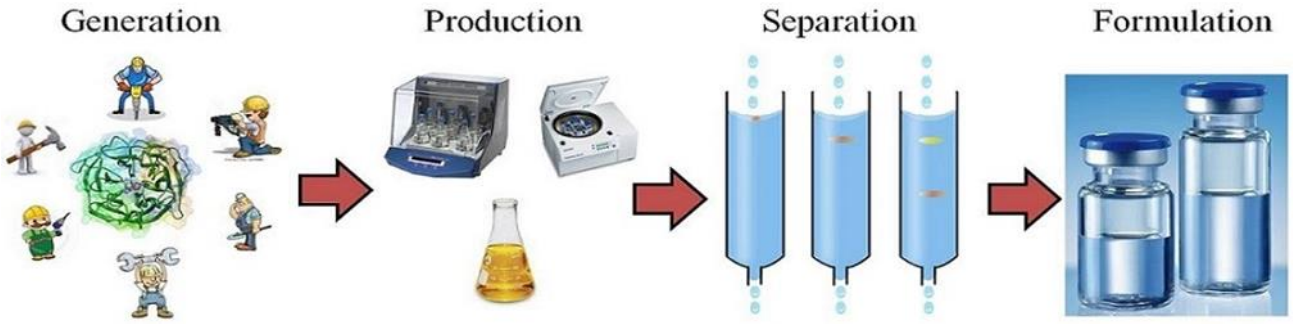
Protein Pharmaceutical Lab

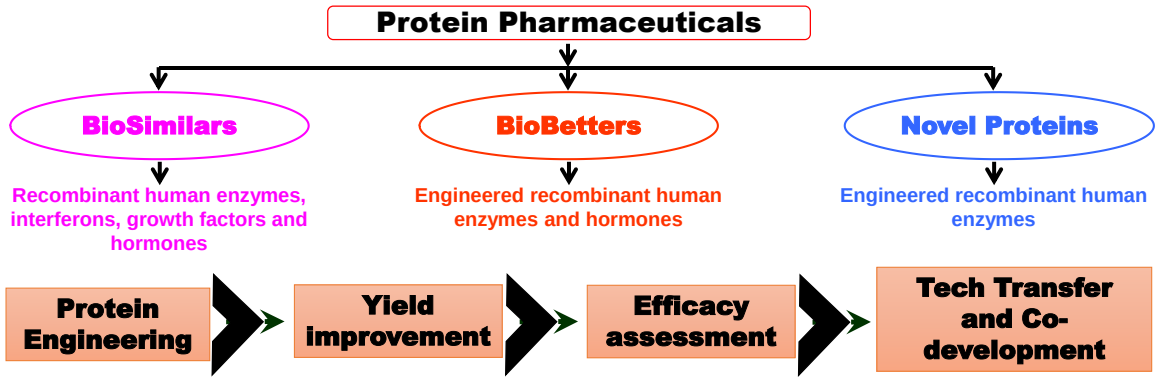


The laboratory is involved in the development of lab-scale technologies for the production of therapeutically important proteins (protein pharmaceuticals). The lab is situated in the Department of Biotechnology at the National Institute of Pharmaceutical Education and Research (NIPER), S.A.S. Nagar, Punjab, India.

The laboratory is led by **Dr. Abhay H. Pande**, Associate Professor, Department of Biotechnology, NIPER, S.A.S. Nagar. Dr. Pande has >18 years of experience in the field of protein research. He obtained his M.Sc. degree in Biochemistry in 1995 from Nagpur University, Nagpur and Ph.D. degree in Life Sciences in 2000 from D. A.V.V. Indore. Subsequently, he obtained ~5 years of post-doctoral research experience by working in national (Dr. Girish Sahni, IMTECH, Chandigarh) and international (Dr. Suren Tatulian, University of Central Florida, USA) labs. Prior to joining NIPER in 2006 he also held an academic at the Department of Biological Sciences, BITS Pilani.

CURRENT RESEARCH

Protein pharmaceuticals are mostly recombinantly-produced proteins that are used for the therapeutic purpose. Over the past decades, advance in the development of technologies for the production of protein pharmaceuticals, has brought hundreds of therapeutic proteins into the clinical applications. It is evident now that, in coming decade, the domestic as well as the international market for protein pharmaceuticals will grow rapidly and will expand its share of the entire pharmaceuticals market.



Project 1: Development of lab-scale technologies for the production of Biosimilars.

Biosimilars are recombinantly-produced protein molecules that are very similar to their 'native' counterparts in term of their biological effect(s). The main goal of this project is to develop lab-scale technologies for the coast-effective production of biosimilar using *E coli* expression system. Towards this, we have cloned and expressed a variety of biosimilar molecules (*viz.*, human enzymes, interferons, growth factors and hormones).

Project 2: Engineering Biobetters.

Biobetters are engineered version of 'native' protein molecules which possesses superior properties (*viz.*, increased circulatory half-life, reduced immunogenicity and target-specificity). The main goal of this project is to provide a clear proof-of-concept that particular engineered molecules possesses desirable properties and also a method to produce these engineered proteins. In one of the project, by using fusion technology, we are trying to develop recombinant human arginase (a promising therapeutic candidate for the treatment of several form of cancers) possessing enhanced circulatory half-life.

Project 3: Development of novel protein pharmaceuticals.

Elucidation of the role of variety of proteins in imparting protection against a variety of conditions has provided an opportunity to explore their use as a therapeutic in humans. In this project we are trying to develop human Paraoxonase 1 enzyme as a prophylactic against nerve-agent poisoning in humans. In our lab, we have not only generated novel variants of this enzyme but also developed a (lab-scale process) to produce these recombinant enzymes. By using fusion-technology we are improving the circulatory half-life of these engineered variants.

LIST OF PAPERS

50] DharamPal*, Patel, G.*, Dobariya, P., Banerjee, U.C. and **Pande, A.H**. Optimization of cultivation media composition for cell mass production of recombinant Escherichia coli SE1 expressing human interferon-β by using response surface methodology.

49] DharamPal*, Tripathy, R.K.*, Teja, M.S. Kumar, M., Banerjee, U.C. and **Pande, A.H**. Antibiotic-free expression system for the production of recombinant human interferon-beta protein.

48] Agarwal, G., Tripathy, R.K. and **Pande, A.H**. Production of recombinant human liver prolidase by in vitro refolding.

47] Iyengar, Satvik A.R. and **Pande, A.H**. Organophosphate-hydrolyzing enzymes as first-line of defence against nerve agent-poisoning: Perspectives and the road ahead.

46] Tripathy, R.K., Aggarwal, G., Bajaj, P., Kathuria, D., Bharatam, P.V. and **Pande, A.H**. Towards understanding the catalytic mechanism of human paraoxonase 1: mutagenesis and in silico studies.

45] DharamPal, Teja, M.S., Iyengar, Satvik A.R., and **Pande, A.H.** (2016) Recombinant human interferon-β: Current perspectives. **W. Journ. Pharm. Pharm. Sci.** 5, 1567-1594.

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37] Bajaj, P. and **Pande, A.H.** (**2014**) Stabilization studies on bacterially produced human paraoxonase1 for improving its shelf life. **Appl. Biochem. Biotechnol.** 172, 3798-3809.

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4. Method of production of recombinant human Interferon-β proteins (**in preparation**).

5. Method of production of recombinant human prolidase. (**in preparation**).

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