

24.03.2024

DFG-funded PhD position: "Studies on the role of RNA polymerase I -specific protein subunits in transcription in the chromatin context"

In the eukaryotic cell nucleus, the genetic information is encoded in the DNA sequence as a large nucleoprotein complex, the chromatin. The main protein components of chromatin are histone proteins, which form an octameric complex with the DNA so-called nucleosomes. The DNA complexed in nucleosomes is compacted and is not accessible for important nuclear processes such as transcription. The activity of genes can therefore be influenced by the chromatin structure. Chromatin undergoes dynamic changes to give the transcription apparatus access to the DNA. Our research aims to contribute to a better understanding of the interplay between chromatin structure and transcription. As a model system we investigate the transcription of ribosomal (r)RNA genes by RNA Pol I in *S. cerevisiae* (hereafter referred to as yeast).

In all eukaryotic cells, the DNA-dependent RNA polymerase I (Pol I), consisting of 14 protein subunits, is responsible for the transcription of an essential precursor of ribosomal (r)RNA. Although Pol I has only one target gene, the enzyme is responsible for over 60% of nuclear RNA synthesis in actively dividing cells. This enormous synthesis capacity is due to the efficient Pol I transcription machinery and multimerization of the rRNA genes. In yeast, about 150 rRNA genes are in tandem repeating units on chromosome XII. Interestingly, not all rRNA genes of Pol I are transcribed even in dividing cells. Thus, about half of the genes assume a nucleosome-depleted, transcribed, so-called "open" chromatin state and the remaining genes a nucleosomal, non-transcribed, "closed" chromatin state. The ratio between the two chromatin states can change in different physiological or pathological conditions. One focus of our investigations is to describe in detail the molecular mechanisms of these chromatin dynamics in correlation with Pol I transcription.

In this specific PhD project, funded by the German Research Foundation, we aim to elucidate the role of Pol I specific protein subunits for transcription in the chromatin context. We use a variety of biochemical, genetic, molecular and cell biological techniques to answer our questions.

If you are interested, please contact me (joachim.griesenbeck@ur.de) at any time. The prerequisite is a completed scientific master's degree in biochemistry, biology or similar. We would be happy to arrange an appointment for a personal meeting.