PAD TECHNOLOGY™-BASED CAL/BDP CREAM DEMONSTRATES SUPERIOR HUMAN SKIN FLUX PROPERTIES COMPARED TO TOPICAL SUSPENSION/GEL

Nigel Crutchley[1], Michelle Georgiou[2], Morten Præstegaard[1], Fraser Steele[2]

[1]MC2 Therapeutics, Hørsholm, Denmark; [2]MC2 Therapeutics, Guildford, UK

OBJECTIVE

- Demonstration of the *in vitro* diffusion of calcipotriene (CAL) and betamethasone dipropionate (BDP) through human epidermis from CAL/BDP cream compared to CAL/BDP Topical Suspension (TS)/gel.

INTRODUCTION

- The topical co-administration of CAL and BDP is a convenient treatment of plaque psoriasis, but good skin permeation of both drugs is necessary for efficacy[3].
- Polyaphron (PAD) Technology™ (**Figure 1**) is a novel formulation and drug delivery system that enables the efficient topical delivery of challenging molecules, while maintaining high tolerability and favorable topical presentation[1].
- PAD Technology is characterized by a multimolecular outer shell consisting of surfactant, oil and water that forms a robust 3-dimensional bicontinuous shell structure around the oil droplet.
- Efficient drug delivery is ensured by fully solubilized drugs, the semi-occlusive nature of the formulation and an optimized ratio of excipients and low levels of surfactants enabled by PAD Technology.

METHODS

- A Franz diffusion study using human epidermis from a healthy female donor.
- 30 mg of CAL/BDP cream or CAL/BDP TS was applied to each Franz diffusion cell. Six cells were used for each formulation. Both formulations contain 0.005% w/w calcipotriene and 0.064% w/w betamethasone dipropionate.
- At time intervals of 16, 24, 40, 48, 64 and 72 hours the receptor phase was removed for analysis for the two compounds by UPLC and replenished. Following the protocol of Simonsen et al (2004)[2], further aliquots of the test materials were applied at 16, 40 and 64 hours.

RESULTS

- Consistently higher amounts of CAL and BDP diffused through the epidermis from the PAD Technology based cream compared with the TS/gel (**Figure 2**).
- The cream delivered significantly greater amounts of both BDP and CAL over the 72h timescale of the experiment.

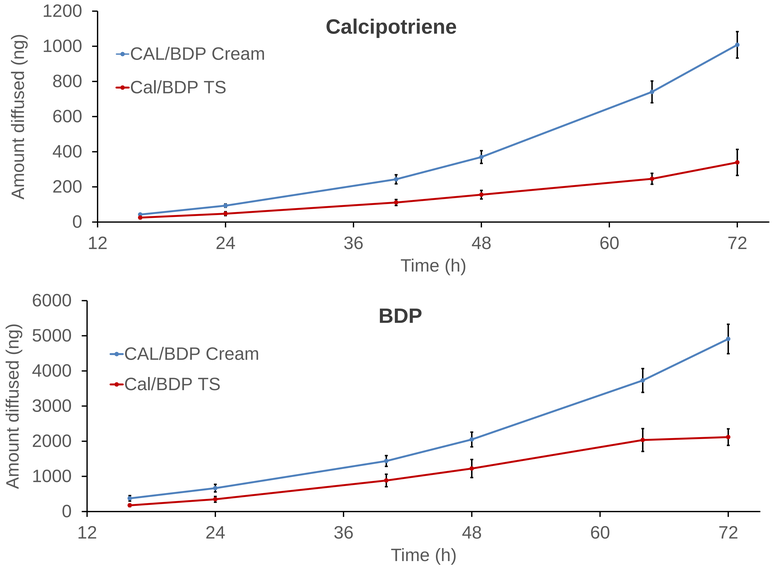

Figure 2. Comparison of diffusion of CAL and BDP over 72 hours through epidermis. Error bars are standard error, n = 6.

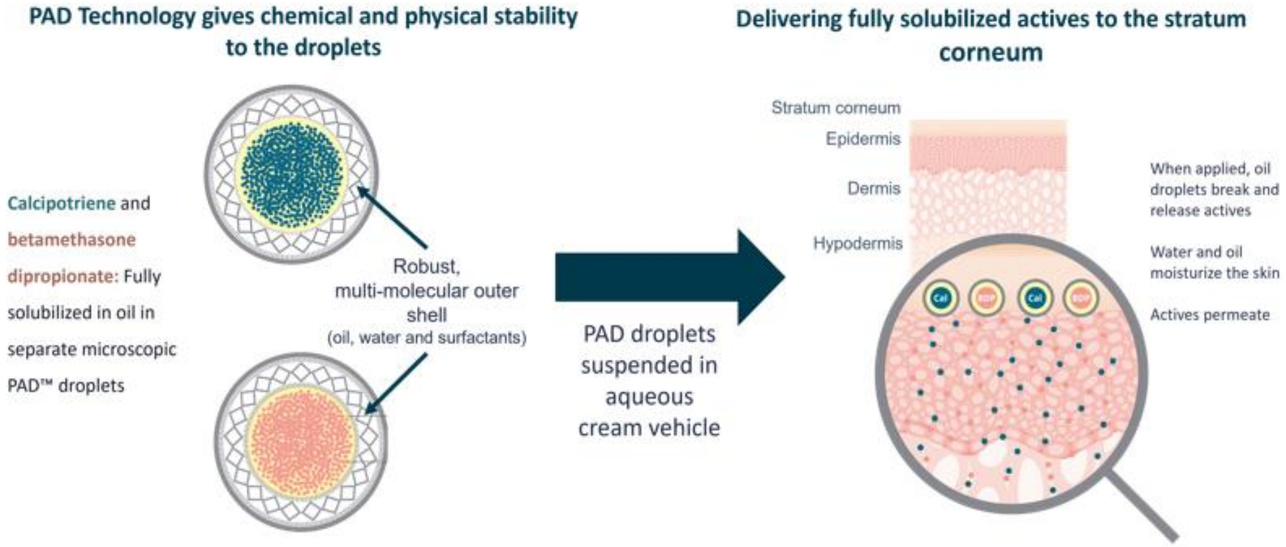

Figure 1. Illustration of PAD Technology formulation oil-in-water droplets and release of drug through stratum corneum into the skin upon application. CAL and BDP are fully solubilized in separate microscopic PAD Technology oil droplets.

CONCLUSIONS

- CAL/BDP cream is an innovative topical treatment for plaque psoriasis based on PAD Technology.
- The PAD droplets ensure that the active ingredients are stabilized and delivered to the stratum corneum where they are absorbed.
- CAL/BDP cream delivered significantly more CAL and BDP through the epidermis than CAL/BDP TS/gel.

REFERENCES

1. Praestegaard et al. Dermatology & Therapy, 2022. doi: 10.1007/s13555-022-00794-y
2. Simonsen,L.; Høy, G.; Didriksen, E (2004) DDIP 30(10) 1095-1102
3. Stein Gold et al. J Drugs Dermatol. 2021 Apr 1;20(4):420-425. doi: 10.36849/JDD.2021.5653