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Hydroxyurea arrests *Saccharomyces cerevisiae* cells in G1/early S-phase of the cell cycle and limits rRNA synthesis

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The chemotherapeutic agent Hydroxyurea (HU) inhibits the ribonucleotide reductase preventing the synthesis of dNTPs. Consequently, DNA replication is inhibited and cells arrest in G1/early S-phase of the cell cycle. Additionally, yeast exposed to the natural pheromone α-factor arrest cell division in G1. Cell growth hinges on the tightly regulated processes of ribosome biogenesis and rRNA synthesis. Thus, expression of rRNA genes and rRNA processing were analyzed in cell cycle arrested cells by both the chemotherapeutic agent HU and the pheromone α-factor. Chromatin endogenous cleavage, chromatin immuno-precipitation, chromatin spreading and Northern blotting were employed to investigate the effect of HU on the expression of rRNA genes and rRNA synthesis. The results indicate that in yeast arrested by HU the overall number of active promoters remains unchanged, and that rRNA genes chromatin stay poised for transcription. However, distribution of RNAPI on individual rRNA gene and rRNA processing are disturbed, lowering rRNA synthesis. Conversely, in α-factor arrested cells rRNA transcription was not affected. These results point out a hitherto unnoticed cellular response to HU that might participate in the inhibition of cell division. NSERC and Ministère des Relations Internationales du Québec (to AC), Bavarian State Chancellery (Bayerisch-Franzosisches Hochschulzentrum, to JG).

Speaker Biography

Alexia Muguet has a master in marine ecology from the Université Pierre et Marie Curie - Paris VI (France) (2014) and a master in microbiology from the Université de Bretagne Occidentale (France) (2015). She previously worked on microalgae ecophysiology before starting studying microorganisms at molecular level. During her master internship, she worked on the replication helicase MCM from *Pyrococcus abyssi*, an Euryarchaeota. As PhD student at Université de Sherbrooke (Québec), she is studying DNA repair mechanisms and chromatin on *Saccharomyces cerevisiae.* Her main work is analyzing the rRNA gene proteome linked to UV radiation and Nucleotide Excision Repair to highlight proteins involved in chromatin repair-dependent modifications. Alexia participated in two published papers and in in-redaction one.

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