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Phage display technology- Potential and Applications

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Phage display involves the expression on the surface of bacteriophage of proteins, including antibodies, peptides, and more recently gene fragments - or cDNA-encoded proteins and mRNA, expanding the practical applications of the technology. The concept of the technique is the incorporation of a nucleotide sequence into a phage genome as a fusion to a gene encoding a phage coat protein. The genes encoding the protein product are found inside the virion while the protein is displayed on its surface. This technology, by allowing the assessment of billions of diverse sequences by displaying random peptide sequences on the coat protein of phage, renders a powerful means to identify peptides that function as cell-surface ligands.

Several, *in vitro* and *in vivo*, studies describe that intact cells have been used as screening targets, and peptide sequences that recognize receptors on the surface of the target cells have been identified. In this sense, we envisioned that phage display could be used to identify peptides and/or receptors that recognize and/or bind to the target cells surface and that, the resulting sequences could be used for further functionalization of micro/nano delivery systems, in order first to diagnose the disease and second to deliver the drug to the desired target, to slow down or even inhibit the progression of the disease.

The work that is being developed by our group comprises different areas of medicine ranging from regenerative medicine - osteoarthritis to cancer - colon and breast cancer, to neurosciences - Alzheimer's disease.

This lecture describes how phage display can be used and applied, using three examples developed in our own group.