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Neuroscience Center, Lexington, Kentucky.

A cerebrospinal fluid (CSF) glucose biosensor is introduced. The biosensor is a polarimeter that measures the rotation of plane polarized light proportional to glucose concentration. Preliminary in vitro studies revealed a linear response with good sensitivity over a range of glucose solutions (0-400 mg/dl). Anesthetized, adult dogs underwent intravenous glucose loading, and these preliminary in vivo studies resulted in good correlation ($r = 0.98$) between CSF polarimeter readings and CSF glucose by laboratory assay. This in vivo correlation suggests that both mutarotation of glucose anomer and changes from other optically active substances present in CSF are either negligible or constant over the range of glucose concentrations studied. The CSF polarimeter showed a significant rise soon after the intravenous loading of glucose (1-30 min) but a longer lag time (45-60 min) between the peak blood glucose and peak CSF polarimeter reading. This preliminary work extends, to the CSF, the concept of measuring optical rotation.

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A Cerebrospinal Fluid Glucose Biosensor for Diabetes Mellitus

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