Peptidoglycan (PG) synthesis interruption in *ΔmrcB* mutant disturbs the bacterial envelope assembly and induces the ECA biosynthesis in *Escherichia coli cells*

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The envelope of Gram-negative bacterium is especially complex and contains two membranes with a thin layer of peptidoglycan (PG) exoskeleton sandwiched in between them. These structures play a key role in maintaining cellular integrity and offer protection from external abuses. Most of our best antibiotics such as penicillin and vancomycin block the biosynthesis of the bacterial envelope and cause cell lysis. Indeed, bacterial envelope biogenesis is one of the best sources of bacterial targets for antibacterial development, because it involves factors that are unique to bacteria and are important for bacterial physiology. In order to determine the role of PG synthesis in envelope biogenesis, *E. coli* WT cells and *ΔelyC* and *ΔmrcB* mutants were grown in LB medium 37°C and 22°C. After that, the hydroxyl radical level was measured by the Flow cytometry (FACS). RNA extraction and purification was achieved and transcriptional analysis by RT-PCR was performed. Then, *murA, mrcB and uppS* genes expression was measured. Our results were shown that these genes were overexpressed at low temperature in WT cells, and highly expressed in *ΔelyC* and *ΔmrcB* mutants. These results show the role of PG and/or ECA synthesis at low temperature. We, therefore observed that the ECA biosynthesis genes was expressed in the WT cells of *E. coli* at low temperature 22°C, and more expressed in *ΔelyC* and *ΔmrcB* mutants associated with the overexpression *of uppS* gene. In addition, uppS gene was too up-regulated at 37°C and 22°C in *ΔelyC* and *ΔmrcB* mutants. So, in the absence of PG synthesis, the lipid carrier Und-P can be produced for the cell wall or more precisely ECA or another polysaccharides biosynthesis. Our results confirm that the cells lacking either of these PBPs are viable, but the simultaneous inactivation of both factors results in rapid lysis and cell death. In addition, the overexpression of ECA biosynthetic cluster, *mrcB* and *uppS* genes in *ΔelyC* mutant confirms the competition between the PG and ECA synthetic pathways for the lipid carrier Und-P. Taken together, these findings suggest that *ΔmrcB* mutant can increase the ECA biosynthesis in the absence of PG synthesis. These results reveal the role of PBP1b protein in the envelope biogenesis correlated with ECA biosynthesis.

Speaker Biography

Khadidja Senouci-Rezkallah received the License (DEA) degree from Mustapha Stambouli University, Biology department, Mascara, Algeria in 2005, Master's degree in Microbiology and Biochemistry from Aix-Marseilles III University, Faculty of Saint-Jerome Marseille, France. After that, she received her PhD degree from Aix-Marseille III, Faculty of Saint-JeromeMarseille, France. The area of her research is microbiology and molecular biology on physiological and molecular characterization of acid tolerance response of *Bacillus cereus*. From 2009 to 2013, she worked as Assistant Professor-Researcher at Mascara University, Algeria. She worked on the characterization of the response to acid and heat stress in bacteria responsible to food-borne illness (*E. coli*, *Stapylococcus aureus* and *B. subtilis*).

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