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Abstract

DNA obtained by *ab initio* synthesis forms hyperbranched net-like structure †

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Abstract: *Ab initio* DNA synthesis is unusual synthesis of dsDNA from tens bp to kbp long by thermophilic DNA polymerases from free dNTPs in the complete absence of added DNAs. As commonly believed, the reaction product is a linear double-stranded DNA in the B form. However, an extremely low efficiency of cloning and the failure to hydrolyze high-molecular-weight DNA, as well as the presence short repeats, palindromes, and AT-rich repeats in the sequence assumes more complex spatial structure of this DNA. The AFM coupled with nuclease analysis revealed that high-molecular-weight dsDNA products branched and formed net-like structures. The DNA contained single-stranded and triple-stranded segments. These net-like structures may be assumed to be three-dimensional (3D). The present work was the first detailed investigation of the *ab initio* synthesis products. The results may be useful to develop techniques requiring synthesis of large amounts of DNA with complex spatial structure.

Keywords: template/primer-independent DNA synthesis; DNA structures; atomic force microscopy

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