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Sheep brain atlas creation. Diffusion tensor imaging and Scanning electron microscope in sheep brain analysis

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Aim of EDEN 2020 project is the development of a steerable catheter for CED system in glioblastoma therapy. The VET group is involved in realization and validation of the proper animal model. For surgical planning purpose a Diffusion Tensor Imaging (DTI) of white matter tracts in the sheep is necessary to identify the target points useful for the catheter introduction. The analysis of the sheep brain under a Scanning Electron Microscope (SEM) is required to understand any alterations due to the catheter introduction and to fluids injection during CED administration. Animals were treated in accordance with the European Communities Council directive (86/609/EEC), to the laws and regulations on animal welfare enclosed in D.L.G.S. 26/2014 A total of five 70 kg female, one year old, sheep were used for the study. All animals, under general anesthesia, underwent to Magnetic Resonance Imaging (MRI) acquisition. MRI scanner used was Philips Ingenia 1.5 Tesla system. Once the DTI imaging were acquired the animals were euthanased, sheep brain was collected and samples of white matter tracts obtained with disposable biopsy punches of 1.5-2 mm of diameter. The samples were fixed, stained in Osmium tetroxide (OsO_4) and then embedded with two different protocols (cold curing vs thermal curing) in resin for the Focused Ion Beam (FIB) SEM analyses. All the DTI images were uploaded to TrackVis software and major white matter fiber tracts analysed. Corticospinal tract, visual radiation, fornix and fronto-occipital fasciculus were identified. Corticospinal tract (Figure 1) was identified as major white matter tract in sheep brain and useful as target area for the research aims. For the SEM analysis the thermal protocol was recognised as better curing methods for the research purpose than cold curing one.The conclusions are missing while waiting for the data to be processed. The research is connected with researches of human medicine to improve the Glioblastoma Multiforme therapy.

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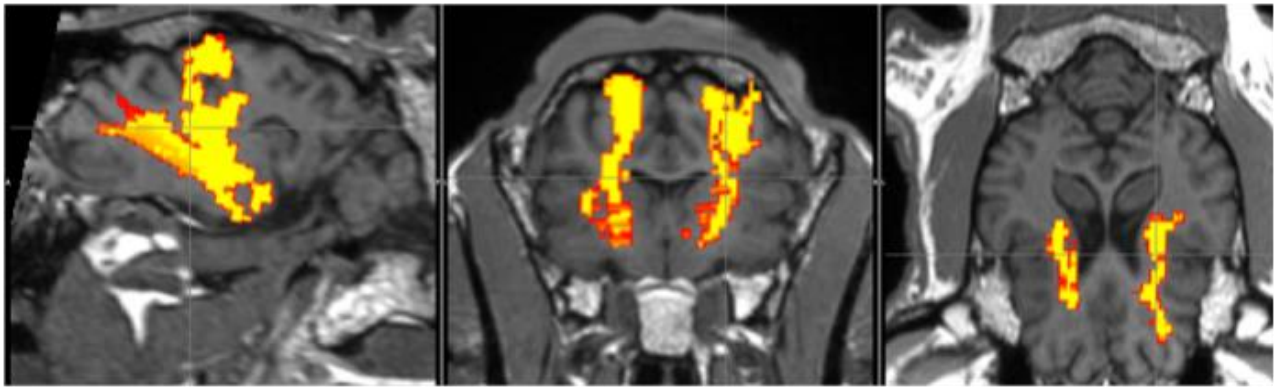
Figure 1: Sheep corticospinal tract. In this picture is showed the corticospinal tract merged with a MRI image acquired during the study.



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