**Trna Handles**

Tech ID: 33269 / UC Case 2014-725-0

**BACKGROUND**

**TECHNOLOGY DESCRIPTION**

tRNA is notoriously difficult to manipulate. Sequencing of tRNA presents various problems because of complex and tightly bound secondary structures and associated proteins. Current methods of tRNA analysis include RNA sequencing, microarray analysis and mass spectrometry. Each has limitations, however. RNA sequencing requires extensive library preparation and PCR amplification followed by a reverse transcription step. This results in the loss of the original RNA strand and its secondary structure. Reverse transcription is also impeded by the structural and nucleotide modifications that commonly occur in tRNA’s. These so-called RT stops result in truncated cDNA.

tRNA can be sequenced with nanopore sequencers, so long as they can be unfolded and electrically attracted to the nanopore. So a mechanism to capture tRNA molecules, unfold them, and initiate threading them into a nanopore is needed.

**APPLICATIONS**

The invention includes attaching DNA or RNA “handles” to a tRNA molecule. These handles allow manipulation of the tRNA molecule, including unfolding its structure and acting as targets for attaching other molecules to the tRNA.

One example is a double stranded oligonucleotide adapter that can be ligated to a tRNA from a biological sample. Such an adapter can be a Y shaped double stranded DNA-RNA adapter with a 3’ RNA overhang complementary to the CCA tail present in tRNA. The adapter can also include a cholesterol tag within its 3’ end.

Examples of sequences used in oligonucleotide adaptors include:

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CTCACCTATCCCTCAXCAXCATACTATCATCTXTCAGATCTCAGACTAUCUGGU
GATXGTGAGATCTGATTTTTTTTTTTTTTTZ
GATAGTGAGATCTGATTTTTTTTTTTTTTTZ
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CTCACCTATCTTCCACTGATTACATTGCTCTGAGATCTCACTAUCUGGU

GATXGTGAGATCTGATTTTTTTTTTTTTTTZ

CTCACCTATCTTCCACTGATTACATTGCTCTGAGATCTCACTAUCUGGU

X indicates an abasic 1'2' dideoxyribose; Z indicates a triethylene glycol cholesterol

**ADVANTAGES**

Molecular adaptor that facilitates tRNA sequencing by nanopore

Rapid identification of tRNA species in a biological sample

**INTELLECTUAL PROPERTY INFORMATION**

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Additional Patent Pending

**RELATED MATERIALS**

**ADDITIONAL TECHNOLOGIES BY THESE INVENTORS**

- Software Tool for Predicting Sequences in a Genome that are Subject to Restriction or Other Surveillance Mechanisms
- Salt-Tolerant DNA Polymerases