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Editorial

Quality control in protein synthesis

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In all living cells, protein synthesis (also named translation) is a complex and dynamic process mediated by the ribosome. It allows for an accurate correspondence between the genetic information and newly synthesized proteins. While the basics of translation have been known for several decades, the details of how ribosomes perform their task at the molecular level were only recently elucidated, by combining structural and functional studies (Ramakrishnan, 2014). In this "golden age" of ribosome studies we have now access not only to a full description of the ribosome itself but also to a detailed sketch of the process at the cellular level, which involves numerous protein and RNA partners that constantly bind and dissociate from the ribosome.

To maintain cell viability, protein synthesis must find an equilibrium between speed and accuracy. Towards this aim several quality control pathways exist that ensure the correct operation of the whole process (Giudice and Gillet, 2014). Until recently, most of them were poorly understood or even unknown but this fantastic period of discoveries allows now a rather complete understanding of many of these pathways, both in pro- or eukaryotic cells. This is why this special issue dedicated to quality control in protein synthesis finally comes of age.

The other great opportunity of this special issue is to bring together people involved in different fields, all related to protein synthesis, but not always related to each other. Indeed, when thinking about quality control in protein synthesis I realized that the problem could be tackled from so many points of views. While troubles as well as solutions can obviously occur directly on the ribosome, they can also be linked upstream, at the mRNA level, or downstream, at the protein level.

It's like taking a train: when the trip is smooth, nobody notices the amount of work necessary. But if the train stops or worse, derails, one realizes how much the tracks, like mRNA, need to be correctly built and maintained; that the train, like the ribosome, needs to be correctly assembled and constantly maintained and supplied with energy; that the passengers and crew, like the translation factors, must be kept informed and fed; and finally that the freight, like proteins, must be protected and correctly tagged to reach their final destinations on time and in good shape!

Therefore, when organizing the program I paid close attention to inviting people from the various fields surrounding the topic. This special issue is intended to encompass a large variety of examples of quality control occurring on mRNAs, ribosomes or proteins. Of course it is always difficult to satisfy everyone; a French proverb says that "choosing means renouncing". But I am confident that the readers will find a vibrant selection of great

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contributions that will certainly satisfy their curiosity and set the stage for future prospects in ribosome quality control. And for this I must acknowledge the enthusiastic and outstanding authors who accepted to participate in the project. Together with the wonderful work done by the reviewers and the Redaction of Biochimie (Richard Buckingham, Claude Forest and Malika Hassini), without which this special issue would not have been possible.

References

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