Macroparticle-enhanced cultivation of *Lentzea aerocolonigenes*: Variation of mechanical stress and combination with lecithin supplementation for a significantly increased rebeccamycin production

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June 12, 2021

Abstract

The actinomycete *Lentzea aerocolonigenes* produces the antitumor antibiotic rebeccamycin. In previous studies the rebeccamycin production was significantly increased by the addition of glass beads during cultivation in different diameters between 0.5 – 2 mm and the induced mechanical stress by the glass beads was proposed to be responsible for the increased production. Thus, this study was conducted to be a systematic investigation of different parameters for macroparticle addition, such as bead diameter, concentration and density (glass and ceramic) as well as shaking frequency, for a better understanding of the particle induced stress on L. aerocolonigenes. The induced stress for optimal rebeccamycin production can be estimated by a combination of stress energy and stress frequency. In addition, the macroparticle-enhanced cultivation of L. aerocolonigenes was combined with soy lecithin addition to further increase the rebeccamycin concentration. With 100 g L^{-1} glass beads in a diameter of 969 µm and 5 g L^{-1} soy lecithin a concentration of 388 mg L 1 rebeccamycin was reached after 10 days of cultivation, which corresponds to the highest rebeccamycin concentrations achieved in shake flask cultivations of *L. aerocolonigenes* stated in literature so far.

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