Revisiting the enzymatic activity of the T7 gene exonuclease by a high-throughput single-DNA molecule assay.

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The enzymatic activity of the T7 bacteriophage exonuclease leading to the conversion of ds DNA to ssDNA had not been yet explored by a single molecule technique. Previous bulk analyses led to a classification of this nucleic acid enzyme as non processive. We investigated the hydrolysis of duplex DNA by the T7 bacteriophage exonuclease using a biochip allowing for high-throughput Tethered Particle Motion (TPM) measurements. We obtained evidences for the processivity of the enzyme and revealed subtle characteristics of its mechanism which could not be unveiled by conventional approaches.