Production of Galactitol from Galactose by the Oleaginous Yeast *Rhodosporidium toruloides* IFO0880

**Background/objective**
Sugar alcohols are valuable as low-calorie sweeteners and as industrially useful chemical precursors. While *Rhodosporidium toruloides* has been studied largely for the production of lipids and lipid-based products, the strain *R. toruloides* IFO0880 was recently shown to produce arabitol from xylose. Here, researchers explored if *R. toruloides* can produce additional sugar alcohols.

**Approach**
- Cultured *R. toruloides* IFO0880 under nitrogen-rich conditions on multiple sugars to identify additional sugar alcohols.
- Compared growth on galactose under nitrogen-rich and nitrogen-poor conditions.
- Characterized metabolic pathways responsible for galactose metabolism.
- Compared intracellular metabolites on glucose and galactose.

**Results**
- Of the sugars tested, only galactose yielded sugar alcohol.
- Simultaneous galactitol production (0.028 g/L/h, 0.136 g/g) and lipid accumulation (45% w/w) were achieved via cultivation under nitrogen-poor conditions.
- Leloir pathway confirmed as mechanism of galactitol production. The aldose reductase AldR was characterized as an NADPH-dependent enzyme.

**Significance**
This work demonstrates that galactitol, a valuable bioproduct, may be co-produced with lipid from galactose under nitrogen-poor conditions, demonstrating the flexibility of the *R. toruloides* IFO0880 yeast strain for production of valuable coproducts.

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