

1. **Research Unit:** Laboratory of tRNA Transcription
2. **Supervisor:** Prof. dr hab. Magdalena Rakowska-Boguta
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4. **Auxiliary supervisor:** dr Małgorzata Cieśla
5. **Project title (English):** New aspects of negative regulation of RNA polymerase III in yeast *Saccharomyces cerevisiae*
6. **Project title (Polish):** Nowe aspekty negatywnej regulacji polimerazy III RNA u drożdży *Saccharomyces cerevisiae*
7. **Description of the project (up to 500 words):**

Control of transcription in an eukaryotic cell is the main mechanism of gene expression regulation, basic for growth and differentiation. Our laboratory has a long term experience in studying the regulation of tRNA transcription by the yeast RNA polymerase III (Pol III). Specific elements of the Pol III machinery are: the general transcription factors TFIIB and TFIIC, and Maf1, the negative regulator. Work on yeast Maf1 and TFIIC is likely of relevance to the regulation of RNA Pol III in higher eukaryotes, and we have made strong contributions to this field. Our results have been published in prestigious journals like *PNAS*, *Molecular Cell* and *Nucleic Acids Research*. Recent years have provided the knowledge about various mechanisms regulating Pol III transcription and allowed to create new research hypotheses which currently require experimental verification. Results of our studies indicated the interplay between components of the Pol III machinery in controlling tRNA gene transcription upon the physiological switch of yeast from fermentation to respiration - a condition that represses Pol III in yeast *S. cerevisiae*. Moreover, we revealed that besides activation, TFIIC plays a role in repression of tRNA transcription. The respective molecular mechanism that stands behind such effect has not been recognized yet. The aim of the proposed study is to explain new aspects of the negative regulation of Pol III transcription by TFIIC. The research plan involves exploring the molecular mechanisms controlling TFIIC activity, the role of TFIIC in recruitment of TBP - the TFIIB subunit, to tRNA genes, and cooperation between TFIIC and the Maf1 protein in Pol III repression. In the proposed project, the PhD student will be based on classical genetics and modern methods used in molecular biology and biochemistry. Results obtained during realization of the PhD studies will be presented at international conferences and published in high-ranking journals.

8. **References related to conducted /planned research (maximum 3):**

- Cieśla M, Turowski WT, Nowotny M, Tollervey D and Boguta M. 2020. The expression of Rpb10, a small subunit common to RNA polymerases, is modulated by the R3H domain-containing Rbs1 protein and the Upf1 helicase. *Nucleic Acids Res* 48:12252-12268. doi: 10.1093/nar/gkaa1069
- Cieśla M, Skowronek E and Boguta M. 2018. Function of TFIIC, RNA polymerase III initiation factor, in activation and repression of tRNA gene transcription. *Nucleic Acids Res* 46:9444-9455. doi: 10.1093/nar/gky656
- Graczyk D, Cieśla M and Boguta M. 2018. Regulation of tRNA synthesis by the general transcription factors of RNA polymerase III - TFIIB and TFIIC, and by the MAF1 protein. *Biochim Biophys Acta Gene Regul Mech* 1861:320-329. doi: 10.1016/j.bbagr.2018.01.011

9. **Scholarship amount (net):** please contact the project supervisor.