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(54) Title: MOLECULAR ANALYSES USING LONG CELL-FREE FRAGMENTS IN PREGNANCY

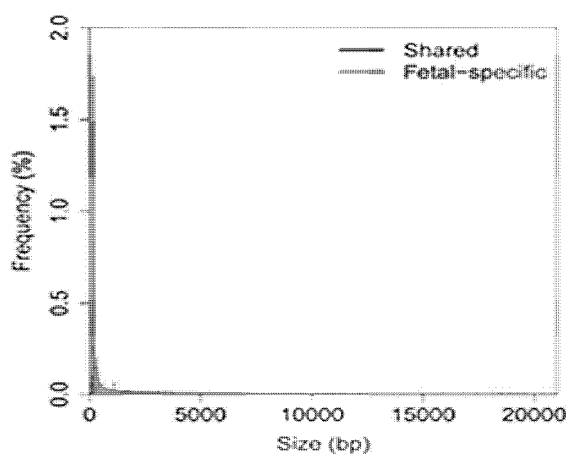


FIG. 4A

(57) **Abstract:** Methods and systems described herein involve using long cell-free DNA fragments to analyze a biological sample from a pregnant subject. The status of methylated CpG sites and single nucleotide polymorphisms (SNPs) is often used to analyze DNA fragments of a biological sample. A CpG site and a SNP are typically separated from the nearest CpG site or SNP by hundreds or thousands of base pairs. Finding two or more consecutive CpG sites or SNPs on most cell-free DNA fragments is improbable or impossible. Cell-free DNA fragments longer than 600 bp may include multiple CpG sites and/or SNPs. The presence of multiple CpG sites and/or SNPs on long cell-free DNA fragments may allow for analysis than with short cell-free DNA fragments alone. The long cell-free DNA fragments can be used to identify a tissue of origin and/or to provide information on a fetus in a pregnant female.

[Continued on next page]

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