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Decreasing the ratio non-specific to specific miRNA amplification using a stem loop template

MicroRNA are small endogenous noncoding molecules of only 19-23 nucleotides in length. These tiny molecules play an important role in many processes in the human. Due to their limited length, miRNA sequences are very difficult to reliably detect and quantify. One possible detection method, exponential amplification reaction (EXPAR), is already being used for miRNA detection, viral DNA detection, and genomic DNA detection. The amplification process is specific and non-specific, the non-specific amplification makes it difficult to study the molecule of interest. More specific miRNA amplification would lead to a greater understanding of miRNA function in pathological processes would enable earlier disease diagnoses and potentially provide new therapies. On site diagnosis of miRNA for disease detection would be a breakthrough for biomedical research. One way to increase the specific rate of miRNA amplification is to use a stem loop template. The stem loop will help prevent the non-specific amplification of the molecule low, until the specific trigger molecule is present to initiate amplification. Altering enzyme, loop, dNTP, and magnesium concentrations were done to determine the best reaction environment. A matlab model was also created to model the reaction and determine how changing different concentrations affected the reaction.