OBJ LIMITED

transdermal drug delivery technology

PRESS RELEASE

Thursday 17th March 2005

FOR IMMEDIATE RELEASE

Presentation to the 39th Annual Conference Australian Society Cosmetic Chemists

OBJ Limited (OBJ) is pleased to release the materials that will be presented by Dr Heather Benson, Drug Development Department, Curtin University at the 39th Annual Conference of the Australian Society Cosmetic Chemists to be held in Brisbane between Match 17th and 20th.

-ENDS -

Background to the Announcement

OBJ Limited is a drug delivery company, developing electronic "drug patch" technologies that allow drugs, therapeutic agents and cosmetic compounds to be delivered more effectively and more efficiently through-the-skin.

OBJ's technology works by temporarily changing the skin's barrier effect. As this does not involve a change to the target drug or compound, new and effective delivery strategies can be created without the necessity for the drug to undergo costly re-registration. This provides pharmaceutical companies with a market friendly, cost effective and safe route of administration for many existing and newly created drugs and compounds.

The company had previously announced a 600% increase in the rate of delivery of the drug caffeine and a 70% reduction in the through-the-skin delivery times for the anaesthetic drugs lignocaine and prilocaine hydrochloride. More recently, it had demonstrated precise control over drug delivery rates and recent finding added an additional time- based control mechanism previously not seen in the drug delivery sector.

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Independence of Results

OBJ contracts its drug and technology testing programs to independent and respected organisations, such as Western Australian Biomedical Research Institute or WABRI and Universities.

WABRI is a government owned and funded drug development and testing facility operated by Curtin University. The high level of independence and international accreditation means that the results by OBJ can be published and presented at major medical and scientific conferences and forums.

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ABSTRACT

DERMAL DELIVERY ENHANCEMENT BY DERMAPORTATION – A NOVEL PENETRATION ENHANCEMENT TECHNOLOGY

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Dermaportation is a novel skin penetration enhancement technology. It involves application of an inductive energy field to the skin which we propose acts on the ordered structure of the stratum corneum lipid bilayers to reduce the barrier effect of this domain to the ingress of solutes.

The influence of Dermaportation (30 min application time) on the penetration of caffeine across excised human epidermal membranes was investigated using Franz-type diffusion cells and standard procedures. Four different Dermaportation energy cycles were designed and compared with passive diffusion. The amount of caffeine in the receptor solution (phosphate buffered saline) was determined by HPLC with UV detection at time intervals up to 4h post application. Caffeine flux values were determined for each of the Dermaportation energy cycles and compared to passive diffusion.
Dermaportation increased caffeine flux, with up to 19.24 □g.cm^{-2}.h^{-1} compared to passive diffusion of 1.83 □g.cm^{-2}.h^{-1}. Further studies to optimize this novel skin penetration enhancement technology for application to therapeutic and cosmetic applications are being conducted.

Dermaportation – a novel dermal penetration enhancement technology

Heather Benson, Sarika Namjoshi
& Jeff Edwards

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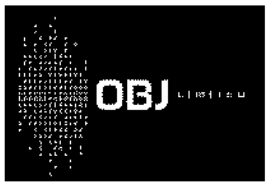

Transdermal Drug Delivery

- Convenient and patient friendly
- Avoid first pass metabolism: lower dose and reduced side-effects
- Controlled release: better control of symptoms, extended dosing intervals and reduced side-effects
- Major limitation: skin permeability – few TDD applications currently available

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Skin Penetration Enhancement

- Optimise physicochemical characteristics of active and/or formulation
- Chemical penetration enhancers
- Physical penetration enhancers
  - Iontophoresis
  - Electroporation
  - Sonophoresis/phonophoresis
  - Dermaportation

Dermaportation: inductive energy

- The only non-invasive technique to target dermis as well as epidermis
- Low induced energy – typically 0.7 volts
- No physical contact required
- Control over delivery rates and depth
- Larger and more complex molecules
- Suitable for low-cost disposable drug patches

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Dermaportation: theory

- Induces bio-electrical potentials across lipid bi-layer
- Discharge path alters lipid concentration around piercing proteins
- Creates controlled temporary pathways
- Reorganisation rates can be influenced by secondary fields

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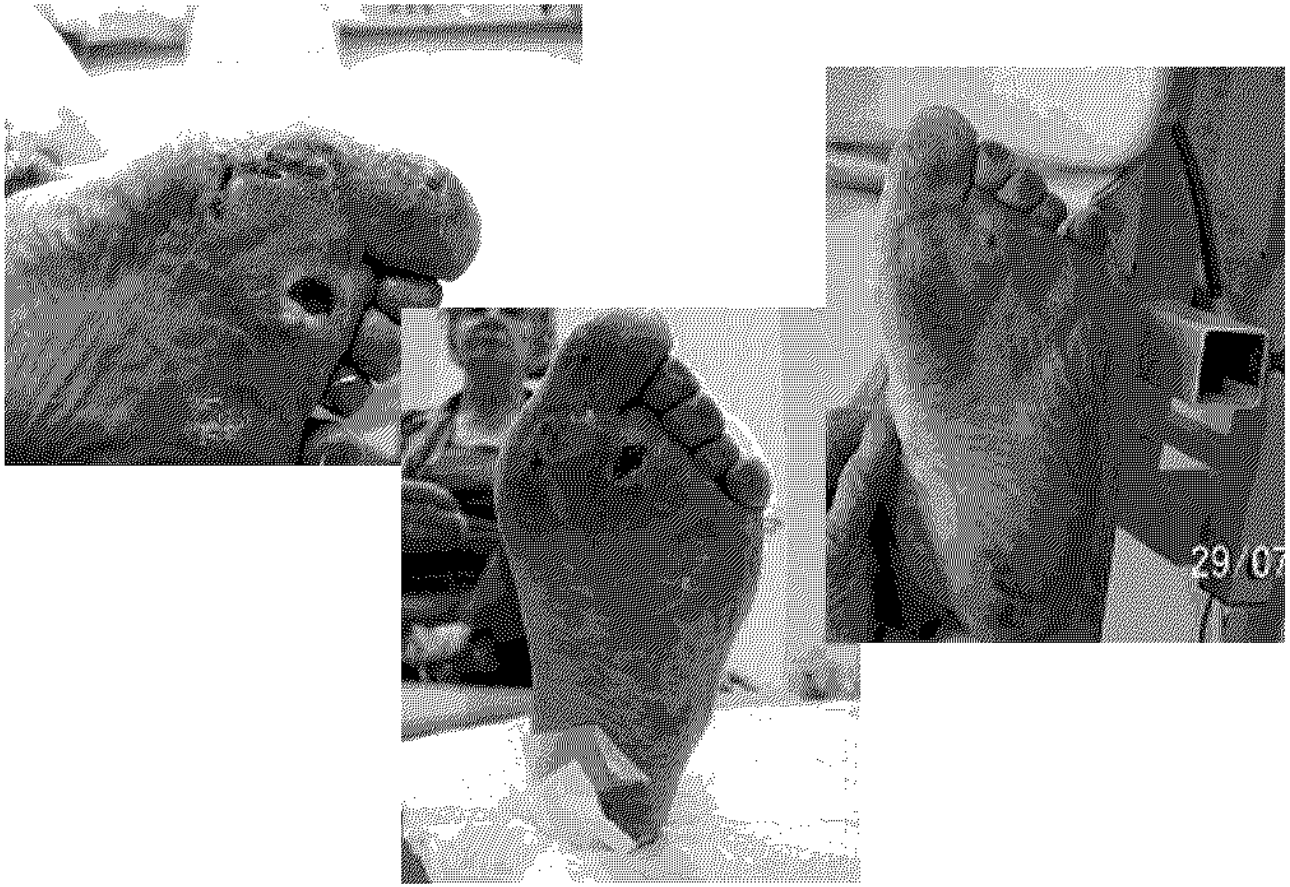
Diabetic neuropathy – ulcers
HA & Dermaportation



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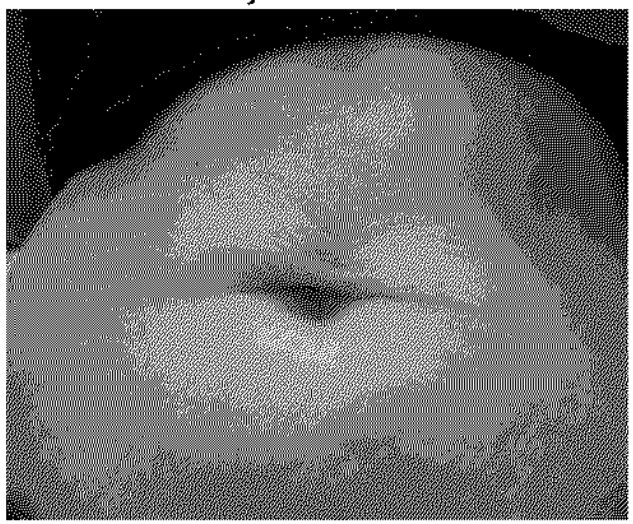
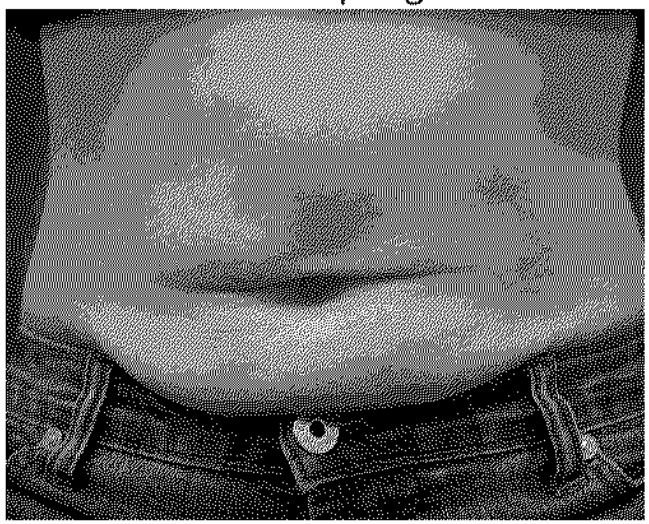
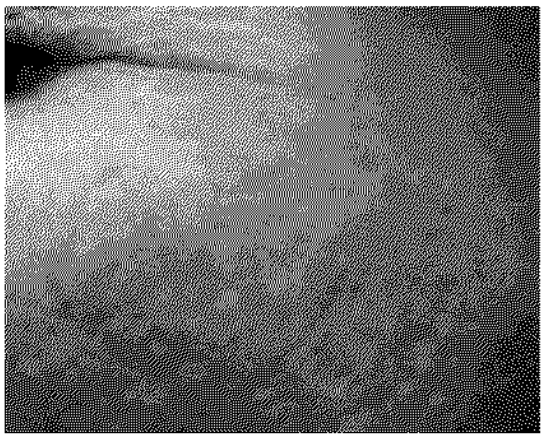
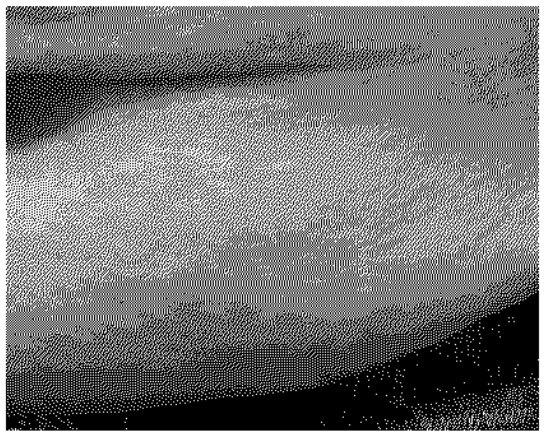
Postnatal Stretchmark Treatment using Dermaportion to increase bio-availability of standard Tretinoin cream - 12 week program









September 2004

December 2004

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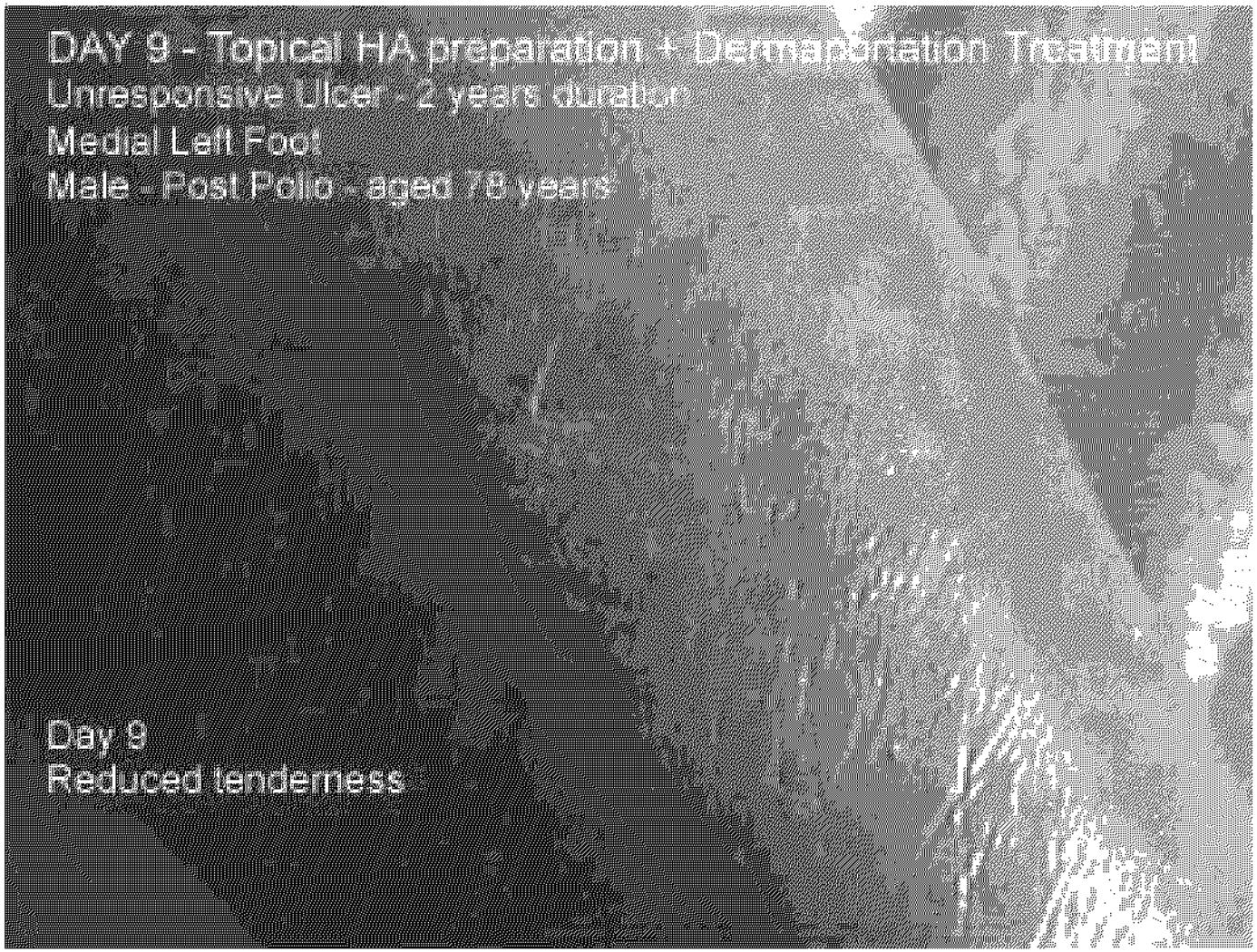

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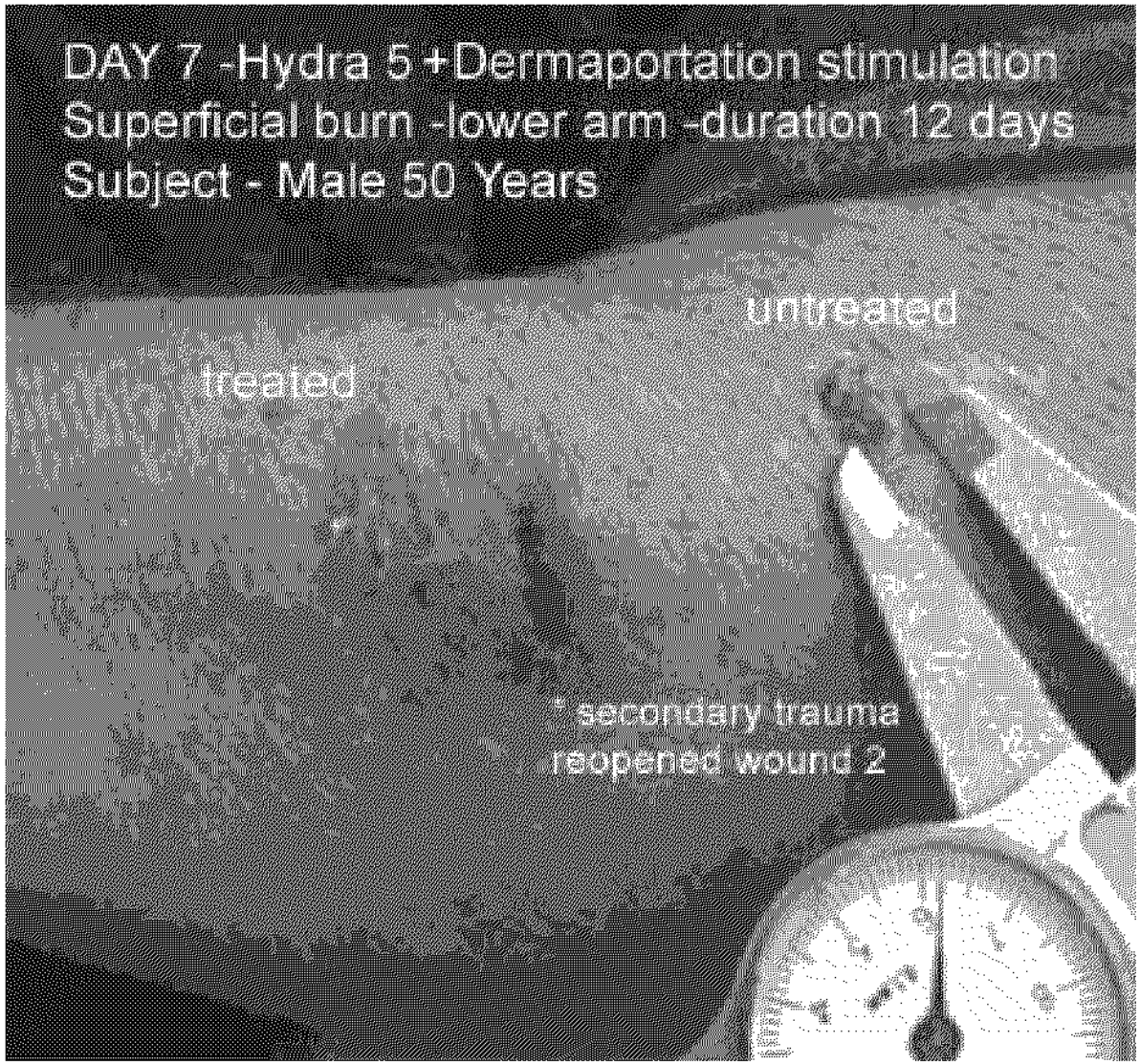

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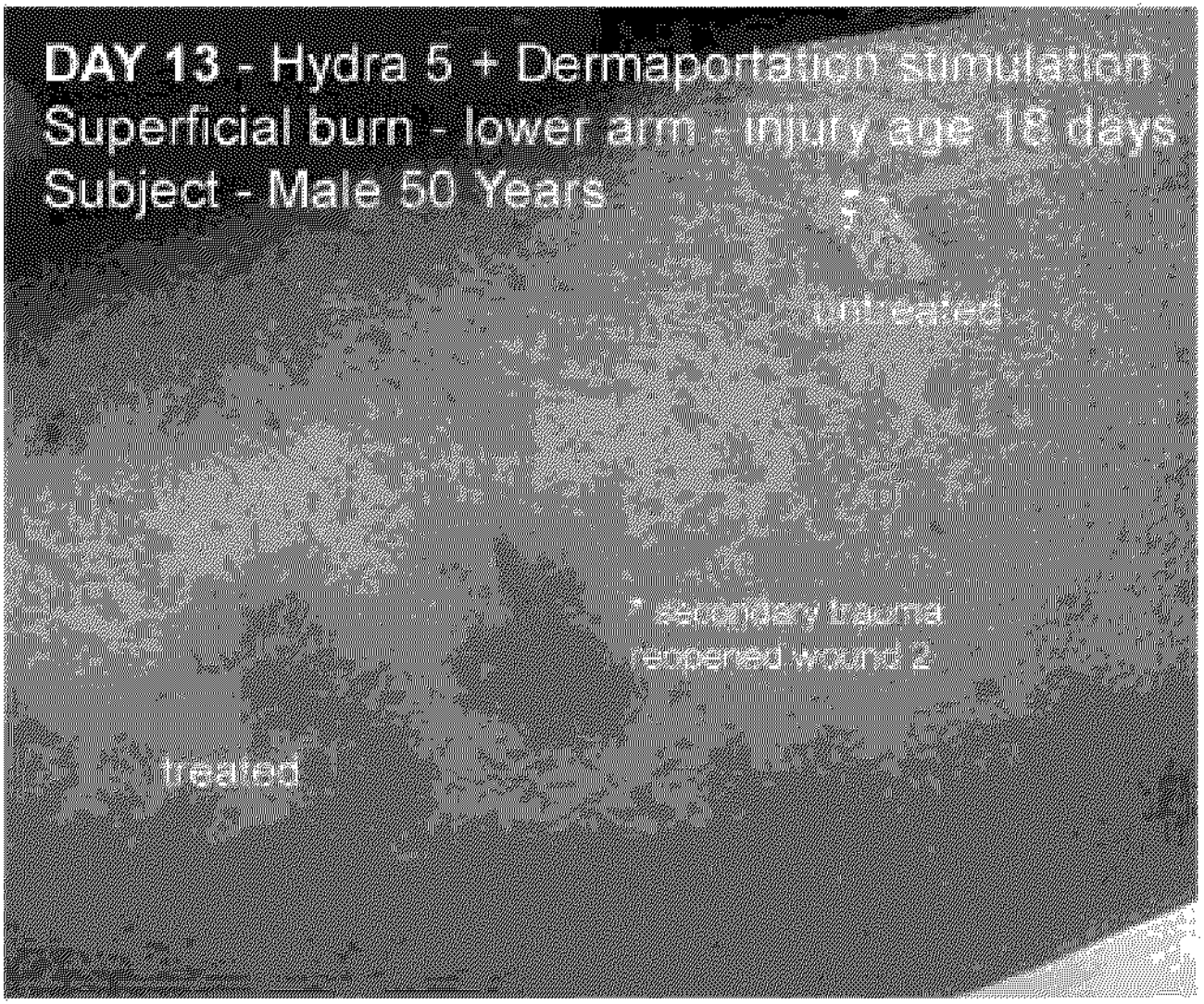

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Dermaportation – clinical applicator

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Preliminary investigation: effect of Dermaportation on permeation of caffeine across human epidermis

- Donor: 1 ml caffeine aqueous solution (100 μg/ml) applied under occlusion
- Receptor: isotonic phosphate buffered saline (pH 7.4) at 37°C stirred continuously
- Membrane: human epidermis (female abdominal site) heat separated by conventional method
- Dermaportation applied for 30 min
- Receptor solution analysed for caffeine content by HPLC over 2.5 h; donor analysed at 2.5 h

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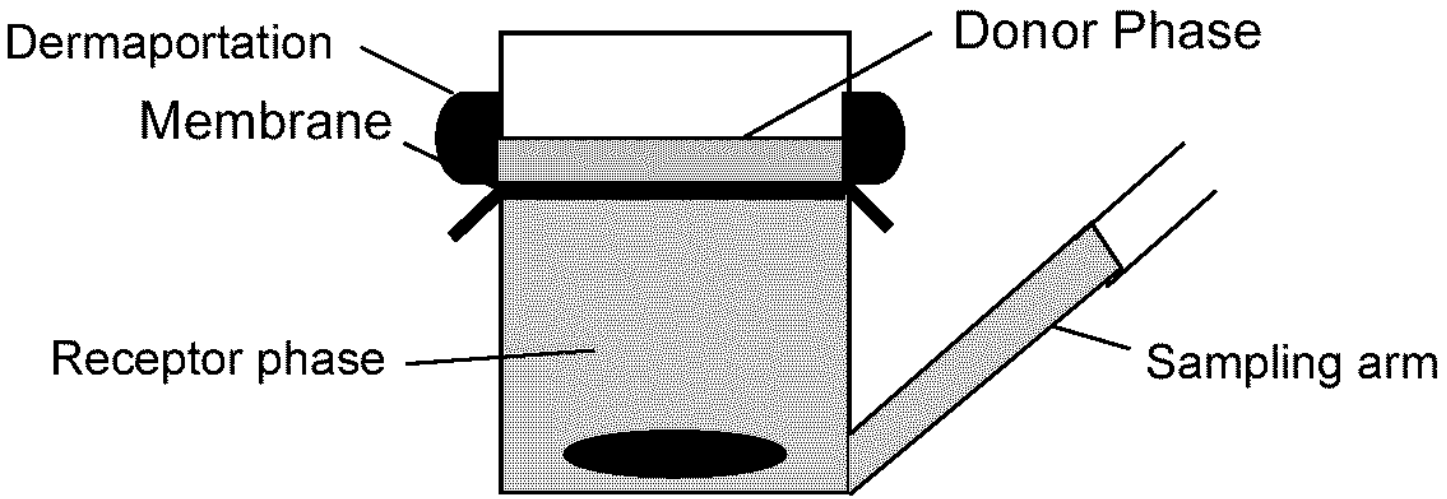
Dermaportation – in vitro diffusion protocol



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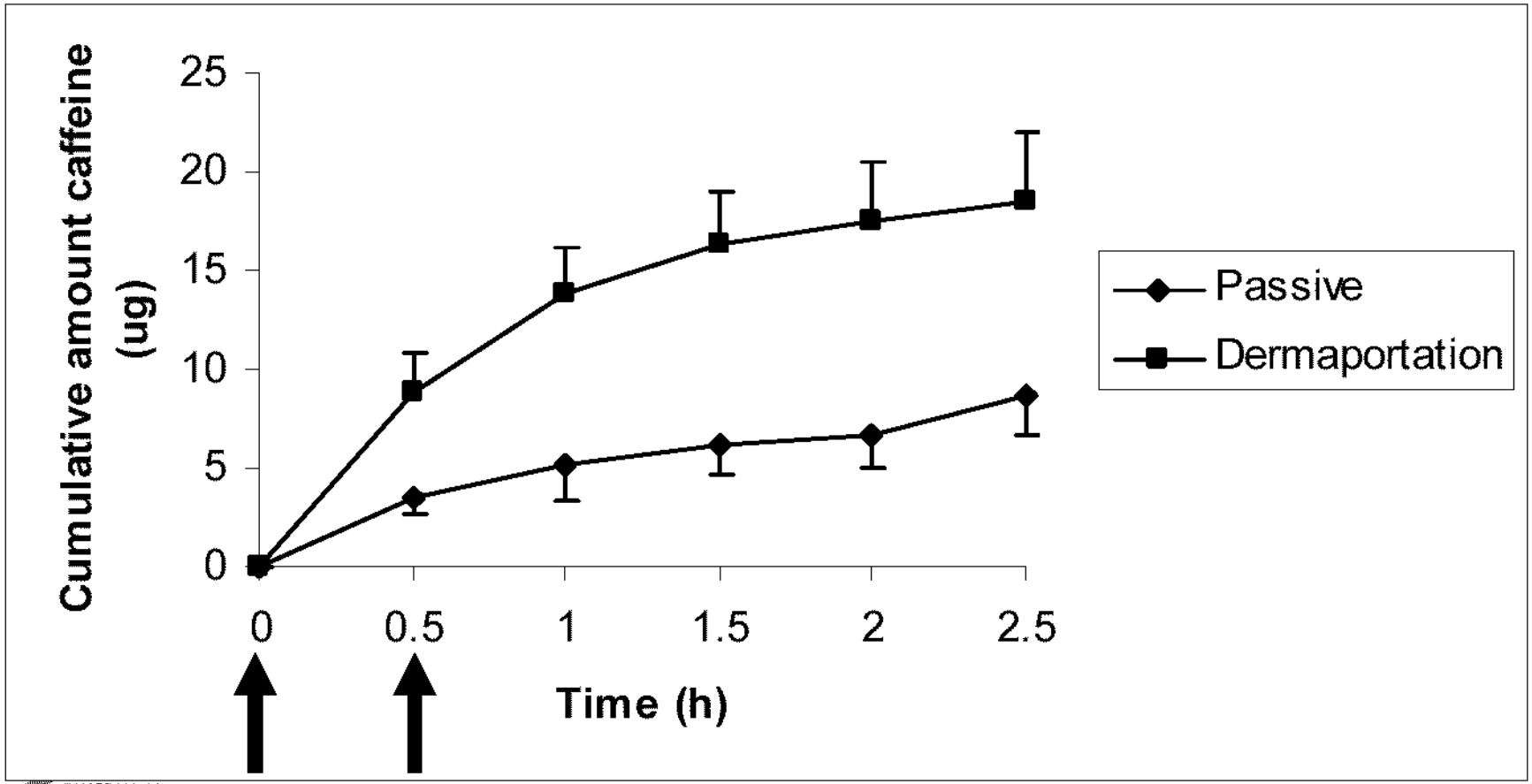
Dermaportation vs passive diffusion of caffeine across human epidermis (mean ± sem; n=4-5)



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Dermaportation energy cycles: influence on caffeine flux

- Donor: 1ml caffeine solution (100 μg/ml)
- in vitro protocol as described previously
- Energy cycles: 4 different combinations of waveforms/intervals tested, parameters:
  - Total energy transfer (TET):- the total number of inductive units delivered to the target tissue per second,
  - Tissue integration period (TIP):- the period to allow the integration of the inductive effect
  - Waveform shape and duration (WSD)

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Dermaportation: caffeine flux and enhancement ratios (ER) at range of energy cycles

	Flux during Dermaportation ($\mu g.cm^{-2}.h$)	ER during Dermaportation	Flux: period after Dermaportation ($\mu g.cm^{-2}.h$)	ER period after Dermaportation
Passive	0.5		0.4	
Cycle 1	0.6	1.2	0.6	1.2
Cycle 2	17.6	35.2	9.9	19.8
Cycle 3	19.2	38.4	6.9	13.8
Cycle 4	3.5	7.0	6.7	13.4

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Dermaportation: further development

- In vitro penetration enhancement assessment for other drug and cosmetic applications including:
  - Hormones: testosterone, estradiol
  - Pain management: fentanyl, NSAID
  - Cosmetic: retinol, anti-oxidants
- Clinical/volunteer studies including:
  - 5-aminolevulinic acid in photodynamic therapy of basal cell carcinoma
- Applicator design – disposable device

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