



# Biotransformation Technology

For over 10 years, Cambrex has been developing extensive expertise in enzyme-catalyzed biotransformations. Through efficient and environmentally friendly enzymatic syntheses, we are able to supply highly pure regio-, chemo- and enantioselective intermediates and APIs for the pharmaceutical industry.

Using our enzymatic technology we provide custom development and R&D screening, in addition to our pilot scale to commercial scale cGMP capability, for a wide range of chiral alcohol and chiral amine syntheses.

## INNOVATION

### Chiral Alcohols

Our proprietary toolbox contains over 160 cloned and over-expressed oxidoreductases for large scale manufacturing.

- Large volume
- High conversion and yield
- High enantiomeric excess
- Typical side reactions of chemical synthesis are avoided
- Broad substrate spectrum
- Cost-efficient at commercial scale
- Low enzyme costs
- Negligible cofactor costs

### Chiral Amines

Cambrex manufactures a wide variety of chiral amines with very high chiral purity using proprietary transaminases. All chiral amines are produced at pilot scale and most are available in large scale for commercial supply.

Via biotransformation, Cambrex has developed cost-effective processes for the commercial scale manufacture of over 120 amines including:

- Aminotetralins
- Phenyl- & Pyridylbutylamines
- Methylbenzylamines
- Phenylpropylamines
- Polyfunctional amines
- A broad range of other amines

**Please refer to our Product List for a complete listing of chiral amines.**



Call Cambrex today

**+1-866-286-9133**  
in North America

**+46 586 783110**  
outside North America

[www.cambrex.com](http://www.cambrex.com)

## EXPERIENCE

### Custom Development

Cambrex provides custom biocatalytic process development to meet your needs:

- Synthesis development
- Analytical development
- In-house process safety testing
- Technology laboratory (to 10 L scale)
- Kilo lab and kilo scale manufacturing capabilities
- Pilot plants
- Methodology for performing custom development projects is well-established
- Development of processes transferable to multi-ton scale
- Efficient technology transfer
- Process development from enzyme search to pilot scale process (100 L reaction volume)

### Our expertise includes:

- Molecular biology
- Cloning
- Over-expression of oxidoreductases
- Process development in biocatalysis using oxidoreductases
- Ability to work with a variety of organisms

## PERFORMANCE

### Screening Services for Chiral Alcohols and Chiral Amines

Services include:

- Collection of new enzyme strains (up to 100 strains)
- Cultivation and screening of enzyme candidates
- Execution of exclusive cooperation deals with x strains
- Development of chiral intermediates and APIs via enzymatic routes
- Screening service of the entire Cambrex proprietary library of enzymes
- Manufacture of commercial volumes of enzymes
- Development of licensing agreements to manufacture chiral products with identified enzyme(s)
- Screening for new enzymes and development of chiral products under cooperative agreements
- Manufacturing chiral alcohols and amines under custom development agreements

Typical screening services timeline:

- Screening/feasibility study (5-7 days)
  - Screening enzyme candidates
  - Determination of solubility requirements
  - Proof of product formation
  - Determination of enantiomeric excess
  - Selection of optimal enzyme
- Process development optimization (2-3 weeks)
  - Assess bioreduction parameters
  - Sample reduced product
  - Evaluate small-scale process technology for feasibility
- Individual license agreement

