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Hypothetical proteins: Can they be the next drug targets?

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Hypothetical proteins also known as orphan proteins can be found across all genomes of all taxa of life. Despite their considerable number in any given genome their functional presence and significance is rarely investigated due to their sequence and structural dissimilarity to well-characterized proteins. This further poses challenges on the right approach to be adopted and streamlined when studying these proteins. Using a combination of both genomics and bioinformatics approaches; we streamlined our efforts in mining for hypothetical proteins which are deemed functionally significant, specifically of medical relevance to be used as potential drug targets in the future. Using the locally isolated *Bacillus lehensis* G1 alkaliphile as a model, 1,202 hypothetical proteins encoded by its genome were thoroughly analyzed using several bioinformatics tools to determine their sequence identity the presence of functional domains, cellular localization and metal-binding properties among many others. A hypothetical proteins cluster was accordingly developed based on these data and several hypothetical proteins deemed to be involved in significant processes such as metal-trafficking and antibiotics-degradation/resistance were identified from the cluster. Prediction on their structures, functions and mechanisms were subsequently achieved via in silico protein modeling and docking approaches. Results obtained from this integrated study do reveal that the selected hypothetical proteins have high possibility in carrying our metal-to-protein trafficking and conferring antibiotics-resistance. Such case studies on these orphan proteins highlighted in this present work point to the interesting and very promising notion of using them as the next potential drug targets.

Biography

Normi Mohd. Yahaya has completed her PhD at the age of 25 from RIKEN Institute and Universiti Sains Malaysia in Molecular Genetics specializing on protein engineering under the RIKEN-Asia Joint Graduate School Program. She later pursued her Postdoctoral training in the area of structural biology, specifically in protein Nuclear Magnetic Resonance (NMR) in Institut National Polytechnique de Lorraine, Nancy, France under Center National de la Recherche Scientifique (CNRS). She has won several awards of merit including PACIFICHEM 2010, Young Scholar Award and was one of the selected young scientists for the 60th Meeting of Nobel Prize Winners with Young Scientists in Lindau, Germany.

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