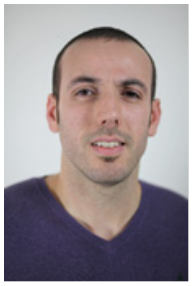
**DR Djemel Hamdane** (CNRS)
Address: Laboratoire de Chimie des Processus Biologiques, Collège de France,
11 place Marcelin Berthelot, 75005 Paris, France
Phone Number:33 1442716 45
Email: djemel.hamdane@college-de-france.fr



RESEARCH INTERESTS

Nucleic acids Biochemistry, enzymology, molecular Biophysics and structural biology

- Post-transcriptional RNA modifications
- Structural Enzymology
- Enzyme's mechanisms, kinetics and biophysics
- Protein/protein and protein/RNA interactions
- Redox biochemistry, flavinologie

SUMMARY

I study the structures and mechanisms of enzymes implicated in several important redox-dependent post-transcriptional RNA modifications in bacteria and human. I employ a variety of approaches including RNA biochemistry, X-Ray crystallography, FRET, absorbance, circular dichroism spectroscopy, fast kinetics in order to provide compelling evidence regarding enzyme/RNA interactions that play a key role in substrate binding and catalysis.

SELECTED PUBLICATIONS:

▫ Ultrafast dynamics of fully reduced flavin in catalytic structures of thymidylate synthase ThyX. Dozova N, Lacombat F, Lombard M, Hamdane D, Plaza P. Phys Chem Chem Phys. 2021 13;23(39):22692-22702.

▫ An enzymatic activation of formaldehyde for nucleotide methylation. Bou-Nader C, Stull FW, Pecqueur L, Simon P, Guérineau V, Royant A, Fontecave M, Lombard M, Palfey BA, Hamdane D. Nature communications. 2021, 12, 4542-4548.

▫ Dihydrouridine synthesis in tRNAs is under reductive evolution in Mollicutes. Faivre B, Lombard M, Fakroun S, Vo CD, Goyenvalle C, Guérineau V, Pecqueur L, Fontecave M, De Crécy-Lagard V, Brégeon D, Hamdane D. RNA Biol. 2021 Dec;18(12):2278-2289

▫ 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.

▫ Hamdane D, Xia C, Im SC, Zhang H, Kim JJ, Waskell L. Structure and function of an NADPH-cytochrome P450 oxidoreductase in an open conformation capable of reducing cytochrome P450.
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.

▫ Hamdane D, Kiger L, Hoa GH, Dewilde S, Uzan J, Burmester T, Hankeln T, Moens L, Marden MC. High pressure enhances hexacoordination in neuroglobin and other globins. J Biol Chem. 2005 Nov 4;280(44):36809-14.

▫ Hamdane D, Kiger L, Dewilde S, Uzan J, Burmester T, Hankeln T, Moens L, Marden MC. Hyperthermal stability of neuroglobin and cytoglobin. FEBS J. 2005 Apr;272(8):2076-84.

▫ Hamdane D, Kiger L, Dewilde S, Green BN, Pesce A, Uzan J, Burmester T, Hankeln T, Bolognesi M, Moens L, Marden MC. The redox state of the cell regulates the ligand binding affinity of human neuroglobin and cytoglobin. J Biol Chem. 2003 Dec 19;278(51):51713-21.