**Background**

Lignin is the second most abundant organic polymer in nature. Its efficient utilization plays a critical role in the viability and profitability of biofinerories that process lignocellulosic biomass. Adipic acid is the commercially most important dicarboxylic acid in petrochemical industry. It has a market volume of 2.6 million tons per year with an annual demand growth forecast of 3-3.5% globally. Adipic acid is used almost exclusively in the manufacturing of nylon 6,6, one of the most widely used thermoplastics. To sustain the production of adipic acid from renewable resources also eliminates the utilization of a carcinogenic, benzene, as the starting material and the emission of greenhouse gas, nitrous oxide (N2O) (Figure 1).

**Probing Key Metabolic Node**

β-Ketoadipoyl-CoA is the key metabolic node for directing carbon flux from the central metabolism into the biosynthesis of adipic acid. We studied its metabolism in KT2440 strains with genetic deletions.

**Engineering Carbon Source Utilization**

We examined effects of the deletion of global carbon utilization regulator, crc, on carbon source utilization by KT2440 strains. Abbreviation, AA, adipic acid.

**Conclusions**

- Pathway crosstalk is discovered in the metabolism of β-keto adipoyl-CoA. PaaJ enzyme in the phenylacetic acid degradation pathway also functions in the utilization of this CoA molecule.
- Elimination of the Crc regulator has minimal effect on the co-metabolism of sugar and aromatics, but reduces cell growth.
- Engineered KT2440 strains successfully produced adipic acid from model compounds of lignin degradation. The highest titer is 1.48 mM (6.4% yield) by using a pathway integration strain.

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**De novo Biosynthesis of Adipic Acid**

The biosynthesis of adipic acid was studied using strains that expressed the heterologous pathway from plasmids or from the genome.