROTEIN

David bars' popularity is not surprising, given consumers' growing obsession with

protein. In the past decade, the number of food products on the global market with high-protein claims has **quadrupled**. Consumers increasingly view protein as a tool for weight loss, fueled by diet crazes such as the Atkins, South Beach, Paleo, and Carnivore diets. Wellness influencers—including David bar financer Peter Attia—suggest that for optimal performance, muscle preservation, and longevity followers consume **two to three times more** than the US recommended daily allowance of 0.8 grams protein per kilogram of body weight.

To put this amount of protein into perspective, a 68 kilogram (150 pound) individual would need to consume about 136 grams of protein, or about 20 eggs, each day to meet Attia's requirements. Most people find it difficult to incorporate that much protein into their diets without also consuming large amounts of calories and fat—which is the David bar's market strategy.

Each David bar delivers 28 grams of protein, with only 2 grams fat and 150 calories. For comparison, the same flavor Quest bar (a David's competitor) contains 21 grams of protein, 9 grams of fat, and 190 calories. Both brands use similar protein sources (milk and whey protein isolates) and low-calorie sweeteners. The major difference is the fat source, which is mainly EPG for David and cocoa butter for Quest.

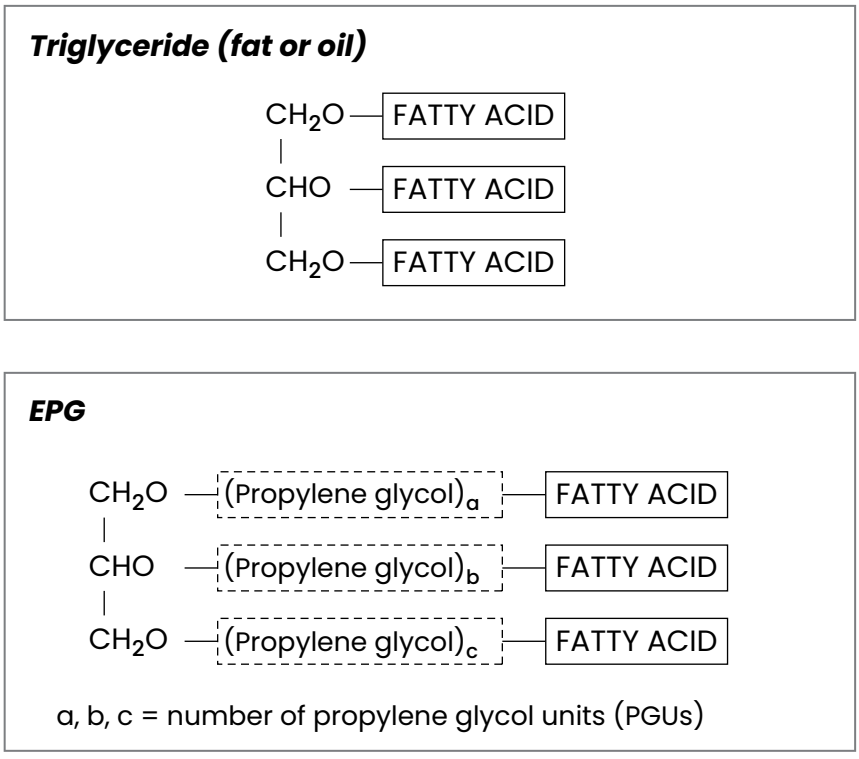
Some form of fat is necessary to create a palatable protein bar. "When you have really high protein levels without fat, it becomes like sawdust—not very appealing," says Eric Decker, food science professor at the University of Massachusetts, Amherst. "EPG is a way to make the quality of the bar much better without adding calories."

ENTER EPG

EPG is a modified plant fat that passes though the GI tract mostly undigested, delivering 92 percent fewer calories than normal fat. The fat substitute is synthesized in a two-step process: 1) manufacturers react food-grade glycerol with propylene oxide to insert propylene glycol units (PGU) on glycerol's hydroxyl groups, and 2) the propylated glycerol is esterified with fatty acids derived from vegetable oils like soybean and canola. The result is a modified triglyceride in which the PGU block access of the digestive enzyme lipase to ester linkages, impairing normal lipid digestion (see image).

Versions of EPG with different functional properties, ranging from liquid to solid, can be made by changing its fatty acid constituents. Fatty acids used to make EPG are typically in the C16-C24 range and can be saturated or unsaturated. The higher the degree of saturation, the higher the melting temperature of the fat.

Basic structure of triglycerides versus EPG. *Source: Bechtel, D.H.,* Reg. Toxicol. Pharm. 70 *(2014)*



The EPG version selected for initial commercial development contained a high content of saturated fatty acids so that the fat remained solid at body temperature. In contrast, the original Olestra melted to an oily liquid upon ingestion, which may have caused its unpleasant gastrointestinal effects.

OVERCOMING BAD PRESS

EPG was developed in the 1980s by the oil-and-gas company ARCO, who partnered with Best Foods in the 1990s to bring the fat substitute to market. The companies sponsored a series of safety studies led by David H. Bechtel, finding that in a variety of animals EPG was not associated with any type of toxicity. Ingested EPG was not metabolized, absorbed, or accumulated by the body and it did not cause deficiencies in lipid-soluble vitamins.

The researchers went on to conduct a randomized, controlled clinical trial of EPG. Over an 8-week period, 139 healthy volunteers consumed a diet containing 0, 10, 25, or 40 grams per day of EPG. The fat substitute did not significantly affect levels of circulating vitamin A, E, or D, although EPG groups had slightly lower levels of circulating vitamin K and beta-carotene.

Olestra consists of sucrose esterified with 6–8 fatty acids. It was shown to reduce circulating vitamins A, E, D, and K in a dose-dependent manner. And as a result, the US Food and Drug Administration mandated that Olestra be fortified with these vitamins.

Lipophilic molecules like Olestra and EPG have the potential to act as "sinks" for fat-soluble vitamins in the gastrointestinal tract, reducing their absorption by the small intestine. However, EPG is much less lipophilic than Olestra, with a Kow (octanol/water partition coefficient) of 3.2–3.4, compared with more than 40 for Olestra.

The clinical trial also revealed that EPG ingestion is unlikely to cause gastrointestinal distress, except at higher doses. For example, participants in the control and 10-gram EPG groups experienced diarrhea at roughly the same frequency (27.8 and 29.4 percent, respectively), but this adverse effect rose to 54.3 percent of the EPG-25 group and 61.8 percent of the EPG-40 group.

Decker notes that different fatty acid formulations of EPG and Olestra likely have different physiological effects. "Olestra had so much bad press, and a lot of it was overstated," he says. "Many of the unpleasant GI symptoms were associated with very early versions of Olestra. You can change the fatty acid composition to make sure the fat is solid at body temperature, just like EPG."

Properties of fat substitutes Olestra and EPG.

	Olestra	EPG
Structure	Sucrose esterified with 6-8 long-chain fatty acids	Propoxylated glycerol esterified with 3 long-chain fatty acids
Caloric value	0 kcal/g	0.7 kcal/g
Current food applications	Some brands and flavors of "light" or "fat-free" potato chips	Some high-protein bars, nut butters, sauces, and chocolate bars
Melting temperature*	98 – 104 F	102 F
Kow (lipophilicity)	>40	3.2-3.4
Lipid-soluble vitamin absorption	Reduced absorption of vitamins A, E, D, and K and beta-carotene	Reduced absorption of vitamin K and beta-carotene
GI side effects	Widely reported by consumers but not supported by clinical trials	No significant increase in GI effects for 10 g EPG/day

*Melting temperature depends on fatty acid composition.

EPG MONOPOLY?

Olestra's backlash prompted Best Foods to exit its partnership with ARCO. As a result, Bechtel's safety studies went unpublished until 2014, when Choco Finesse gained the rights to EPG and published the studies. In 2015, the FDA deemed EPG Generally Recognized as Safe (GRAS) for multiple confectionary applications, including baked goods, frozen dairy, desserts, and snack foods. Two more GRAS notifications followed for spreadable EPG and EPG for commercial frying applications. In 2018, Choco Finesse rebranded as Epogee and remained the sole, little-known supplier of EPG. That is, until David bars came along.

The high-protein bars proved so popular that EPG sourcing became a concern. So in May 2025, David purchased Epogee, which holds the patent for EPG, and promptly cut off orders from customers who did not have long-term contracts. Recently, three former Epogee customers—all start-up food companies—filed a lawsuit accusing the company of unlawful monopolization of the ingredient.

According to an article in *Men's Health*, Epogee currently has the capacity to produce 3 million pounds of EPG annually, yet David's demand already exceeds 4 million pounds per year. David founder Peter Rahal noted that once Epogee ramps us production, possibly as soon as 2026, it will resume supplying other customers—but David's needs will always be prioritized over those of potential competitors.

BEYOND BARS

Even if Epogee resumes supplying EPG to other food companies, it remains unclear whether the ingredient will stay confined to the high-protein bar niche or branch out to a wider range of products. Epogee's website claims, "EPG is the alternative fat that works across nearly every category," including chocolate, nut butters, plant-based foods, salty snacks, baked goods, and ice cream.

In the 1990s, William Artz, a food science professor at the University of Illinois, Urbana-Champaign, partnered with Choco Finesse to evaluate EPG as a **frying oil**. His research contributed to the GRAS approval of EPG for commercial frying applications. Artz observed that while EPG was slightly less stable than conventional triglyceride oils at deep-fat frying temperatures, its breakdown products were identical in type and concentration to flavor compounds produced during normal frying.

Although EPG is cheaper than Olestra, it is still more expensive than conventional frying oils. "Frying in fast food restaurants would probably not be the best application for EPG because of its higher price and slightly shorter lifespan," Artz says. "But in factories, the large volume of food moving through fryers consumes the oil faster than it can degrade. So EPG could work fine for production on a grand scale of various fried foods, while reducing their fat and calorie contents."

If EPG becomes a widespread food ingredient, staying below the recommended 10 gram daily intake could be an issue. David's website advises limiting consumption to two bars per day, warning that "overconsumption of bars may cause GI effects." As Decker notes, "For now, most people are not going to eat 10 David bars in one sitting. But if EPG is expanded to other products, then you are going to run the risk of gastrointestinal distress."

According to Decker, a bigger problem for EPG may be overcoming the synthetic stigma. "Right now, synthetic additives are getting a lot of bad press, and most of the additives being criticized are present in very low, milligram concentrations," he says. "EPG is used in gram concentrations."

As EPG edges closer to mainstream adoption, it offers food manufacturers an opportunity to deliver indulgent textures and flavors with a fraction of the fat and calories. Whether EPG becomes a staple across the food industry or remains limited to specialized products depends on resolving supply challenges and convincing consumers that synthetic fats are safe.

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