

## Creating new functional biomaterials: construction and production of Bone Morphogenetic 2-ELP hybrid proteins

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Bone morphogenetic protein 2 (BMP-2) is a potent osteoinductive cytokine from the TGF- $\beta$  superfamily that triggers the development of stem cells into osteoblasts. Its therapeutic interest has led to the development of various production systems for recombinant variables of BMP-2. Production has been achieved in expression systems ranging from animal cells to bacteria, but is always associated with three major drawbacks: low production rates (in animal cells), low activity (bacterial cells) and low solubility due to aggregation in inclusion bodies (bacterial cells) [1].

In this study we have developed a strategy to overcome the low production levels as well as the insolubility of BMP-2 in *E. coli* by fusing it with an elastin like polymer (ELP). This recombinant ELP, based on repetitions of the main monomer VPAVG, displays no measurable cytotoxicity [2] and exhibits thermoresponsive properties as well as hysteresis behaviour [3]. By exploring this thermal responsiveness we are able to purify the fusion protein using a simple and low cost method and thus avoid expensive chromatographic techniques. The mature human-BMP2 domain was cloned in frame to the N-terminus of the (VPAVG) $_n$  ( $n = 60$  or  $220$ ) polymers. The production of the genetic constructs was achieved in *E. coli* BL21 (DE3) with Lysogeny Broth (LB) supplemented with lactose for auto-induction. Purification of the hybrid BMP2:(VPAVG) $_n$  polymers was accomplished by exploring the thermal responsiveness of the ELP tail. Physical and chemical characterization as well as bioactivity studies of both constructs are currently in progress.

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