
Key developmental and regulatory proteins use intrinsically disordered protein (IDP) regions to carry out crucial functions, for example to intramolecularly regulate their own functions via auto-inhibitory domains or to bind to and regulate the functions of their DNA, RNA and/or protein partners. For all of the developmental and regulatory proteins examined so far, these interactions are altered or modulated by both alternative splicing (AS) and by post-translational modification (PTM), both of which map to the IDP regions. During development, both AS and PTM in IDP regions have been shown to be tissue-specific. Thus, both AS and PTM located within IDP regions “rewire” protein-protein and gene-regulatory networks and pathways in a tissue-specific manner. Given these observations, we propose that IDP, AS, and PTM working in concert provide a toolkit that underlies (enables?) both the evolution of multicellular organisms and the developmental biology of individual multicellular organisms.

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John A. Burns School of Medicine, Kaka’ako Campus
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