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Exploring circRNAs in cancer: Nanopore sequencing for MHC presentation insights

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Background: Circular RNAs (circRNAs) have emerged as significant players in the regulation of immune responses and cancer biology. These non-coding RNAs can influence various cellular processes, including the presentation of major histocompatibility complex (MHC) proteins, which are crucial for immune recognition in cancer and allergic reactions. Our study aims to explore the involvement of circRNAs in modulating MHC protein presentation.

Method: Our research is in the early stages. We have successfully extracted high-quality RNA from cultured PANC-1 cell lines and have practiced poly(A) enrichment to focus on mRNA and circRNA populations. We are currently working on optimizing nanopore sequencing technology to sequence RNA, with the goal of sequencing circRNAs in the near future. Bioinformatics tools will be employed to identify candidate circRNAs that interact with MHC-related transcripts. Experimental validation will follow, utilizing RNA immunoprecipitation and RNA pull-down assays to confirm these interactions. Functional assays are planned to manipulate circRNA levels and assess their impact on MHC protein expression and immune cell activation. Computational modeling will be used to simulate the dynamics of circRNA-mediated regulation within cellular contexts.

Results: The preliminary results include the successful extraction of high-quality RNA from PANC-1 cell lines and effective poly(A) enrichment. These foundational steps set the stage for subsequent sequencing and analysis.

Conclusion: This research aims to uncover the regulatory mechanisms by which circRNAs modulate MHC protein presentation. Understanding these interactions could provide new insights into immune evasion strategies employed by cancer cells and the hyperactive immune responses seen in allergic reactions. This work lays the foundation for future studies and the development of RNA-based therapeutics targeting circRNA interactions to enhance immune responses against cancer.