Growth of sulfate reducing bacteria on the methanogenic inhibitor BES

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The metabolism of methanogenic archaea is inhibited by 2-bromoethanesulfonate (BES). Methane production is blocked because BES is an analog of methyl-coenzyme M and competes with this key molecule in the last step of methanogenesis. For this reason, BES is commonly used in several studies to avoid growth of acetoclastic and hydrogenotrophic methanogens [1]. Despite its effectiveness as methanogenic inhibitor, BES was found to alter microbial communities' structure, to inhibit the metabolism of non-methanogenic microorganisms and to stimulate homoacetogenic metabolism [2,3]. Even though sulfonates have been reported as electron acceptors for sulfate- and sulfite-reducing bacteria (SRB), only one study described the reduction of BES by complex microbial communities [4].

In this work, a sulfate-reducing bacterium belonging to *Desulfovibrio* genus (98 % identity at the 16S rRNA gene level with *Desulfovibrio aminophilus*) was isolated from anaerobic sludge after several successive transfers in anaerobic medium containing BES as sole substrate. Sulfate was not supplemented to the anaerobic growth medium. This microorganism was able to grow under the following conditions: on BES plus H_2/CO_2 in bicarbonate buffered medium; on BES without H_2/CO_2 in bicarbonate buffered medium; and on BES in phosphate buffered medium. The main products of BES utilization were sulfide and acetate, the former was produced by the reduction of sulfur from the sulfonate moiety of BES and the latter likely originated from the carbon backbone of the BES molecule.

BES was found, in this study, to represent not only an alternative electron acceptor but also to serve as electron donor, and sole carbon and energy source, supporting growth of a *Desulfovibrio* sp. obtained in pure culture. This is the first study that reports growth of SRB with BES as electron donor and electron acceptor, showing that the methanogenic inhibitor is a substrate for anaerobic growth.

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