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Moonlighting proteins and diseases associated with them

Asweeta Sinha

Proteins are polymers of amino acids. They perform various functions inside the body, which include repairing tissues, metabolism, transportation of micro molecules or atoms within cells, etc. Each protein has a specific function but in contrast to normal single functional proteins, multi-functional proteins have been identified, which are made of a single polypeptide chain performing several autonomous functions that might be multi-catalytic or binding activity. Moonlighting proteins are a special form of multi-functional proteins; glyceraldehyde 3Ã¢â‚¬Â•phosphate dehydrogenase (GAPDH) is considered as a typical example of a protein with moonlighting characteristics. These proteins are mainly formed by mutation of conformational changes that results in performing functions of the other protein along with the previous one. Owing to these conformational changes, they bind to a new promoter, changing the design of transcription in a gene. These moonlighting proteins then get aggregated as they become insoluble oligomers after the conformational changes and result in neurodegenerative diseases, such as Alzheimer's disease and Parkinson's disease. Moonlighting proteins have been researched to play a key role in various other diseases besides neurological disorders, for example, in host cell invasion. Accordingly, enhancing or blocking the moonlighting functions could be studied as a target for future drug design. For this, intensive research on moonlighting functions of proteins at the molecular level is necessary.

Keywords: Moonlighting proteins, Neurodegeneration, Multifunctional proteins, Neurological diseases

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