

METHODS IN MOLECULAR BIOLOGY™

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Protein Expression in Mammalian Cells

Methods and Protocols

Edited by

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Preface

For the past decade, biomedical science has been heavily influenced by the development of high-throughput DNA sequencing technologies. Despite the public perception that scientists are the ultimate objectivists and driven by noble and altruistic interest in arcane corners of human knowledge, the reality is that we are as susceptible as anyone to the influence of the “drunk looking for his keys under the lamp post” phenomenon. (If you have lost your keys on a dark city street, you should certainly start your search where the light is the best.) These days, the light shines especially brightly where we can find ways of using next-generation sequencing to answer questions relevant to our larger research interests.

However, in a sense, our present preoccupation with millions of bits of DNA sequence is a sham and a delusion or, to put it more accurately, a postponement of the most difficult and fundamental work that will ultimately be required. We find it so convenient to deal with the uniform and predictable behavior of nucleic acids that we are seduced into thinking of biology as reducible to As, Gs, Cs, Ts, and Us. But, so far as we know today, all those billions and trillions of bases lead nowhere but to the world of PROTEINS: how much, with what activities, where and when expressed, how mutated or modified, and interacting with what partners. Why do we care about exons and splicing; copy numbers and ploidy; deletions and mutations; alternative splicing and promoters; enhancers and micro RNAs and epigenetics? Only because they affect the proteins and protein organelles in cells and how they function.

The previous paragraph would be an overstatement if we could predict the amounts and behaviors of proteins by knowing, say, the complete sequence of the human genome, with all its SNPs, mutations, and variations. But we do know all those base pairs, and the biology of even cells in culture, let alone intact organisms, remains in many fundamental ways deeply mysterious. Thus, even though an encyclopedic knowledge of all the proteins of a cell will not solve all of its mysteries, it is also true that without such knowledge our ability to manipulate cells and intervene in human disease will remain proportionately superficial.

As the chapters in this volume illustrate, mammalian cells are uniquely suited for the expression of mammalian proteins. Because you and I are mammals, protein expression in mammalian cells will grow in importance to the increased understanding of our biology.

Frederick, MD, USA

James L. Hartley

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