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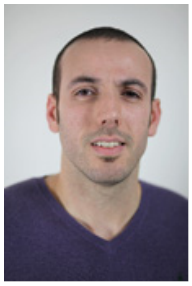

RESEARCH INTERESTS

Flavoenzymes Biochemistry, molecular Biophysics and structural biology

- Enzyme / Protein dynamics and structure
- Enzyme mechanism, kinetics and biophysics
- protein/protein and protein/RNA interaction
- Flavoenzymology and flavin biophysical chemistry
- Time resolved spectroscopy
- RNA modification

SUMMARY

I study the structures and mechanisms of enzymes and seek to understand at the atomic level how redox enzymes function. I employ a variety of High technology biophysical approaches including X-Ray crystallography, pressure-perturbation spectroscopy, fluorescence resonance energy transfer, and absorbance, circular dichroism spectroscopy, fast kinetics in order to provide compelling evidence regarding conformational changes resulting from ligand binding and/or protein-protein interactions that play a key role in substrate binding and turnover, volume of transient states during catalysis... I am particularly interested in electron transfer and redox catalysis. I am studying the mechanism of cofactor-dependent catalysis in flavo- and hemoproteins and aim to reveal the molecular details of the interaction of flavoenzymes with their cellular partners.

SELECTED PUBLICATIONS:

▫ Structural, biochemical and functional analyses of tRNA-monooxygenase enzyme MiaE from Pseudomonas putida provide insights into tRNA/MiaE interaction. Carpentier P, Leprêtre C, Basset C, Douki T, Torelli S, Duarte V, Hamdane D, Fontecave M, Atta M. Nucleic Acids Res. 2020 Sep 25;48(17):9918-9930. doi: 10.1093/nar/gkaa667.

▫ Reductive Evolution and Diversification of C5-Uracil Methylation in the Nucleic Acids of Mollicutes. Sirand-Pugnet P, Brégeon D, Béven L, Goyenvalle C, Blanchard A, Rose S, Grosjean H, Douthwaite S, Hamdane D, Crécy-Lagard V. Biomolecules. 2020 Apr 10;10(4):587. doi: 10.3390/biom10040587.

▫ Conformational Stability Adaptation of a Double-Stranded RNA-Binding Domain to Transfer RNA Ligand. Bou-Nader C, Pecqueur L, Barraud P, Fontecave M, Tisné C, Sacquin-Mora S, Hamdane D. Biochemistry. 2019 May 21;58(20):2463-2473.

▫ Ultrafast photoinduced flavin dynamics in the unusual active site of the tRNA methyltransferase TrmFO. Dozova N, Lacombat F, Bou-Nader C, Hamdane D, Plaza P. Phys Chem Chem Phys. 2019 Apr 24;21(17):8743-8756.

▫ Molecular basis for transfer RNA recognition by the double-stranded RNA-binding domain of human dihydrouridine synthase 2. Bou-Nader C, Barraud P, Pecqueur L, Pérez J, Velours C, Shepard W, Fontecave M, Tisné C, Hamdane D. Nucleic Acids Res. 2019 Apr 8;47(6):3117-3126.

▫ A robust zirconium amino acid metal-organic framework for proton conduction. Wang S, Wahiduzzaman M, Davis L, Tissot A, Shepard W, Marrot J, Martineau-Corcos C, Hamdane D, Maurin G, Devautour-Vinot S, Serre C. Nat Commun. 2018 Nov 22;9(1):4937.

▫ Electrostatic Potential in the tRNA Binding Evolution of Dihydrouridine Synthases. Bou-Nader C, Brégeon D, Pecqueur L, Fontecave M, Hamdane D. Biochemistry. 2018 Sep 18;57(37):5407-5414.

▫ Unveiling structural and functional divergences of bacterial tRNA dihydrouridine synthases: perspectives on the evolution scenario. Bou-Nader C, Montémont H, Guérineau V, Jean-Jean O, Brégeon D, Hamdane D. Nucleic Acids Res. 2018 Feb 16;46(3):1386-1394.

▫ Enzyme Activation with a Synthetic Catalytic Co-enzyme Intermediate: Nucleotide Methylation by Flavoenzymes. Bou-Nader C, Cornu D, Guerineau V, Fogeron T, Fontecave M, Hamdane D. Angew Chem Int Ed Engl. 2017 Oct 2;56(41):12523-12527.

▫ Flavin-dependent epitranscriptomic world. Lombard M, Hamdane D. Arch Biochem Biophys. 2017 Oct 15;632:28-40.

▫ Flavin-Dependent Methylation of RNAs: Complex Chemistry for a Simple Modification. Hamdane D, Grosjean H, Fontecave M. J Mol Biol. 2016 Dec 4;428(24 Pt B):4867-4881.

▫ A chemical chaperone induces inhomogeneous conformational changes in flexible proteins. Hamdane D, Velours C, Cornu D, Nicaise M, Lombard M, Fontecave M. Phys Chem Chem Phys. 2016 Jul 27;18(30):20410-21.

▫ An extended dsRBD is required for post-transcriptional modification in human tRNAs. Bou-Nader C, Pecqueur L, Bregeon D, Kamah A, Guérineau V, Golinelli-Pimpaneau B, Guimarães BG, Fontecave M, Hamdane D. Nucleic Acids Res. 2015 Oct 30;43(19):9446-56.

▫ Hamdane D, Bou-Nader C, Cornu D, Hui-Bon-Hoa G, Fontecave M. Flavin-Protein Complexes: Aromatic Stacking Assisted by a Hydrogen Bond. Biochemistry. 2015 Jul 21;54(28):4354-64.

▫ Hamdane D, Guelorget A, Guérineau V, Golinelli-Pimpaneau B. Dynamics of RNA modification by a multi-site-specific tRNA methyltransferase. Nucleic Acids Res. 2014 Oct;42(18):11697-706.

▫ Guimarães BG, Hamdane D, Lechauve C, Marden MC, Golinelli-Pimpaneau B. The crystal structure of wild-type human brain neuroglobin reveals flexibility of the disulfide bond that regulates oxygen affinity. Acta Crystallogr D Biol Crystallogr. 2014 Apr;70(Pt 4):1005-14.

▫ Hamdane D, Bruch E, Un S, Field M, Fontecave M. Activation of a unique flavin-dependent tRNA-methylating agent. Biochemistry. 2013 Dec 10;52(49):8949-56.

▫ Hamdane D, Argentini M, Cornu D, Golinelli-Pimpaneau B, Fontecave M. FAD/folate-dependent tRNA methyltransferase: flavin as a new methyl-transfer agent. J Am Chem Soc. 2012 Dec 5;134(48):19739-45.

▫ Hamdane D, Argentini M, Cornu D, Myllykallio H, Skouloubris S, Hui-Bon-Hoa G, Golinelli-Pimpaneau B. Insights into folate/FAD-dependent tRNA methyltransferase mechanism: role of two highly conserved cysteines in catalysis. J Biol Chem. 2011 Oct 21;286(42):36268-80.

▫ Hamdane D, Guerineau V, Un S, Golinelli-Pimpaneau B. A catalytic intermediate and several flavin redox states stabilized by folate-dependent tRNA methyltransferase from Bacillus subtilis. Biochemistry. 2011 Jun 14;50(23):5208-19.

▫ Hamdane D, Kiger L, Hui-Bon-Hoa G, Marden MC.Kinetics inside the protein: shape of the geminate kinetics in myoglobin. J Phys Chem B. 2011 Apr 14;115(14):3919-23.

▫ Xia C, Hamdane D, Shen AL, Choi V, Kasper CB, Pearl NM, Zhang H, Im SC, Waskell L, Kim JJ. Conformational changes of NADPH-cytochrome P450 oxidoreductase are essential for catalysis and cofactor binding. J Biol Chem. 2011 May 6;286(18):16246-60.

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J Biol Chem. 2009 Apr 24;284(17):11374-84.

▫ Hamdane D, Vasseur-Godbillon C, Baudin-Creuza V, Hoa GH, Marden MC. Reversible hexacoordination of alpha-hemoglobin-stabilizing protein (AHSP)/alpha-hemoglobin Versus pressure. Evidence for protection of the alpha-chains by their chaperone. J Biol Chem. 2007 Mar 2;282(9):6398-404.

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