Two roles of salicylic acid in the accumulation of polyhydroxyalkanoic acid in *Pseudomonas fluorescens* BM07 grown with mixtures of fructose and 11-phenoxyundecanoic acid: inhibition of PhaG-mediated aliphatic monomer-unit incorporation and shift of aromatic monomer-unit distribution

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Medium-chain-length-polyhydroxyalkanoic acid (MCL-PHA) formed in *Pseudomonas* spp. have a rather broad distribution of monomer-units whose precursors are supplied via -oxidation degradation of MCL fatty acids fed as the carbon source and/or via PhaG enzyme catalyzing the transformation of 3-hydroxyacyl-ACPs' derived from sugars to their coenzyme A forms. The material properties of MCL-PHA strongly depend on the length of side-chains of the constituent comonomer-units and theirdistribution. Thus, a monomer-unit ratio modulation may be necessary to improve their physical properties. We introduce a method to modulate the monomer-unit distribution of MCL-PHA to some extentusing an unmetabolizable inhibitor. It was found that salicylic acid(SA), in a concentration dependent manner, inhibited the synthesis of PHA in *Pseudomonas fluorescens*BM07 from fructose as well as shifted the distribution of monomer-units derived from a MCL fatty acid co-added as carbon source (e.g., 11-phenoxyundecanoic acid (11-POU)). For the cells grown on medium supplemented with 50 mM fructose and 3 mM 11-POU in which monomer supplying through PhaG enzyme by fructose metabolism was partially open,

addition of SA resulted in the suppression of aliphatic monomer-units, probably due to the inhibition of PhaG, but the total content of aromatic monomer-units was rather enhanced compared to the control and a significant enhancement of the content of longer aromatic monomer-units was observed. Much more significantshift was observed in the cells grown with 50 mM fructose plus 5 mM 11-POU in which aliphatic PHA synthesis from fructose was maximally suppressed by 11-POU even in the absence of SA (the total amount of incorporated aliphatic monomer-units was only ~10 mol%): 3-hydroxy-5-phenoxyvalerate, from 66 (control) to 31 mol% at 1.5 mM SA 3-hydroxy-7-phenoxyheptanoate, from 30 to 48mol%; 3-hydroxy-9- phenoxynonanoate, from 4 to 21 mol%, respectively. Thus the intervening role of SA in the accumulation of aromatic PHA in *P. fluorescens* BM07, probably resulted from the inhibition of -oxidation enzyme(s), was shifting of the aromatic monomer-unit distribution to longer units as well as significantly increasing the yield of conversion of 11-POU into PHA, which was possible only under the cometabolism of 11-POU and fructose.

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