Claims

1. An isolated genetically engineered yeast cell, wherein the cell has been transformed by at least one polynucleotide molecule;

the at least one polynucleotide molecule comprising lipoic acid pathway genes comprising *LIP2, LIP5, GCV3, LPA*, and one or both of *SAM1* and *SAM2*, operably linked to at least one promoter,

wherein the lipoic acid pathway genes are expressed in mitochondria by virtue of a mitochondrial targeting peptide (MTP),

wherein at least one of the lipoic acid pathway genes is heterologous and said genetically engineered yeast cell is capable of increased production of free lipoic acid compared to a non-transformed cell.

2. The isolated genetically engineered yeast cell of claim 1, wherein the one or both of SAM1 and SAM2 is from a cell selected from a group comprising Kluyveromyces, Candida, Pichia, Yarrowia, Debaryomyces, Saccharomyces spp., and *Schizosaccharomyces pombe*.

3. The isolated genetically engineered yeast cell of claim 1, wherein the mitochondrial targeting peptide (MTP) is from yeast cytochrome c oxidase subunit IV (COX4).

4. The isolated genetically engineered yeast cell of any one of claims 1 to 3, wherein the yeast is selected from a group comprising Kluyveromyces, Candida, Pichia, Yarrowia, Debaryomyces, Saccharomyces spp., and *Schizosaccharomyces pombe*.

5. The isolated genetically engineered yeast cell of any one of claims 1 to 4, wherein said at least one promoter is a constitutive promoter.

6. The isolated genetically engineered yeast cell of any one of claims 1 to 5, wherein said lipoic acid pathway genes are expressed from one or more plasmids.

7. The isolated genetically engineered yeast cell of any one of claims 1 to 6, wherein at least one of said lipoic acid pathway genes is integrated into the yeast genome.

8. The isolated genetically engineered yeast cell of any one of claims 1 to 7, wherein the LPA is from *Enterococcus faecalis* (EfLPA).

9. The isolated genetically engineered yeast cell of any one of claims 1 to 8, wherein the *LIP2, LIP5, GCV3, LPA,* and one or both of *SAM1* and *SAM2* genes respectively encode an amino acid sequence comprising SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 5, SEQ ID NO: 7, SEQ ID NO: 9 and/or SEQ ID NO: 11.

10. The isolated genetically engineered yeast cell of claim 9, wherein the *LIP2, LIP5, GCV3, LPA,* and one or both of *SAM1* and *SAM2* genes respectively comprises a polynucleotide sequence having at least 80% sequence identity, at least 90% sequence identity or 100% sequence identity to SEQ ID NO: 2, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 10 and/or SEQ ID NO: 12.

11. A recombinant expression vector comprising one or more heterologous lipoic acid pathway genes defined in any one of claims 1 to 10*,* operably linked to a promoter, wherein an expressed protein from said pathway genes is located to the mitochondria.

12. The recombinant vector of claim 11, wherein said promoter is a constitutive promoter.

13. A method of producing free lipoic acid in a genetically engineered yeast cell, comprising the steps:

a) culturing a plurality of genetically engineered yeast cells of any one of claims 1 to 10 in medium under conditions for lipoic acid biosynthesis, and

b) supplementing the medium with cysteine,

wherein said genetically engineered yeast cell is capable of increased production of free lipoic acid compared to a non-transformed cell.

14. The method of claim 13, wherein the medium is supplemented with cysteine at a concentration of at least 0.05 mg/ml, at least 0.1 mg/ml, at least 0.2 mg/ml, at least 0.5 mg/ml or in the range from 0.05 mg/ml to 0.7 mg/ml, preferably in the range 0.1 mg/ml to 0.4 mg/ml.

15. The method of claim 13 or 14, further comprising isolating said free lipoic acid.

16. The method of claim 13, wherein the engineered yeast cell is *Saccharomyces cerevisiae.*