P27
Nanoparticle stabilisation of liquid crystalline lipid based systems: towards pharmaceutical application
Kara Holloway1, Dr Tim Barnes1, Dr Ben Boyd2, Prof Clive Prestidge1
1Ian Wark Research Institute, University of South Australia, Adelaide, South Australia
2Monash Institute of Pharmaceutical Sciences, Monash University, Melbourne, Victoria

Objective. Liquid crystalline lipid dispersions can be utilised in pharmaceutical application for controlled or sustained release, but are typically stabilised by surfactants, creating potential toxicity. This study aims to replace surfactants with silica nanoparticles and investigate their influence on phase behaviour, carrier stability and drug release kinetics.

Methods. The stability of dispersions of the lipids, glycerol monooleate, phytantriol and glycerol monooleyl ether and influence of nanoparticles were evaluated by measurement of particle size, zeta potential and critical coagulation concentration. Confocal microscopy was used to determine nanoparticle localisation. Phase behaviour was examined using cross-polarised light microscopy and small angle X-ray scattering. Drug release studies were conducted on nanoparticle stabilised dispersions loaded with a model hydrophobic drug.

Results. A lipid to hydrophilic silica ratio of 10:1 was found to be sufficient for dispersed phase stability, while hydrophobic silica caused aggregation. Stability of particle size was shown over several weeks and is important for long term storage in drug carrier applications. Colloidal stability studies revealed critical stabilisation concentrations, with bulk phase incorporation of hydrophilic silica giving increased stability compared to the control (lipid-only). Phase behaviour was significantly affected by the nanoparticles, e.g. formation of phases with higher apparent water content than the control. Confocal microscopy revealed nanoparticles were more dispersed when added after bulk phase preparation than during preparation. Drug release kinetics is modulated by the inclusion of nanoparticles.

Discussion. Stability of dispersed phases over time using hydrophilic nanoparticles is due to the energy required to remove particles from the interface into the continuous phase. Hydrophobic silica formed multiple layers around a liquid crystalline "core", with the dispersed particles aggregating over time. Increased stability of dispersed phases with incorporated hydrophilic nanoparticles may be attributed to short-range hydration forces. Hybrid drug carriers composed of liquid crystalline lipids and nanoparticles offer a number of properties for the enhancement of drug delivery.

P28
An evaluation of the clinical efficacy of kunzea oil formulations in the therapeutic management of psoriasis in adults
Thomas, J (1), Narkowicz, CK (1), Jacobson, GA (1), Peterson, GM (1), Basson, S (2)
(1)University of Tasmania, Hobart, Tasmania, (2) General Practitioner, Launceston, Tasmania

Introduction: Psoriasis is a very common, non-infectious inflammatory skin disease and is frequently found on the extensor skin surface of elbows and knees, scalp and other sacral areas. Current treatment options are only effective in reducing psoriasis symptoms temporarily. Kunzea oil in an ointment base has been used for the management of inflammatory skin diseases including psoriasis and eczema with anecdotal reports of its effectiveness. Kunzea oil has been listed as a therapeutic substance by the Therapeutic Goods Administration in Australia for topical application to treat various dermatological ailments (AUSTL 72143; 1996). The objective of this 8-week randomised, double-blinded, controlled clinical study was to assess the safety and efficacy of kunzea oil containing formulation(s) in subjects with mild to moderate plaque psoriasis.

Methods: Seventy six subjects (responded to a news paper article describing the study) were recruited through a GP surgery. Thirty subjects with clinically confirmed symptoms of psoriasis were enrolled into study after a wash-out period (2-6 weeks) with 15 subjects in each of the two treatment arms. Subjects were supplied with pre-coded 100 g ointment and/or 100 ml scalp lotion containing 20% kunzea oil (test group) or control medications not containing kunzea oil (control group). Formulations in both treatment arms contained 5% liquid coal tar solution. Subjects were assessed at follow-up clinics after 2, 4 and 8 weeks. Treatment efficacy was assessed by using a validated Psoriasis Area and Severity Index (PASI). Additionally, pruritus was evaluated by subjects using a visual analogue scale (VAS) score.

Results: A total of 26 subjects, 10 men and 16 women, completed the study and were included in the final efficacy analysis. After the completion of the study period, both test and control groups demonstrated a significant (P<0.05) improvement in PASI scores. The incidence of adverse events was low for both groups, with one subject withdrawing from the trial (test group) due to the mild to severe headache, resulted from the odour of the test formulation. Subjects in the test group had a decrease in mean (± s.d.) PASI scores 12.7 ± 7.9 to 6.7 ± 7.2, an improvement of 51.3%. The control group showed a decrease in PASI scores from 8.1 ± 4.6 to 3.5 ± 4.7, an improvement of 59.6%. Comparative efficacy analysis between the test and control groups did not reveal a difference (P>0.05).

Discussion: The inclusion of kunzea oil made no difference to the efficacy of the topical formulations.