MedPharm

CASE STUDY

Demonstrating the Skin Penetration Potential of a Large Aptamer

Challenging traditional molecular weight limits in topical drug delivery

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The Challenge

Topical drug delivery has long been constrained by the belief that molecules larger than 1,000 Daltons cannot penetrate the skin at therapeutic levels. This assumption has limited the development of large-molecule therapies for dermatological diseases.

A sponsor sought to evaluate whether a high molecular weight aptamer could penetrate the skin and demonstrate biological activity, challenging established paradigms in drug delivery.

Approach

MedPharm collaborated with GSK and the University of Reading to assess the penetration and activity of a large aptamer:

- Developed disease-relevant skin models to evaluate drug delivery under physiological conditions
- Selected a 22 kDa aptamer, a large RNA-based molecule with therapeutic potential
- Applied the formulation to targeted skin models designed to assess penetration and activity
- Measured skin penetration and distribution of the aptamer
- Evaluated biological activity to determine therapeutic relevance
- Generated data to challenge traditional assumptions around molecular size limits

Outcome

- Demonstrated successful penetration of a 22 kDa aptamer through the skin barrier
- Confirmed measurable biological activity following penetration
- Challenged the long-standing “1,000 Dalton rule” in topical drug delivery
- Generated data supporting the feasibility of large-molecule topical therapies
- Results published in the Journal of Investigative Dermatology

Why This Matters

Expanding the range of molecules that can be delivered through the skin opens new opportunities for treating complex dermatological diseases. By challenging established assumptions, MedPharm enables the development of innovative therapies that were previously considered unviable.