# Full-length recombinant production of human CDKL5 protein in Antarctic marine bacterium *Pseudoalteromonas haloplanktis*

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A small amount (about 5%) of Rett syndrome patients, frequently characterized by early-onset epilepsy, carries a mutation in the X-linked gene Cyclin-Dependent Kinase-Like 5 (CDKL5). Although belonging to a well conserved family of kinases, structural and functional characterization of CDKL5 is still in its early stages, greatly limiting our understanding of its role in neuron development, plasticity, and pathology [1]. Indeed, due to its kinase domain, CDKL5 has been reported to regulate the activity of crucial downstream proteins (MeCP2 among others) by direct phosphorilation. Furthermore, when the interaction between CDKL5 and PSD-95 at the synaptosomes is impaired, dendritic spine formation and growth are heavily inhibited, thus contributing to the pathogenesis of CDKL5-related disorders. Therefore, the set up of a system for the recombinant CDKL5 production is required, to be used either for structural/functional studies or in a future replacement therapy. However, all previous attempts to achieve its full-length production in conventional prokaryotic systems (*Escherichia coli*) failed. Therefore, the recombinant production of human CDKL5 isoform 115 was carried out in the Antarctic marine bacterium *Pseudoalteromonas haloplanktis* TAC125, a novel and promising cell factory successfully used for the production of difficult-to-express eukaryotic proteins [2]. Several genetic systems and growth conditions were explored looking for best production conditions. The successful full-length CDKL5 production was obtained growing the recombinant cells at -5°C, a subfreezing temperature in which the recombinant protein was totally soluble.

Selected references

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