Intrathecal magnetic drug targeting for localized delivery of therapeutics in the central nervous system
Indu Venugopal1, Nazia Habib1 and Andreas Linninger1*
1 Department of Bioengineering, University of Illinois at Chicago, 851 S. Morgan Street, 218 SEO, Chicago, IL-60607
*Corresponding author

ABSTRACT
Aim: The challenge in treating neurological diseases is not lack of drug potency, but ineffective targeting techniques. We propose a technique called intrathecal magnetic drug targeting (IT-MDT), in which intrathecally-injected magnetic nanoparticles (MNPs) are targeted to specific sites using external magnets.

Materials & Methods: Magnetic resonance imaging (MRI) and histology confirmed localization of MNPs via IT-MDT at target sites along the spine of Sprague Dawley rats.

Results: MRI results confirmed greater MNP localization when duration of magnet application was extended. Histological analysis quantified MNP tissue uptake, and provided insight into their route of transport into deeper tissue regions.

Conclusion: IT-MDT has potential for future use in neurological disease treatments. It can produce localized therapeutic effect, with decreased systemic toxicity.

Keywords: Magnetic nanoparticles, intrathecal drug delivery, targeted delivery, magnetic drug targeting