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Study Shows Sutro Biopharma's Biochemical Protein Synthesis Technology Enables Rapid Production and Scale-Up of Biopharmaceuticals

Results Published in Biotechnology and Bioengineering Demonstrate that Cell-Free Production of a Biologically Active Human Cytokine Can be Scaled-up to Commercial Manufacturing Levels

Study Featured in Journal's Spotlight Section

SAN FRANCISCO, May 19, 2011 – Sutro Biopharma, a biopharmaceutical company developing novel and biosuperior protein therapeutics with improved pharmaceutical properties, today announced that a study published in the July issue of [*Biotechnology and Bioengineering*](#) demonstrates that the company's biochemical protein synthesis technology platform enables fast and high-yield protein synthesis and scale-up with straightforward downstream purification processes.

In the study, the fully bioactive cytokine human granulocyte-macrophage colony-stimulating factor (rhGM-CSF) was produced at linearly scalable levels from frozen extract of Sutro's *E.coli*-based open cell-free synthesis (OCFS) system. The disulfide-

bonded biotherapeutic protein was produced at titers of 700 mg/L in 10 hours, demonstrating the potential of the company's technology for cGMP production.

"The study showed that Sutro's biochemical protein synthesis technology platform provides a robust, linearly-scalable system that allows the industrial production of disulfide-bonded proteins such as GM-CSF, and since the study was published, we have been able to double production efficiency per batch," said Christopher Murray, Ph.D., vice president of research at Sutro Biopharma and senior author of the publication. "The company's platform also enables the synthesis of proteins that contain site-specific non-natural amino acids as well as proteins that cannot be expressed using conventional technologies, allowing us to explore novel protein therapeutics that have been inaccessible, and even unimaginable, until now."

The authors extended and optimized the *E. coli*-based system that was developed by James R. Swartz, Sc.D., director and founder of Sutro Biopharma, to this OCFS system for high-level production of rhGM-CSF. The production capacity of the activated extract after freezing and storage at -40°C and -80°C was retained, even after multiple freeze-thaw cycles. The approach demonstrated robust protein production with more than 95 percent correctly folded multi-disulfide-bonded protein and 65 percent recovery.

The publication was also featured in *Biotechnology and Bioengineering's* Spotlight section of the same issue.

About Sutro Biopharma

Sutro Biopharma is a biopharmaceutical company that develops and designs novel protein therapeutics and biosuperiors that have site-directed modifications, including modifications incorporating non-natural amino acids. Sutro's biochemical protein synthesis technology opens up opportunities to create protein therapeutics that cannot be produced using conventional methods. Sutro's technology enables the rapid and systematic exploration of many protein drug variants to identify drug candidates. Once identified, the company can efficiently scale production to commercial levels. In addition

to developing its own drug pipeline, Sutro is collaborating with select pharmaceutical and biotechnology companies in the development of novel protein therapeutics that cannot be designed, produced or studied with current technologies.