

Enzymes and protein engineering

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Research Field and Subjects

The research efforts are devoted to the development of new methods for the generation of enzymes endowed with non natural properties. Enzymes are modified either by incorporation of non natural amino acids using simple microbiological techniques or by the techniques of accelerated evolution in the laboratory. The enzymes to be engineered are displayed on phage and combinatorial libraries of mutants are generated; the mutant enzymes are selected either by *in vivo* or *in vitro* strategies depending on the final goal.

This methodology has been applied, among other things,

1. to change the specificity of proteolytic enzymes of industrial interest;
2. to engineer a regulation into an unregulated enzyme and generate mutants with the potential to be used in homogeneous immunoassays;
3. to target proteins and viruses towards eucaryotic cells.

In selections for catalytic activity, organic labels featuring inhibitory head groups are designed and prepared in the laboratory; they are reacted with the phage-enzymes libraries under kinetic control; the labelled phage-enzymes are then selected by affinity panning and characterized.

In selections for regulation, libraries of phage-enzymes are created, in which random peptide sequences are inserted into exposed loops of the enzymes in such a way that the insertion remains compatible with activity; new enzymes having acquired an affinity for target proteins are selected; enzymes for which complex formation can induce allosteric regulation are isolated after screening.

Similar strategies have been used to target proteins and bacteriophages to mammalian cells with the purpose of developing delivery vehicles for drugs and genes.

Products and Services

- ▶ Libraries of phage displayed enzymes

Main Equipment

- ▶ High sensitivity UV-Vis spectrophotometer
- ▶ Molecular biology equipment

Representative References

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Patents

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Partnership

- ▶ Member of *Institut des Sciences de la Vie (ISV)* Louvain-la-Neuve, Belgium
- ▶ Partner in the program *Pôles d'attraction interuniversitaires (PAI)* on "Protein structure and function in the post-genomic, proteomic area"
- ▶ Partner of the European Research Training Network (RTN): European network on directed evolution of functional proteins
- ▶ Partner in the program *Actions de recherche concertées (ARC)* on "Accelerated molecular evolution of enzymes"
- ▶ UCB, Braine l'Alleud, Belgium

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Total: 15

KEY WORDS FOR R&D

cell targeting
 diagnostic tools
 directed evolution
 enzyme engineering
 immunoassays, homogeneous
 protein engineering
 transfection vectors

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