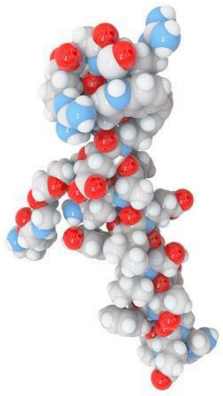
Harnessing Polyphenols for metabolic health

According to two recently published research papers:

- **Physiological functions of poorly absorbed polyphenols via the glucagon-like peptide-1.** Yamashita Y., et al. (2024). *Bioscience, Biotechnology, and Biochemistry, Oxford Press*.
- **Grape pomace as a cardiometabolic health-promoting ingredient: Activity in the intestinal environment** Taladrid D., et al. (2023) *Antioxidants*.

The polyphenols, fiber, and organic acids found in grape pomace provide significant health benefits when added to food or beverage formulas.



GLP-1 molecule

Polyphenols are plant-derived compounds with profound health benefits. For example, they play a key role in regulating glucagon-like peptide-1 (GLP-1), a hormone vital for glucose regulation, appetite suppression, and vascular health.

Natural fiber like lignocellulose and short-chained fatty acids like acetic acid also play a role in secretion.

There are 20 known hormones that effect satiety and weight management. The other critical ones are:

- Peptide YY: also controls digestion and satiety
- cholecystokinin (CCK): controls digestion and satiety
- Polypeptide GIP: stimulates insulin secretion
- Incretin hormone: stimulates insulin secretion
- DPP-IV: inhibition can increase GLP-1 and GIP secretion

Although *raw* polyphenols are often poorly absorbed, their activity within the gastrointestinal (GI) tract directly influences metabolic pathways.

Crush puree, derived from fermented grape pomace, serves as a rich source of these bioactive compounds, including procyanidins, anthocyanins, flavan-3-ols, and phenolic acids. The patented **Crush** fermentation process greatly enhances the bioavailability and potency of these compounds, particularly their ability to stimulate GLP-1 secretion.

Crush also has ~50% natural fiber and ~5% short-chain Fatty acid (acetic).

Polyphenol Activation of GLP-1 Secretion

GLP-1 is secreted by L-cells in the gut in response to nutrients and bioactive compounds. Procyanidins, especially tetrameric forms like cinnamtannin A2, are potent GLP-1 activators. These compounds stimulate the hormone's release by activating G-protein-coupled receptors (e.g., GPR40/120), which trigger calcium-dependent signaling pathways involving TRPM5 channels. Anthocyanins, such as delphinidin 3-rutinoside, enhance secretion through similar mechanisms. Together, these polyphenols amplify GLP-1 release, promoting better glucose regulation and metabolic health.

Crush Fermentation Enhances Bioavailability

Fermentation enhances the efficacy of **Crush puree** by breaking down large polyphenols into smaller, more absorbable forms, such as catechins and phenolic acids. It also releases polyphenols bound to grape cell walls, improving their bioavailability. Once in the colon, gut microbiota metabolizes these polyphenols into bioactive compounds that further stimulate GLP-1 secretion and provide systemic health benefits. This dual action highlights fermentation's role in unlocking the full potential of grape pomace (Yamashita Y., et al.)

Cardiometabolic and Gut Health Benefits

Beyond GLP-1 secretion, polyphenols in **Crush** support cardiometabolic health by improving vascular function and regulating lipid profiles. They increase nitric oxide production, reduce oxidative stress, and inhibit enzymes involved in carbohydrate and lipid digestion, such as α-amylase, α-glucosidase, and lipase. Additionally, the dietary fiber in grape pomace modulates the gut microbiome, promoting short-chain fatty acid (SCFA) production. These SCFAs further enhance gut health, strengthen the intestinal barrier, and reduce systemic inflammation (Taladrid D., et al.; Yamashita Y., et al.)

Conclusion

Crush puree combines the synergistic benefits of polyphenols, fiber, and fermentation, creating a functional food with significant potential for managing metabolic health.

Additional References

1. González-Abuín N., et al. (2014). Grapeseed procyanidins modulate cellular membrane potential and nutrient-induced GLP-1 secretion. *Am J Physiol Cell Physiol, 306*, C485-C492. **https://doi.org/10.1152/ajpcell.00355.2013**

2. Casanova-Martí À., et al. (2017). Acute selective bioactivity of grape seed proanthocyanidins on enteroendocrine secretions. *Food Nutr Res, 61*, 1321347. **https://doi.org/10.1080/16546628.2017.1321347**

3. Kato M., et al. (2015). The anthocyanin delphinidin 3-rutinoside stimulates glucagon-like peptide-1 secretion. *PLoS One, 10*, e0126157. **https://doi.org/10.1371/journal.pone.0126157**

4. Alexandra M Bodnaruc et al, (2016). Nutritional modulation of endogenous glucagon-like peptide-1 secretion: a review. Nutrition & Metabolism. **https://nutritionandmetabolism.biomedcentral.com/articles/10.1186/s12986-016-0153-3#Sec6**

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