

REPLACING TRANS FATS THE HEALTHIEST WAY

Trans fat is a chemically modified fat and artificial compound used in some countries as a substitute for butter or lard and in baked goods and spreads. Trans fats are also oxidation resistant and used for production of fried and deep-fried foods. Trans fat clogs arteries and leads to heart attacks. Globally, trans fat was estimated to cause more than half a million deaths every year¹. Many governments have already successfully protected their people by implementing policies to prohibit or strictly limit trans fat in any food.

Trans fat elimination can save more than 17 million lives worldwide over 25 years– and using healthy fats and oils as replacements could save even more^{2,3}

- Trans fats are the worst type of fat for our health. Oils called partially hydrogenated oils (PHO) are the main dietary source of trans fat in many countries.
- All trans fat replacement options provide a net health benefit. But palm, palm kernel and coconut oils are high in saturated fat, which is associated with increased risk of cardiovascular disease and should be minimized. Oils rich in polyunsaturated fatty acids (PUFA) and monounsaturated fatty acids (MUFA) have the greatest heart health benefits.
- For replacing PHOs used in frying, solid fat is not needed. High PUFA oils with antioxidants or high MUFA oils (i.e., high oleic oils) with moderate PUFA are the healthiest options. The next healthiest options are high MUFA oils (i.e., high oleic oils) with no or low PUFA.

 BAD FATS Increase the risk of heart disease	 GOOD FATS Lower the risk of heart disease
<p>Oils high in trans-fatty acids (TFA)</p> <ul style="list-style-type: none"> • Solid/semi-solid at room temperature • The worst fats for heart health ✗ Partially-hydrogenated oils (PHO) 	<p>Oils high in polyunsaturated fatty acids (PUFA)</p> <ul style="list-style-type: none"> • Liquid at room temperature • The best fats for heart health ✓ Sunflower ✓ Corn ✓ Soybean ✓ Cottonseed ✓ Safflower
<p>Oils high in saturated fatty acids (SFA)</p> <ul style="list-style-type: none"> • Solid/semi-solid at room temperature • Less harmful than TFA, but not good for heart health ✗ Coconut ✗ Palm ✗ Palm kernel ✗ Animal fat (tallow, lard) 	<p>Oils high in monounsaturated fatty acids (MUFA)</p> <ul style="list-style-type: none"> • Liquid at room temperature • Good fats for heart health ✓ Canola/Rapeseed ✓ High oleic canola ✓ Peanut ✓ Olive



Governments can support industry to accelerate the transition to healthier oils, using agricultural policies and incentives to promote the production of oilseeds and prioritize healthier replacement options.

To replace PHOs in baked goods and spreads/margarines without changing the food's texture or consistency, semi-solid and solid fats (i.e., fats that melt at higher temperatures) are needed. Slow cooling of oils and fats ('fractionating') is often used to select solid fats with a specific food functionality. Solid fats and the specific solid fat fractions have a high saturated fat content, but they can be combined with liquid oils to improve their health properties without compromising function. The two main ways to do this include simple blending of solid fat and liquid oil, and interesterification.

PHO should be replaced by alternatives with the lowest possible saturated fat and highest PUFA content:



Interesterified fats with high PUFA oils. Interesterification gives maximal solid fat structure at lower SFA levels.



Interesterified fats with low or some PUFA or MUFA oils.



Solid fats/fractions blended with low or some PUFA or MUFA oils.

What is interesterification?

Interesterification creates solid fats suitable for use in baked goods, spreads and margarines with good taste, no trans fat and lower saturated fat content.

The interesterification process breaks up and rearranges the fatty acids from different fats, forming a new fat or oil with maximal solid fat structure at lower saturated fat levels. Solid fats can be mixed with high MUFA or PUFA oils before interesterification, or solid fats can first be mixed and interesterified and then blended with high MUFA or PUFA oils.

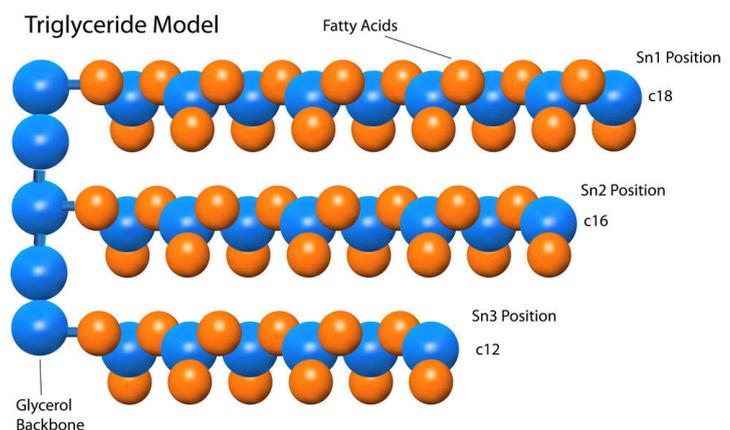


Figure 1: Fats and oils are made up of triglycerides: three fatty acids attached to a glycerin molecule



Benefits of interesterified fats and oils:

- Improved functional properties (e.g., desired melting temperature, texture, shelf life, mouthfeel)
- Approximately 10% less saturated fat (compared to a non-interesterified fat with a similar solid content.)⁴
- Can be high or moderate in heart-healthy MUFAs and PUFAs, depending on the natural oil used.⁵
- Intake decreases or does not affect cardiovascular risk.⁵
- Studies have not revealed any health issues (but gaps in knowledge remain about potential longer-term health effects).⁶
- Making TFA-free interesterified fat mixes does not need to be more expensive than partial hydrogenation, which requires expensive chemicals, but setting up interesterification facilities does require large capital investments and specific knowledge.⁷

Recommendations in the WHO REPLACE package for replacing trans fat:⁸

- Use the healthiest replacements, with the lowest saturated fat and highest PUFA content, with both omega-3 and omega-6 PUFA.
- When fat is only needed as a heat transfer medium, release agent or lubricant (for example, for frying), use liquid oils that do not oxidize quickly, such as high oleic canola oil.
- For other products that need “body” or other functionalities of saturated fat:
 - 1 Harder fats or hardstocks (i.e., animal fats, tropical oils, fully hydrogenated oils) are not recommended as full PHO replacement because of their high saturated fat content; for example, palm oil can be used as a baking shortening but is around 50% SFA.
 - 2 For some applications, blending of liquid oils with the above hardstocks is the most economical way to replace PHO. Blending is the mixing of fat molecules. For example, liquid oil blended with 1% or 2% of fully hydrogenated oil gives a viscous liquid that is easy to use in professional kitchens.
 - 3 Interesterification, or fat rearrangement, is often the method of choice since it gives more solid fat structuring capacities at lower overall saturated fat levels.
 - 4 Combinations of technologies (fractionating, full hydrogenation, fat rearrangement and blending) are well suited to formulate products. This also allows cost-effective use.



References

- 1 Wang, Qianyi, et al. "Impact of nonoptimal intakes of saturated, polyunsaturated, and trans fat on global burdens of coronary heart disease." *Journal of the American Heart Association* 5.1 (2016): e002891.
- 2 Kontis, Vasilis, et al. "Three Public Health Interventions Could Save 94 Million Lives in 25 Years Global Impact Assessment Analysis." *Circulation* (2019).
- 3 Mozaffarian, Dariush, et al. "Trans fatty acids and cardiovascular disease." *New England Journal of Medicine* 354.15 (2006): 1601-1613.
- 4 Mills C, Hall W, Berry S. What are interesterified fats and should we be worried about them in our diet? *Nutrition bulletin*. 2017;42(2):153-8.
- 5 L'Abbé MR, Stender S, Skeaff C, Tavella M. Approaches to removing trans fats from the food supply in industrialized and developing countries. *European Journal of Clinical Nutrition*. 2009;63(S2):S50.
- 6 Mensink RP, Sanders TA, Baer DJ, Hayes KC, Howles PN, Marangoni A. (2016). The increasing use of interesterified lipids in the food supply and their effects on health parameters. *Adv Nutr*. 7(4):719–29.
- 7 Persistence Market Research. (2018). PHO and non PHO based oils and fats market: global industry analysis 2013–2017 and forecast 2018–2026.
- 8 REPLACE action package. Module 2: Promote. How-to guide for determining the best replacement oils and interventions to promote their use. Geneva: World Health Organization; 2019 (WHO/NMH/NHD/19.13). Licence CC BY-NC-SA 3.0 IGO.