RNA-Binding Proteins in Action: From Molecular Switches to Therapeutic Targets in Lung Fibrosis

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RNA-binding proteins (RBPs) are master regulators of gene expression, orchestrating RNA processing, stability, transport, and translation with remarkable precision. By recognizing distinct RNA sequences and structures, RBPs govern the fate of mRNAs and thereby safeguard cellular adaptation under stress and dynamic environmental changes. Their dysregulation has emerged as a central driver in the pathogenesis of devastating diseases, including neurodegeneration, cancer, and metabolic disorders, positioning RBPs as critical molecular switches between health and pathology. In our work, we uncovered previously unrecognized roles of RBPs in interstitial lung diseases, identifying a pivotal regulator of fibrotic signaling. Utilizing advanced 3D disease models, we provide compelling evidence that targeted modulation of RBPs through antisense-based strategies represents a powerful therapeutic opportunity. This line of investigation not only illuminates fundamental molecular mechanisms but also establishes a transformative bridge between basic scientific discovery and clinical translation, paving the way for innovative therapies in fibrosis.