Development of an ex vivo skin model for the assessment of intradermal administration

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INTRODUCTION

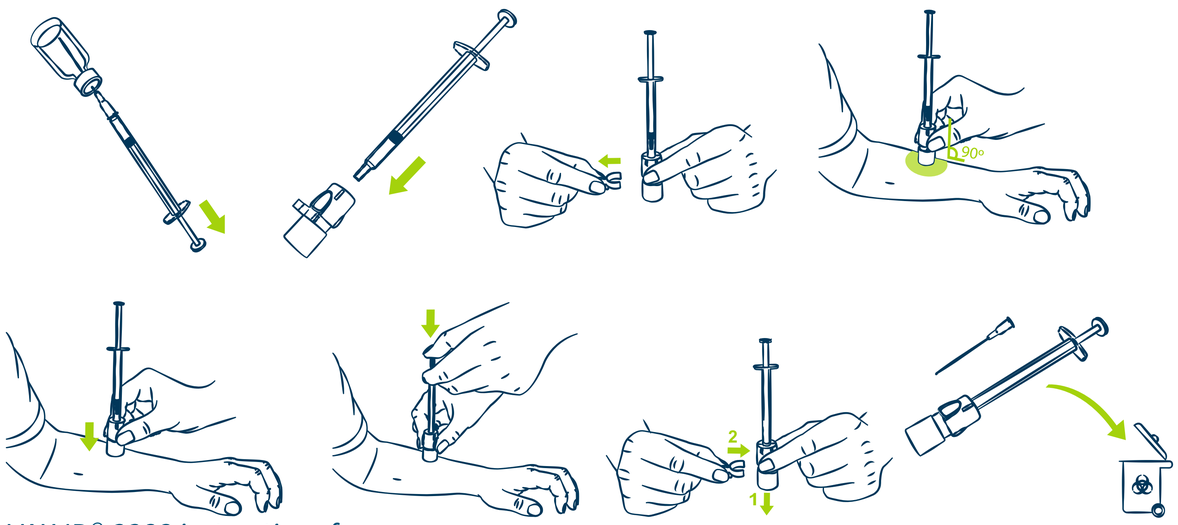
Skin models are critical for the development and evaluation of the VAX-ID® device, an intradermal injection adaptor designed to enable standardized, reproducible, and user-friendly delivery of medicinal products like vaccines into the skin. The present study builds on previously collected skin thickness data from humans and across commonly used laboratory animals to support the development of a relevant ex vivo skin model.



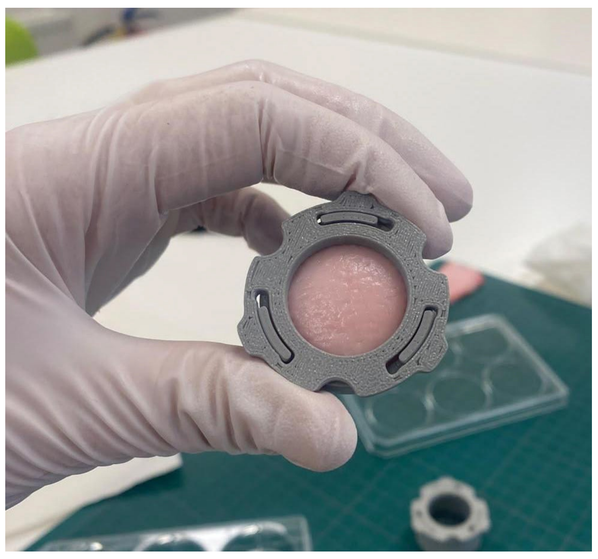
VAX-ID® 2200, 32G variant, intradermal injection adaptor

METHODOLOGY

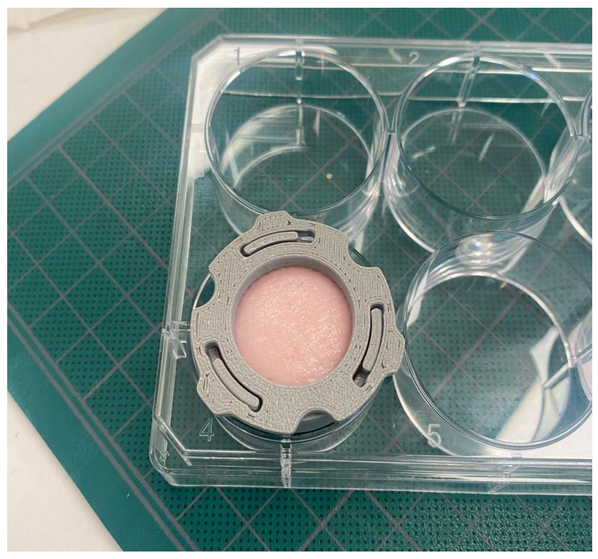
A deep dive into own skin thickness as well as a literature review was conducted to assess skin thicknesses in humans as well as animal species commonly used in preclinical research. These insights were used to develop an in-house ex vivo porcine skin model, using a custom clamping structure to secure 24mm diameter skin pieces within a 6-well plate containing culture medium.



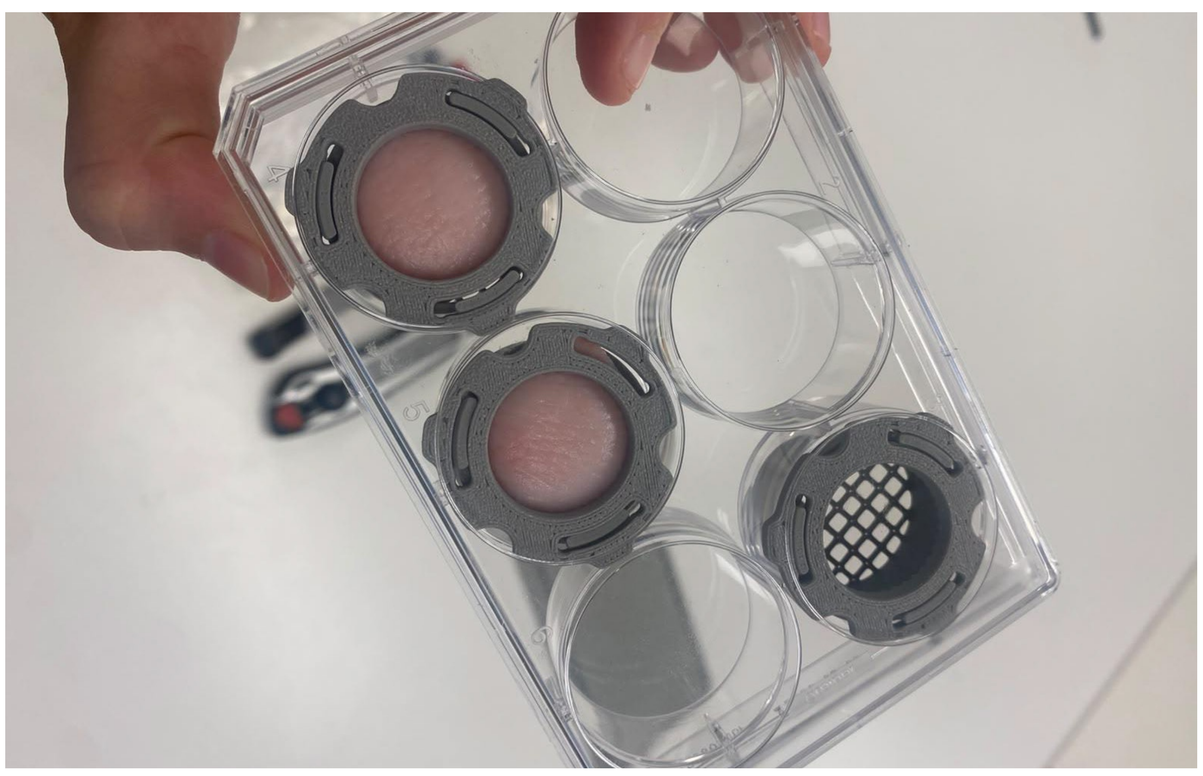
VAX-ID® 2200 instructions for use



Piglet skin clamped into the skin holder



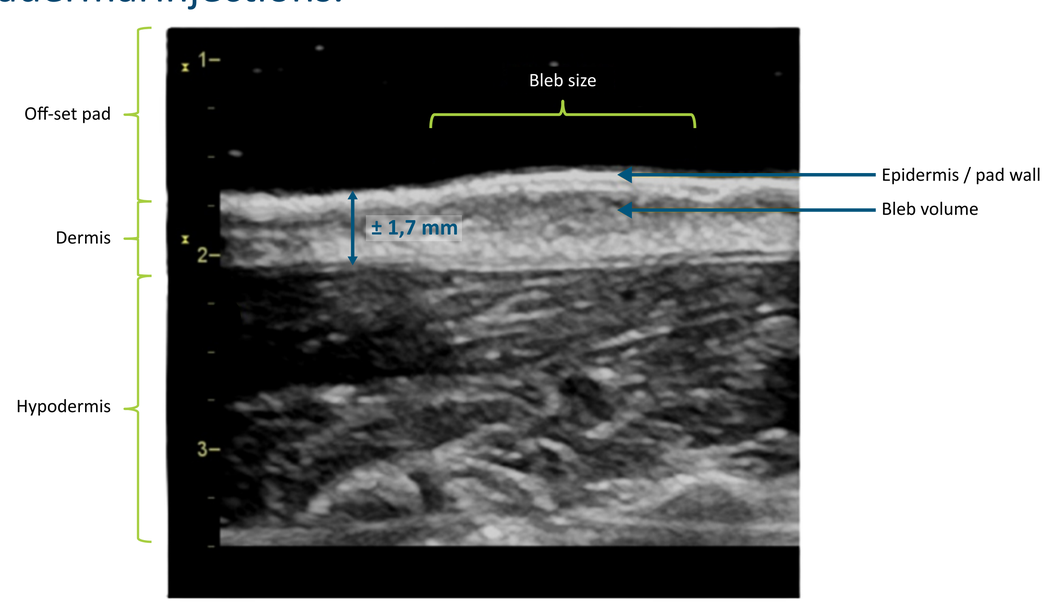
Skin holder with piglet skin fitting into the well plate



Skin holders placed into the 6-well plate

RESULTS

A literature review indicated that mice have the thinnest skin, with reported thicknesses ranging from 0.2 to 0.7 mm[ab]. Hamsters[c], guinea pigs[d], and macaques[e] exhibited intermediate skin thicknesses of approximately 1.2 mm. Human and porcine skin showed the greatest similarity, with average thicknesses of around 1.7 mm and comparable structural characteristics[f]. Therefore, 24 mm diameter porcine skin pieces were incorporated into the *ex vivo* skin model. Preliminary studies demonstrated the feasibility of this model, while the custom clamping system ensured consistent skin tension, providing a reproducible and reliable platform for the evaluation of intradermal injections.



Ultrasound of skin of Landrace Piglet injected with VAX-ID® 32G

RESULTS

The ex vivo porcine skin model, incorporating a custom clamping structure integrated into a 6-well plate, provided a reliable platform for the assessment of intradermal injections. In the future, this model may serve as a valuable tool to investigate dermal deposition following intradermal administration of various substances. Furthermore, adaptation of the model using human skin could enhance its translational relevance and support the evaluation of intradermal delivery devices such as VAX-ID®.

REFERENCES

a. Wang et al, 2015 (PMID:25803703), b. Kocsis et al, 2024 (ISSN: 23489790), c. Chernova et al, 2022 (https://doi.org/10.1134/S1062359022090096),
d. Ferry et al, 1995 (PMID: 7770477), e. Dittus et al, 2015 (PMID: 25715692), f. Krumpholz et al, 2022 (PMID: 36208224)

VAX-ID®

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