tRNA Revolution: Advances in tRNA-Based Therapies

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What is tRNA?
Transfer RNAs (tRNA) act as an intermediate molecule in cellular protein synthesis process. tRNA molecules are responsible for interpreting the information contained in the sequence of messenger RNA (mRNA) to accurately translate the genetic information stored in DNA.

Role of tRNA in the cell
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A single tRNA therapeutic can target many different diseases
Diseases on traditionally organized by clinical presentation and underlying baseline path.

● Some diseases are caused by a single mutation that may overlap with other diseases, e.g., two different diseases in two different patients from the same mutation.
● tRNA therapeutics would make it possible to target only that mutation, effectively treating anyone with that single mutation, no matter the disease.

Summary
- tRNAs vary in supply and demand based on the codons required.
- If there are too few of a rare tRNA, translation will be slower, which can cause decreased protein output and misfolded proteins.
- tRNA pool therapeutics adds in the rarer tRNAs to increase translation speed.
- tRNA-based medicines are under development.
- tRNA therapeutics offer hope to patients who are suffering from rare and ultra-rare diseases.