In vivo labelling of functional ribosomes reveals spatial regulation during starvation in Podospora anserina

ABSTRACT

Nuclear sequestration can be another level of ribosomal protein regulation in eukaryotic cells.This may contribute to the regulation of cell growth and division.

INTRODUCTION

Background Because translation utilizes a large proportion of the cell energy, its components are tightly regulated, especially ribosomes. Indeed, as cells are depleted of nutrients, a reduction in ribosome function occurs. In E. coli, ribosomes are converted by dimerization through the action of the RMF protein into 100S particles that are unable to perform translation. In eukaryotes, ribosomal proteins are down regulated. This occurs through transcriptional regulation in yeast and mostly through translational regulation in mammals and Dictyostelium. To date, in vivo observation of a tagged and functional ribosomal particle during various cellular growth phases has not been reported (despite the fact that the large ribosomal subunit has recently been successfully tagged with GFP), so there has been no evidence of whether spatial regulation can also be involved in the regulation of ribosomal proteins. Here, we report a spatial regulation of a small subunit ribosomal protein upon entrance into stationary phase.

CONCLUSION

Conclusions We report here for the first time a nuclear sequestration of a ribosomal protein during a transient period at the onset of stationary phase. A plausible explanation is that this kind of regulation permits a rapid production of ribosomes if nutrients are encountered before a more pronounced stationary phase is entered. However, recent data show that release of cdc14, sequestered in the nucleolus, is involved in the proper exit from mitosis. Because ribosomes might regulate cell cycle progression, it is possible that sequestering ribosome in the nucleus is an additional level of regulation involved in ensuring a correct cell cycle arrest.