ABSTRACT

Linking regulation of lipid metabolism with nuclear division has recently become a thoroughly investigated phenomenon. It has been shown that an undisturbed lipid metabolism is required for proper mitotic division from yeasts to mammals. In my doctoral project, I focused on the transcriptional regulation of lipid metabolism genes with respect to mitotic fidelity in the fission yeast *Schizosaccharomyces pombe*.

Cbf11 and Mga2 are two transcriptional regulators of lipid metabolism genes. For a long time, it was assumed that they act as two independently functioning units. However, we have identified a novel regulatory partnership between Cbf11 and Mga2. Our results show that Cbf11 and Mga2 work closely together.

In addition to regulating lipid metabolism, Cbf11 was known to be involved in cell cycle progression and a range of other processes. We have now determined that all known functions of Cbf11 require its canonical DNA-binding ability. Interestingly, we have identified novel roles for both Cbf11 and Mga2 and found that Mga2 mirrors the functions of Cbf11, including cell cycle control.

Furthermore, we have shown that lipid metabolism has a pronounced impact on chromatin structure and the proper regulation of gene expression, and we have suggested how fatty acid synthesis contributes to mitotic fidelity. In addition, we have described new interconnections between lipid and nitrogen metabolism.

Overall, this work provides new insights into the transcriptional control of lipid metabolism and its relationship with mitotic progression in fission yeast.

Keywords: Cbf11, Mga2, transcription factors, binding to DNA, lipid metabolism, closed mitosis, genome integrity, fission yeast