

Pathogenic Yeast *Candida parapsilosis* and Its Carbonic Anhydrase

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The yeast *Candida parapsilosis* is a so-called opportunistic pathogen. It is harmless for healthy people, however, it is a serious threat to immunocompromised individuals, e.g. organ transplant recipients, or HIV/AIDS patients. Pathogenic *Candida* species can be disseminated into the entire body of these patients, causing infections with high mortality rates. *C. parapsilosis* is a successful pathogen due to its ability to adapt to different conditions, such as changes in pH, temperature, or atmosphere. *Candida* can thrive on human skin, as well as in bloodstream. These environments differ, among other, in CO₂ concentration. While in the air there is less than 0.04 % CO₂, in the bloodstream the CO₂ concentration reaches approximately 5%. To cope with these dramatic changes, living organisms use enzymes called carbonic anhydrases (CAs). They catalyse reversible hydration of CO₂ to HCO₃⁻. Although this reaction proceeds spontaneously in nature, CAs accelerate it by 10000-fold. Analysis of *C. parapsilosis* genome has revealed only one gene potentially encoding CA. It has been denominated NCE103 on the basis of homology with a gene in *Saccharomyces cerevisiae*, encoding an enzyme with a CA activity. However, over 90% of *C. parapsilosis* genes have not been characterised, and it has been unclear, whether the gene product of NCE103 is really a CA. Therefore I expressed NCE103 in *Escherichia coli*, optimised chromatographic procedures in order to obtain purified protein from bacterial lysates, and finally, I proved that Nce103p, the protein encoded by NCE103, displays a carbonic anhydrase activity. I also measured inhibition constants for several potential inhibitors. At present, I am trying to obtain Nce103p crystals for structural analysis, as well as to search more Nce103p inhibitors.

Awards Won:

Fourth Award of \$500