

S05-6 Display techniques onto nano-sized bacterial magnetic particles for receptor analysis

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Magnetic particles offer vast potential in ushering new techniques, especially in biomedical applications, as they can be easily manipulated by magnetic force. Magnetic bacteria synthesize nano-sized biomagnetites, otherwise known as bacterial magnetic particles (BacMPs) that are individually enveloped by a lipid bilayer membrane. BacMPs are ultrafine magnetite crystals (50-100 nm diameters) with uniform morphology produced by *Magnetospirillum magneticum* AMB-1. Based on our elucidations on the molecular mechanism of BacMP formation in *M. magneticum* AMB-1, functional nanomaterials have been designed. Through genetic engineering, functional proteins such as enzymes, antibodies, and receptors were successfully displayed onto BacMPs. Here, I will introduce display techniques of functional proteins onto nano-sized BacMPs and its applications to ligand binding assays. Dopamine receptor, which is a member of G protein-coupled receptors, was successfully displayed onto BacMPs. This system makes possible the convenient acquisition of the native conformation of membrane proteins without the need for detergent solubilization, purification and reconstitution after cell disruption. Furthermore, estrogen receptor, which is one of nuclear receptor, was also displayed onto BacMPs. The assay using BacMPs displaying estrogen receptor could discriminate full agonists, partial agonists, or antagonists. The elucidation of the mechanism of BacMP synthesis has provided a roadmap for the design of novel nano-biomaterials that would play a useful role in multidisciplinary fields.