Construction of *Escherichia coli* mutants that could produce different structures of lipid A

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Lipopolysaccharide, known as endotoxin, is the main component of outer membrane of most Gram-negative bacteria. It can be recognized by immune cells, resulting in serious endotoxin shock. Lipid A is responsible for the bioactivity of endotoxin. The LPS with special structure of lipid A exhibits lower toxicity of endotoxin, which can be used as vaccine adjuvant. Here a method using *Escherichia coli* to produce attenuated lipid A was established. An *E. coli* mutant HW000 was constructed by knocking out a gene lacI on the genome of *E. coli* W3110, and used as a base strain. At the lacZ site in the genome of HW000, the lpxE gene was inserted to construct the strain HW001, and the genes pagL, pagP and lpxE were inserted to construct the strain HW002. HW003 was further constructed by deleting the lpxM gene in HW001. The structure of lipid A product in these mutants were analyzed by thin layer chromatography and electro-spray ionization mass spectrometry. HW001 could produce MPLA; HW002 could partially produce MPL; HW003 could produce 1-Dephospho-3'-myristoyl-lipid A (a type of detoxified lipid A). This study provides a new way to produce lipid A with special structures and is important for the development of novel lipid A vaccine adjuvants.