Assembly of Full-Length Genes from DNA Arrays

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WARF: P120014US02

Inventors: Lloyd Smith, Cheng-Hsien Wu

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in RNA-mediated gene assembly using oligonucleotides on a DNA array.

Overview

The ability to chemically synthesize single-stranded oligonucleotides has had a profound impact on research and medicine. Yet existing strategies have their limitations. One critical limitation is the short length of the molecules that can be synthesized, as determined by the stepwise reaction yield, typically resulting in oligonucleotide sequences shorter than about 100 nucleotides. What is needed in the community is the ability to synthesize complete, full length, double-stranded genes rapidly and inexpensively.

There has been much interest in exploiting for this purpose the large number of oligonucleotides that can be made in parallel on DNA arrays. Several approaches have been described in the literature, with varying degrees of success. A major problem has been the complexity of the strategies employed. Such assembly-based strategies for gene synthesis remain expensive, time-consuming and inaccessible.

The Invention

UW–Madison researchers have developed a method to produce full-length genes using RNA intermediaries that are produced by run-off transcription from DNA array features. Specifically, an RNA polymerase promoter is appended to the surface-bound oligonucleotides. RNA copies are produced using T7 RNA polymerase and then self-assembled into full RNA transcripts by hybridization and ligation. The RNA transcripts can readily be converted into their corresponding genes using RT-PCR (reverse transcription polymerase chain reaction). These genes then may be employed to express the encoded protein of interest.

Applications

- Creating full-length genes and proteins using a DNA array
- Protein expression, research tools, diagnostics and therapeutics

Key Benefits

- Synthesis takes days, not weeks.
- Cuts labor and costs
- Few sequence errors

Additional Information

For More Information About the Inventors

- Lloyd Smith

Related Technologies

- WARF reference number P00262US describes biomolecular arrays with surfaces made of modified carbon, silicon and germanium.

Tech Fields

- Research Tools : Arrays
- Research Tools : DNA & RNA tools

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854