

Production of 3-hydroxypropionic acid from glycerol by recombinant *Pseudomonas denitrificans*

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Biological production of 3-hydroxypropionic acid (3-HP) from glycerol is possible through two sequential enzymatic reactions, which are catalyzed by a coenzyme B<sub>12</sub>-dependent glycerol dehydratase and an NAD(P)<sup>+</sup>-dependent aldehyde dehydrogenase (ALDH), respectively. *Pseudomonas denitrificans* is considered an ideal host for the production of 3-HP from glycerol, because it can synthesize coenzyme B<sub>12</sub> under aerobic conditions where NAD(P)<sup>+</sup> is regenerated efficiently. When the enzymes glycerol dehydratase (DhaB) and glycerol dehydratase reactivase (GdrAB2) of *Klebsiella pneumoniae* were heterologously expressed, *P. denitrificans* could produce 3-HP from glycerol at 37.7 mM in flask culture. Glucose was needed as carbon and energy sources for cell growth. Overexpression of a heterologous ALDH was not required since unknown ALDH(s) present in *P. denitrificans*, although its activity was low. The rate of 3-HP production was improved by overexpressing an ALDH gene (*puuC*) from *K. pneumoniae*. *P. denitrificans* oxidized 3-HP to malonate and it was suggested that this activity should be removed for further improvement of the recombinant strain.