

S013 Multiple Displacement Amplification (MDA) of genomic DNA: detection and genetic analysis from samples with low DNA content and single cell sequencing

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Multiple Displacement Amplification (MDA) can be used to amplify DNA from minute specimens, including individual cells, enabling detection and genomic analysis. MDA uses random primers to amplify as few as a single copy of DNA template in an isothermal, strand displacement based reaction. The method has been used with tissues, biological fluids, and environmental samples like soil. Valuable DNA collections can be restored by amplification from nearly depleted wells. MDA is used by DNA sequencing centers to amplify plasmids directly from cell cultures as part of their high throughput pipeline for genomic sequencing. Genomic sequencing from single cells is enabling powerful strategies to discover and analyze new microbial species (Lasken RS, 2007, *Current Opinion in Microbiology*, 10:1-7). DNA is amplified more than a billion-fold from the few femtograms present in a bacterium yielding micrograms of DNA for use in sequencing (Raghunathan A, Ferguson, H.R., Bornarth, C.J., Driscoll. M., and Lasken, R.S. (2005) *Applied and Environmental Microbiology* Vol. 71, 3342-3347). Any cell isolated from the environment is now accessible for genomic analysis with no need to culture them. High throughput methods can be used to sort thousands of individual cells and rapidly screen their amplified DNA for taxa and genotypes of interest. Analysis of the human microbiome will be discussed for a variety of clinical specimens including gut, lung, adenoids, and skin.