“This study evaluated computer algorithms for reducing temporal lags via coordinated control of drug and carrier flows.” Parker et al (2014).

Reference:

Parker, M.J., Lovich, M.A., Tsao, A.C., Wei, A.E., Wakim, M.G., Maslov, M.Y., Tsukada, H. and Peterfreund, R.A. (2014) Computer Control of Drug Delivery by Continuous Intravenous Infusion: Bridging the Gap between Intended and Actual Drug Delivery. Anesthesiology. November 21st. .

Improvement in drug delivery by pump-driven intravenous infusion http://ctt.ec/QDeTB+ @ivteam #ivteam

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Abstract:

BACKGROUND: Intravenous drug infusion driven by syringe pumps may lead to substantial temporal lags in achieving steady-state delivery at target levels when using very low flow rates (“microinfusion”). This study evaluated computer algorithms for reducing temporal lags via coordinated control of drug and carrier flows.

METHODS: Novel computer control algorithms were developed based on mathematical models of fluid flow. Algorithm 1 controlled initiation of drug infusion and algorithm 2 controlled changes to ongoing steady-state infusions. These algorithms were tested in vitro and in vivo using typical high and low dead volume infusion system architectures. One syringe pump infused a carrier fluid and a second infused drug. Drug and carrier flowed together via a manifold through standard central venous catheters. Samples were collected in vitro for quantitative delivery analysis. Parameters including left ventricular max dP/dt were recorded in vivo.

RESULTS: Regulation by algorithm 1 reduced delivery delay in vitro during infusion initiation by 69% (low dead volume) and 78% (high dead volume). Algorithmic control in vivo measuring % change in max dP/dt showed similar results (55% for low dead volume and 64% for high dead volume). Algorithm 2 yielded greater precision in matching the magnitude and timing of intended changes in vivo and in vitro.

CONCLUSIONS: Compared with conventional methods, algorithm-based computer control of carrier and drug flows can improve drug delivery by pump-driven intravenous infusion to

better match intent. For norepinephrine infusions, the amount of drug reaching the bloodstream per time appears to be a dominant factor in the hemodynamic response to infusion.

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