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Diversity of 2-oxoglutarate dependent dioxygenases dictates their synergistic association in modifying cell physiology

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The alpha-ketoglutarate dependent superfamily of non-haem iron (II) dioxygenases can, as a unit, influence system-level function of a cell. This novel representation mandates the interplay of the substrates transformed and reaction chemistry of the catalysts themselves.

The superfamily, by definition, comprises members from all major taxa, and participates in neutralizing the effects of several forms of abiotic stress, viz., pesticides, hypoxia, and osmotic. The oxidative decarboxylation of 2-oxoglutarate to succinate is coupled with a concomitant substrate hydroxylation and, is in most cases, followed by an additional specialized conversion. The domain profile of predicted protein sequences (DB2OG; over 3800 sequences) was used as an index of diversity, and interpreted alongside existent kinetic data in a linear model of integrated function. The coefficients were determined using a Monte Carlo approach. The data suggests that 2OG-dependent enzymes incorporate several desirable features of a systems-level player.

Biography

Siddhartha Kundu has done his MD (All India Institute of Medical Sciences, New Delhi, INDIA) and MBBS (University College of Medical Sciences, New Delhi, INDIA). His research interest includes Theoretical Systems Biology, Mathematical modelling, Mathematical and Computational Chemistry.

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