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Research Interests: Regulation of brain development and repair with a focus on glial cells.

Current Funding: NIH and the National Multiple Sclerosis Society

I have been studying glial cells for the last 3 decades. In particular, my research focuses on roles of BDNF on glial cells during development and after a cuprizone demyelinating lesion, a model used to study Multiple Sclerosis. We have used cultures and, more recently, in vivo models of disease for this work. Using the cuprizone model of demyelination we have explored effects of BDNF mediated through the actions of trkB on oligodendrocytes and found that BDNF directly elevates levels of myelin proteins and myelin under demyelinating and remyelinating conditions. Our studies indicate that BDNF is released from oligodendrocytes and astrocytes, suggesting that these cells may be useful sources of trophic factors during development, regeneration and degeneration. Importantly the release is stimulated by metabotropic glutamate receptor 5 (mGluR5) agonists during conditions of demyelination. The reversal of demyelination is evident when the drugs are injected into the abdomen, suggesting their therapeutic utility

Recently we have begun to investigate the signaling mechanisms underlying the effects of metabotropic glutamate receptor agonists on myelination and whether they are applicable to multiple diseases of demyelination. In particular, we are evaluating EAE, a second model of MS, as well as a model of Alzheimer's disease. These studies have led us to investigate the possibility that mGluR5 agonists may serve as therapeutic agents that can reverse demyelination in multiple degenerative conditions.

Selected Publications:

For complete list: http://www.ncbi.nlm.nih.gov/pubmed/?term=Dreyfus+CF

- Saitta KS, Lercher LD, Sainato DM, Patel A, Huang Y, McAuliffe G, Dreyfus CF. (2021) $_{CHPG}$ enhances BDNF and myelination in cuprizone-treated mice through astrocytic metabotropic glutamate receptor 5. Glia, doi: 10.1002/glia.24003. Online ahead of print.
- Huang Y., Song, Y.J., Isaac, M., Miretzkty, S., Patel, A., McAuliffe, G.W., Dreyfus, C.F. (2020) Tropomyosin receptor kinase B expressed in oligodendrocyte lineage cells functions to promote myelin following a demyelinating lesion. ASN Neuro.; Jan-Dec; 12:1759091420957464. doi: 10.1177/17590914209574. PMID: 32927995
- Planas-Fontanez, TM.; Dreyfus, CF.; Saitta, KS (2020) Reactive astrocytes as therapeutic targets for brain degenerative diseases: Roles played by metabotropic glutamate receptors. Neurochem Res. Mar; 45(3):541-550. Doi: 10.1007/s11064-020-02968-6. Epub 2020Jan25. PMID:31983009, PMCID: PMC7058558

- Planas-Fontanez, T.M.; Sainato, D.M.; Sharma, I.; Dreyfus, C.F.; Roles of astrocytes in response to aging, Alzheimer's disease and multiple sclerosis, Brain Res. 1764:147464. Doi,10.1016/j.brainres. 2021.147464. Epub 2021 Apr 1. PMID: 33812850
- Fulmer C.G.; VonDran M.W.; Stillman A.A.; Huang Y.; Hempstead B.L.; Dreyfus C.F. (2014) Astrocyte-derived BDNF supports myelin protein synthesis after cuprizone-induced demyelination. J. Neurosci. Jun 11; 34 (24):8186-96. PMID: 24920623, PMCID: PMC4051974
- VonDran M.W., Clinton-Luke P., Honeywell, J.Z., Dreyfus, C.F. BDNF +/- mice exhibit deficits in oligodendrocyte lineage cells of the basal forebrain. Glia, 2010; 58(7):848-856.
- VonDran M.W., Singh H., Honeywell J.Z., Dreyfus C.F. Levels of BDNF impact oligodendrocyte lineage cells following a cuprizone lesion. J Neurosci. 2011; 31(40):14182-90