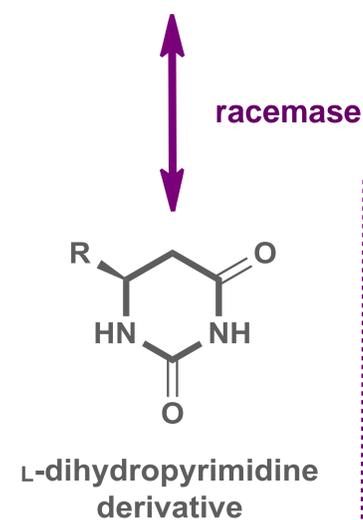
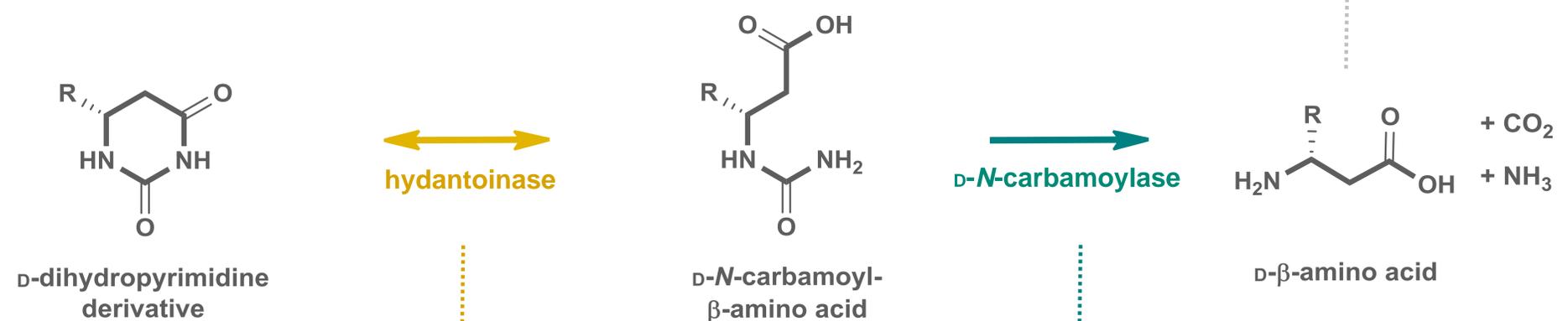
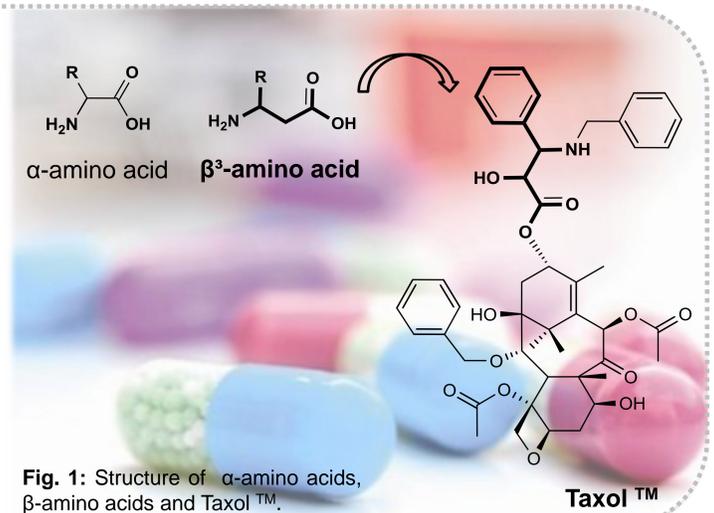


Synthesis of β -amino acids using a modified Hydantoinase Process as an enzymatic reaction cascade

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The use of **β -amino acids** is of increasing importance in the pharmaceutical industry. They serve for instance as building blocks for β -peptides, which form very stable secondary structures and are therefore promising molecules for the application as peptidomimetics.^[1] Due to their specific structure, β -amino acids are also found as constituents of biologically active secondary metabolites like the antitumor drug Taxol™, which contains a modified β -phenylalanine moiety (Fig. 1).^[2] Since the **Hydantoinase Process** for the synthesis of optically pure D- α -amino acids from hydantoin derivatives is well-established in industry, a modified Hydantoinase Process for the synthesis of β -amino acids has been proposed (Fig. 2).^[3]

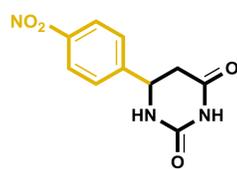


hydantoinase (*Arthrobacter crystallopoietes*)

successful hydrolysis of:

- ✓ D,L-6-phenyldihydrouracil (R=Phe)
- ✓ *p*-chloro-D,L-6-phenyldihydrouracil (R=*p*ClPhe)
- ✓ a novel substrate:

***p*-nitro-D,L-6-phenyldihydrouracil (R=*p*NO₂Phe)**



D-N-carbamoylase (*Arthrobacter crystallopoietes*)

to date:

- ✓ hydrolysis of D,L-carbamoyl-amino acids^[4] (Hydantoinase Process, products: α -amino acids)

aim:

enzymatic hydrolysis of D,L-carbamoyl- β -amino acids to receive β -amino acids

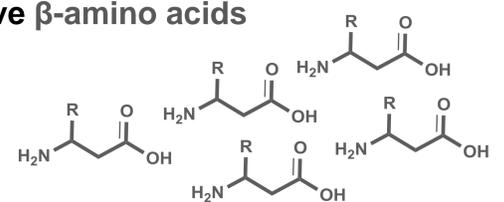


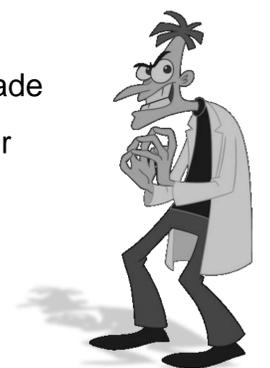
Fig. 2: Modified Hydantoinase Process for the synthesis of β -amino acids.

dynamic kinetic resolution

- enzymatically by racemase, theoretically:
- ✓ **100 % yield**
- ✓ **100 % enantiomeric excess**
- ✓ no enantiomeric separation necessary

outlook

- hydrolysis of D,L-carbamoyl- β -amino acids
- purification and characterization of enzymes involved in the cascade
- applications in microfluidic systems (continuous system with lower product inhibition)
- investigations toward reaction cascades with isolated enzymes in organic solvents



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