

Development of an enzymatic synthesis method for D-amino acids that promote skin barrier function

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D-Alanine and D-aspartic acid are useful cosmetic ingredients because those D-amino acids have a skin barrier function. In this study, to develop an efficient system for enantioselective synthesis of D-alanine and D-aspartic acid through the amination of the 2-oxo acids, NAD (P)⁺-dependent *meso*-diaminopimelate dehydrogenase from *Thermosyntropho lipolytica* (TIDAPDH) was coupled with NADPH regeneration using NAD (P)⁺-dependent glucose dehydrogenase. Using this method, pyruvic acid was converted to D-alanine with an excellent yield (>98.5%). However, this method was not suitable for the synthesis of D-aspartic acid. To obtain the enzyme available for the synthesis of D-aspartic acid, TIDAPDH was used as a reference sequence in the database screening, and *meso*-diaminopimelate dehydrogenases from *Bacillus thermozeamaize* (BtDAPDH), *Candidatus Syntrophocurvum alkaliphilum* (CsaDAPDH) and *Novibacillus thermophilus* (NtDAPDH) were identified. Among the enzymes, BtDAPDH and CsaDAPDH showed the productivities for D-alanine and D-aspartic acid, which are higher than those of TIDAPDH.