The use of injectable local anaesthetics for the treatment of severe postoperative pain is limited by the

short duration of the painkilling effect. Pre-formulation studies were carried out for the development of

an injectable microparticle formulation for controlled release of prilocaine, an amino-amide type local

anaesthetic suitable for intravenous, subcutaneous and intramuscular administration. To the best of our

knowledge, the encapsulation of prilocaine into microparticles has not been investigated yet. Three different

poly-lactic-acid (PLA) polymers were separately employed for the preparation of the microparticles.

Thermal analyses by differential scanning calorimetry (DSC) were carried out for the characterization of

the raw materials, to assess the drug–polymer compatibility and miscibility, to investigate the effects of

the production process on the components. Empty and prilocaine loaded microparticles were prepared by

double emulsion method. All formulations were fully characterized in terms of drug content, morphology,

size and in vitro drug release. The preliminary value of PRL solubility in the polymer material determined

by DSC was evaluated and discussed as a predictive value for encapsulation efficiency and controlled

release. DSC analysis turned out to be a usefulness tool for a fast polymer selection. Microparticles prepared

with PLA R202 and R203S showed desirable characteristics for subcutaneous administration and

could represent two promising formulations for the development of innovative pharmacological tools in

the treatment of postoperative pain.