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Structural characterization of two dihydrobiopterin tautomers as oxidation intermediates of tetrahydrobiopterin

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In humans, tetrahydrobiopterin (BH4) is an important cofactor for aromatic amino acid hydroxylases, glyceryl-ether monooxygenase, and three nitric oxide synthases. A trouble in the BH4 synthesis causes several symptoms and neurological disorders like hyperphenylalaninemia, progressive mental and physical retardation. For treating a BH4 deficiency, BH4 can be administered. However, its chemical behavior is not fully understood. BH4 is unstable and oxidizes spontaneously into dihydrobiopterin (BH2). Nevertheless, according to previous studies, a transitional molecule named quinonoid dihydrobiopterin (qBH2) could appear during the oxidation of BH4 into BH2. Thus, the aim of this study was to identify this transitional molecule. Mass spectrometry FT-ICR coupled to infra-red and mathematical modeling was used in order to identify the transitional molecule which is indeed qBH2. qBH2 is an isomer of BH2. So they have the same m/z. However, qBH2 and BH2 neither have the same fragments nor have the same infra-red spectra. In this way, it was possible to distinguish qBH2 and BH2. The stability of qBH2 in function of the time and the pH was studied too. qBH2 naturally isomerizes into BH2 and more the pH is acidic, more qBH2 is stable.

Biography

LO Aurélien is a PhD student from the LETIAM laboratory of University of Paris-Sud, France.

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