Preservation of amino acids from in situ[produced bacterial cell wall peptidoglycans in northeastern Atlantic continental margin sediments

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ABSTRACT: In this study we present the results of total hydrolysable amino acids (THAA) and amino acid D/L-enantiomers in northeastern Atlantic continental margin sediments. There is increasing evidence that intrinsically labile amino acids are present in old marine sediments as part of a refractory network of peptide-like material. We used amino acid enantiomers to identify the contribution of amino acids from bacterial cell walls to THAA in organic matter ranging from relatively young to 18,000 yr old. The ratio of D/L-amino acids increased with depth in the sediment mixed layer. Application of a transport-racemization-degradation model excludes a significant production of D-amino acids by racemization and implies in situ bacterial production as the main source. Amino acids associated with a refractory pool of bacterial cell walls could account for approximately one third of the THAA deeper in the sediments. We propose that in situ bacterial production and the primary flux of labile organic matter from the water column result in a small but highly reactive pool of amino acids in the surface mixed sediment only, whereas amino acids associated with refractory cell walls persist in marine sediments.