# Microbial production of 2'-deoxyribonucleoside from glucose, acetaldehyde, and a nucleobase by multi-step enzyme catalyzed process

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Microbial production of 2'-deoxyribonucleoside (dNS) from cheap sugar materials by the reverse reactions of nucleoside degradation was investigated. Deoxyriboaldolase (DERA),which is a key enzyme of this process, was found in *Klebsiella pneumoniae* and the gene encoding DERA was overexpressed in *Escherichia coli*. The *E. coli* cells produced 2-deoxyribose 5-phosphate (DR5P), a key intermediate for dNS synthesis, from acetaldehyde and fructose 1,6-diphosphate (FDP). Coupling with an efficient process for FDP production from glucose through partial reactions of alcoholic fermentation by baker's yeast enabled direct production of DR5P from glucose and acetaldehyde using baker's yeast and DERA-expressing *E. coli* as the catalysts. The DR5P produced was transformed to dNS by the coupled reactions of phosphopentomutase and purine-nucleoside phosphorylase. Further improvement of the biocatalysts (co-expression of enzymes in *E. coli*, etc.) and optimization of the reaction conditions enable to established the practical process for dNS synthesis from cheap materials of glucose, acetaldehyde, and a nucleobase.