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Romain Fleurisson, Johan Deniaud, Clotilde Renaud, Julien Pichon, Francesca Franzoso, Laurence Dubreil, Marie-Anne Colle

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Organ clearing and biphotonic microscopy - an innovative complementary technological approach to investigate the central nervous system

Fleurisson Romain | Deniaud Johan | Renaud Clotilde | Julien Pichon | franzoso francesca daniela | Dubreil Laurence | Colle Marie-Anne

PAAnTher, INRA, École nationale vétérinaire, agro-alimentaire et de l'alimentation Nantes-Atlantique (Oniris), Université Bretagne Loire, (UBL), Nantes, F-44307, France | PAAnTher, INRA, École nationale vétérinaire, agro-alimentaire et de l'alimentation Nantes-Atlantique (Oniris), Université Bretagne Loire, (UBL), Nantes, F-44307, France | PAAnTher, INRA, École nationale vétérinaire, agro-alimentaire et de l'alimentation Nantes-Atlantique (Oniris), Université Bretagne Loire, (UBL), Nantes, F-44307, France | PAAnTher, INRA, École nationale vétérinaire, agro-alimentaire et de l'alimentation Nantes-Atlantique (Oniris), Université Bretagne Loire, (UBL), Nantes, F-44307, France | PAAnTher, INRA, École nationale vétérinaire, agro-alimentaire et de l'alimentation Nantes-Atlantique (Oniris), Université Bretagne Loire, (UBL), Nantes, F-44307, France | PAAnTher, INRA, École nationale vétérinaire, agro-alimentaire et de l'alimentation Nantes-Atlantique (Oniris), Université Bretagne Loire, (UBL), Nantes, F-44307, France | PAAnTher, INRA, École nationale vétérinaire, agro-alimentaire et de l'alimentation Nantes-Atlantique (Oniris), Université Bretagne Loire, (UBL), Nantes, F-44307, France | PAAnTher, INRA, École nationale vétérinaire, agro-alimentaire et de l'alimentation Nantes-Atlantique (Oniris), Université Bretagne Loire, (UBL), Nantes, F-44307, France

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3D imaging of the central nervous system at the microscopic level is essential to investigate morphological changes of diseases or to assess the efficacy of a treatment (Denk et Horstam, 2004). However, 3D exploration of the tissues is limited because of the tissues opacity which does not allow the light transmission on large volumes. The technological advances in biphotonic and light-sheet microscopy together with the development of numerous methods in tissue clearing represent innovative solutions for exploring the organs at the cellular level. These methods are promising tools to assess new therapeutic strategies on neurodegenerative diseases developed by our research unit UMR703 using animal models and AAV vector encoding fluorescent proteins.

In the present work we used SCALE, CLARITY, uDISCO, TDE clearing methods and biphotonic imaging on brain and spinal cord from mouse and non human primate. Harmonic and fluorescence signals conservation will be discussed.

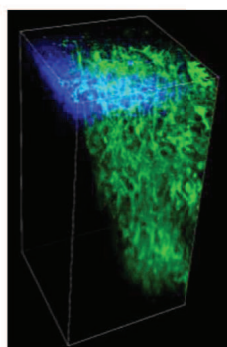


Figure1: Mouse spinal cord cleared with 2,2'Thiodiethanol (TDE). Green: GFP signal in neurons. Blue: Third Harmonic generation (THG) from myelin. Z stack, 0.7 mm depth.