THE STUDY OF ATAXIA-TELANGIECTASIA SYNDROME BY USING THE FILAMENTOUS FUNGUS *ASPERGILLUS NIDULANS* AS A MODEL SYSTEM

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Ataxia telangiectasia (AT) is an inherited disorder characterized by progressive loss of motor function and susceptibility to cancer. Numerous studies have emphasized the role of the affected gene product, ATM, in the regulation of the DNA damage response (DDR). Here we characterized the homolog of ATM (AtmA) in the filamentous fungus *A. nidulans*. The deletion strain Δ*atmA* presented defects in the DDR as previously shown in other model organisms including intra S-phase and G2/M checkpoint defects and increased sensitivity to mutagens. Also, the crude extract from the mutant strain did not phosphorylate the *A. nidulans NBS1* homologue, ScaA. In addition, the Δ*atmA* mutant showed increased nuclear division kinetics and was also required for the formation of a stable axis of hyphal polarity, demonstrating a novel feature for the ATM gene indicating that AtmA probably regulates the function and/or localization of landmark proteins required for the formation of a polarity axis. We extended these studies by investigating which pathways are controlled by AtmA during proliferation and polar growth by comparatively determining the transcriptional profile of *A. nidulans* wild type and Δ*atmA* mutant strains in different growth conditions. Our results indicated an important role of the pentose phosphate pathway in the fungal proliferation during endogenous DNA damage and polar growth monitored by the AtmA. Furthermore, we identified several genes that have decreased mRNA expression in the Δ*atmA* mutant which are directly involved in the formation of polarized hyphae and/or control of polar growth; in the biosynthesis of phosphatidic acid and ergosterol; and intracellular trafficking, secretion, and vesicular transport. In conclusion, we demonstrated that $AtmA^{ATM}$ has an additional role in the formation of stable axes of polarized hyphal growth. In this respect, AtmA may share a pivotal function with its homologs in other highly polarized cell types such as neurons.

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