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Controlled release intramuscular artemether-loaded poly (lactic-co-glycolic acid) PLGA microspheres for treatment of severe malaria in children

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Malaria is a parasitic disease that has plagued sub-Saharan Africa for many years and chemotherapy remains one of the principal means of combating this menace. Artemether is an artemisinin drug currently available as intramuscular injection indicated for severe malaria in children under five. The aim of the study was to develop controlled release intramuscular PLGA microspheres of artemether to replace the multiple injection regimen currently available for children under five. Two resomers of PLGA (RG5O3H and RG5O2H) were used to formulate artemether microspheres by the single emulsion solvent evaporation method. Microspheres of size range 45-90 μm were characterized using light microscopy, scanning electron microscopy and particle size analysis. *In vitro* release of artemether from the formulated microspheres in phosphate buffered saline with 0.02 % tween 80 (PBST) was undertaken under sink conditions. The degradation of the microspheres was studied by determining their mass loss, water uptake and molecular weight profiles. Well-formed, spherical microspheres with smooth surfaces were formulated at high drug loading (20-25 %) and encapsulation efficiencies (59-74 %). The microspheres showed normal size distribution with mean size of 70 and 69 μm for RG5O2H and RG5O3H polymers, respectively. Artemether was released from the microspheres through polymer erosion and diffusion. Mathematical modeling of the release of artemether from the microspheres showed that RG5O2H and RG5O3H formulations fitted the Higuchi (fickian diffusion) and Korsemeyer-Peppas (non-fickian diffusion) models, respectively. The release profiles showed that artemether was slowly released at clinically useful dosing rate for 7 days under simulated physiological conditions.