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If selected, I agree to present my work during an oral communication: Yes

Abstract: Xenon has several interesting properties for the NMR study of biological cells: 1) its nuclear polarization can be boosted via optical pumping, which increases the detection sensitivity by several orders of magnitude. 2) It is nontoxic and soluble in biologic medium and crosses the plasma membrane while keeping its polarization. 3) It has a wide range of chemical shift which makes its NMR signature sensitive to fine cell changes. In particular with cell suspensions two distinct signals are observed on the ^{129}Xe NMR spectrum, corresponding to xenon in the bulk and xenon inside the cells.[1] This has led to promising applications, such as the discrimination of cells sensitive and resistant to chemotherapy.[2]

In this work, we studied Saccharomyces Cerevisiae cells at different times of a culture via hyperpolarized ^{129}Xe NMR (xenon was hyperpolarized using our home made optical pumping setup) and controlled the number of cells by the measure of the optical density at 600 nm. For each time stage of the yeast culture, a sample was withdrawn and after hyperpolarized xenon addition, the corresponding ^{129}Xe spectra were analyzed in a 11.7 Tesla spectrometer: the chemical shift splitting, the in-out exchange rate and the proportion of xenon inside the cells were extracted and compared with classical analyses using optical density. The evolution of the spectral signature of ^{129}Xe in S. Cerevisae is dependent of the culture time as presented in the figure. Hypotheses of explanations will be presented.

In parallel, new methodologies, compatible with narrow-bore NMR spectrometers, were developed to allow the in situ follow-up of cell cultures by NMR, using microfluidic system and micro-NMR detection. Surface treatment such as parylene coating was shown to increase biocompatibility.

[1] C. Boutin et al., Hyperpolarized 129Xe NMR signature of living biological cells, NMR Biomed. 24 (2011) 1264.
[2] France Patent 12 52922 (2012) C. Boutin, P. Berthault, Procédé de détermination de la résistance cellulaire aux médicaments.

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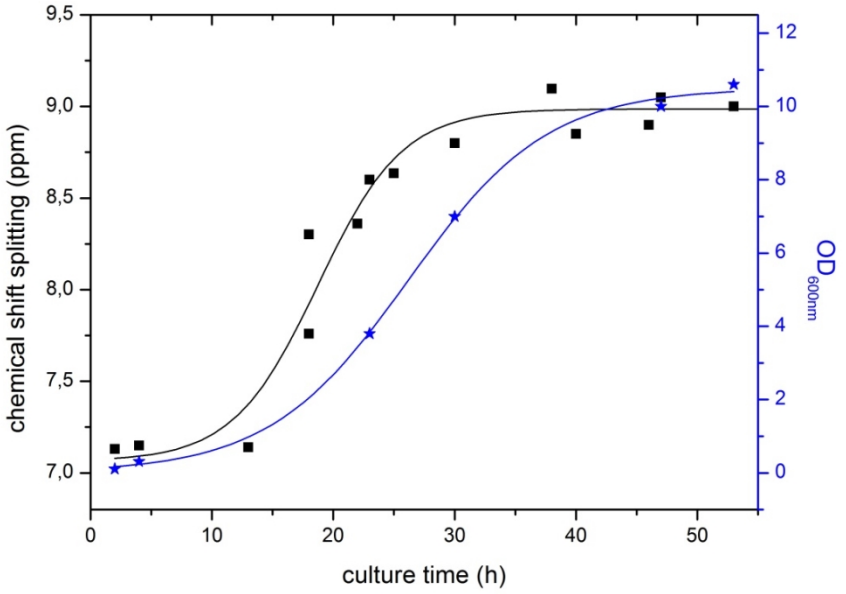

Disclosure of Interest: None Declared