

CLAIMS

1. An isolated cytochrome P450 monooxygenase comprising or consisting of an amino acid sequence at least 80% identical to SEQ ID NO: 1, wherein said sequence comprises a threonine at position corresponding to position 225 of SEQ ID NO:1 and an aspartic acid at position corresponding to position 289 of SEQ ID NO:1.
2. The enzyme according to claim 1, consisting of the sequence SEQ ID NO: 1.
3. An isolated nucleic acid which comprises or consists of a nucleotide sequence encoding an enzyme as defined in claims 1 or 2.
4. A vector comprising a nucleic acid as defined in claim 3 which is operatively associated with expression control sequences.
5. The vector according to claim 4, further comprising a nucleic acid sequence encoding adrenodoxin (Adx) and/or a nucleic acid sequence encoding adrenodoxin reductase (AdR).
6. A host cell containing a nucleic acid as defined in claim 3 or a vector as defined in claims 4 or 5.
7. The host cell according to claim 6, which is a genetically engineered microorganism.
8. The host cell according to claim 6 or 7 which is *Saccharomyces cerevisiae*.
9. A genetically engineered microorganism capable of converting a substrate selected from the group consisting of polycyclic and unsaturated mono alcohols having an aliphatic side chain such as cholesterol, a cholesterol analogue and a cholesterol derivative, into a steroid hormone precursor, wherein said microorganism comprises a nucleic acid as defined in claim 3, and optionally a nucleic acid sequence encoding adrenodoxin (Adx) and/or a nucleic acid sequence encoding adrenodoxin reductase (AdR).
10. An *in vitro* method for preparing an enzyme as defined in claims 1 or 2, said method comprising the steps of:
 - a) culturing a host cell as defined in any one of claims 6 to 8 under conditions suitable to obtain expression of the enzyme as defined in claims 1 or 2 and
 - b) recovering the expressed enzyme.

11. Use of an enzyme as defined in claims 1 or 2 for producing a steroid hormone precursor.

12. A method for producing a steroid hormone precursor, comprising the steps of:

- a) providing a microorganism as defined in any one of claim 7 to 9,
- b) culturing said microorganism under conditions allowing the expression of an enzyme as defined in claims 1 or 2,
- c) contacting the microorganism culture obtained at step b) with a substrate selected from the group consisting of polycyclic and unsaturated mono alcohols having an aliphatic side chain such as cholesterol, a cholesterol analogue and a cholesterol derivative, in conditions allowing the production, by the microorganism, of a steroid hormone precursor from said substrate, and
- d) recovering the steroid hormone precursor produced.

13. A method for producing a steroid hormone precursor, comprising the steps of:

- a) contacting an enzyme as defined in claims 1 or 2 with an isolated adrenodoxin (Adx) polypeptide, an isolated adrenodoxin reductase (AdR) polypeptide and a substrate selected from the group consisting of polycyclic and unsaturated mono alcohols having an aliphatic side chain such as cholesterol, a cholesterol analogue and a cholesterol derivative in conditions allowing the transformation of said substrate into a steroid hormone precursor, and
- b) recovering the steroid hormone precursor obtained.

14. The method according to claim 12 or 13, wherein the steroid hormone precursor is pregnenolone.