GENETIC ENGINEERING TECHNOLOGIES AND DETECTION OF GENE EDITING

Building Genes From Scratch: A Cost And Time Assessment Of Novel Enzymatic Dna Synthesis Technology (abstract For Cbs, Roman Hernandez)

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Phosphoramidite chemistry has been the gold standard for making synthetic DNA for 40 years, but a recent competitive technology has emerged using an enzymatic approach to DNA synthesis. The Syntax STX-100 from DNAScript utilizes a specialized Terminal Deoxynucleotidyl Transferase enzyme to add reversibly terminated nucleotides to the 3' end of the lengthening oligomer. This enzymatic process enables tight control over each step of synthesis and eliminates the multiple capping and deprotection steps required in prototypical chemical oligonucleotide synthesis while also eliminating the large organic waste stream. Here we evaluate this novel enzymatic DNA synthesis technology (Syntax STX-100) along-side a chemical DNA synthesizer (MerMade 192e) and compare them to commercially purchased synthetic 55-90 bp oligos (IDT) to assemble the gene (717bp) encoding Green Fluorescent Protein (GFP). In this assessment we consider cost, time of assembly and precision/accuracy of sequences in building gene blocks using each technology. As the field of synthetic biology continues to grow, the ability to produce specific DNA sequences rapidly, efficiently, and inexpensively can provide a variety of solutions to the Warfighter across many applications.