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CHO — So What?

The October 2007 issue of *CEP* featured a 20-page Society for Biological Engineering (SBE) Special Section entitled "From Chinese Hamsters to Therapeutic Proteins," and a cute little Chinese hamster graced the cover. Some readers told us that they did not see the value in those articles, perhaps because they are not among the nearly 10% of chemical engineers involved in biological engineering.

I thought the article "Recombinant Protein Therapeutics from CHO Cells — 20 Years and Counting" in that issue did a good job of introducing chemical engineers to Chinese Hamster Ovary (CHO) cells and their use as "factories" to produce a variety of medicines known as biologics. For example, you may have seen advertisements for Enbril, Humira, and Orencia — rheumatoid arthritis drugs that are produced by CHO cells. Indeed, CHO cells are the manufacturing machinery for roughly 70% of all recombinant protein therapeutics produced today, with total worldwide annual sales of more than $30 billion.

So even if your chemical engineering career is headed down a very different path, this topic might interest you because, given the widespread and growing popularity of biologics, it's likely that you or someone you know has benefitted, is benefitting, or will benefit from these "wonder drugs." The SBE Special Supplement in this issue provides a behind-the-scenes look at the production of these biologics.

For those who are relatively new to the discipline of biological engineering, the sidebar "Cells as Protein Factories" on pp. 36–37 and the first part of the article starting on p. 44 (up to the subhead "Traditional bioreactor measurement and basic control" on p. 46) provide good background information and define key terminology to help you delve into the articles and explore the chemical engineering aspects of producing biologic medicines.

The supplement's first article (pp. 35–42) discusses new tools being developed through the holistic, large-scale study of genomes (or genetic makeup) that provide chemical engineers with a better understanding of the cells and biological processes that make these drugs. And although most chemical engineers are not performing the genetic engineering research involved in discovering new medicines, you can be sure many chemical engineers are playing important roles in developing, designing and operating the safe, efficient, economic processes and plants needed to bring these drugs to market.

The other article (pp. 44–51) addresses an aspect of design and operation that chemical engineers might more easily relate to — process control, in this case the monitoring and control of a fermentation process. Automating a bioprocess involves numerous challenges stemming from the use of living organisms as the "factory," inherent process variability, and lack of real-time measurements of key parameters (among other things). The specifics are different from the continuous, steady-state processes with which we are most familiar, but chemical engineers are in a unique position to overcome the challenges. This is especially true of the young professionals who are now graduating from the many schools that have integrated biological engineering in their chemical engineering department names and their curricula.

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Editor-in-Chief