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Crossing the blood brain barrier at will-consideration of pH pulsing to confront brain tumours

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A key stumbling block related to many brain cancers is a treatment modality in lieu of, or to complement surgery. Drug selection is inadequate, especially when it comes to propietory molecules able to reliably cross the blood brain barrier (BBB). Some childhood brain cancers like diffuse intrinsic pontine glioma (DIPG) have proven to be particulalry nasty to treat and have almost 100% mortality. Published research is rich with hypotheses to take advantage of an assessed vulnerbility of cancer and one of its emerging hallmarks–its reversed pH gradient. Initial efforts on this front targetted key enzymes or exchangers with proton pump and/or proton transporter inhibitors to date these approaches have fallen short. Our contrarian approach is to confront the reversed pH gradient by employing a yin/yang strategy of cycling through safe limits of physiological entities like body temperature, major cations and anions, and pCO_2 and pO_2 in a concurrent orchestrated manner. For instance, through acute manipulation of CO_2 levels, altered and reversed gradients for CO_2 to 'diffuse down' are possible, directly affecting pH. Here, both exogenous and endogenous CO_2 sources can be manipulated to cross the BBB in either direction where associated pH levels are transiently reached. Where altering cellular pH by as little as one unit of pH is reported to "drastically" alter a cells's outcome, determining what outcomes might be possible with deliberate safe cycling through ~1 pH unit is a mind captivating concept. All cancers, including brain cancers could be susceptable to this approach.

Biography

Flemming H Rasmussen is a BEng and BSc with focus in Cell Biology including almost six years of graduate studies surrounding cancer at McGill University. Flemming G Rasmussen graduated with a Bachelor of Martime Studies from Memorial University and is a career Canadian Naval Officer. Together this father/son team has developed this pH pulsing concept. Unpublished and preliminary proof of concept experiments from 2016 would be summarized in the oral presentation.

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