

Microneedle Penetration Evaluation System

Visualization of Penetration Characteristics and Pharmacokinetics with Dynamic Skin Model

Overview

Microneedles deliver drugs by coating or loading therapeutic agents onto fine needles that penetrate tissues and release the drug in a minimally invasive manner. However, pharmacokinetic evaluations have so far relied on the assumption that sufficient drug amounts were successfully administered to achieve therapeutic effect. This has limited the quantitative assessment of safety and efficacy.

Our system enables quantitative evaluation of microneedle penetration behavior—such as penetration depth, direction, and the range of affected tissue—within a simulated skin environment that can reproduce mechanical properties like pulsation and viscoelasticity. These features allow realistic replication of the dynamic interactions that occur during microneedle insertion.

Using stereo camera-based measurements, the system captures both the physical penetration process and the dynamic deformation of the target with high precision.

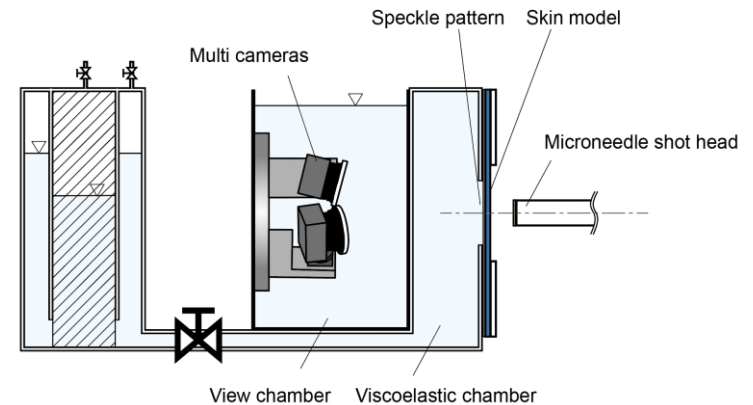
Applications

- ☐ Analysis of the correlation of drug delivery efficiency with penetration parameters
- ☐ Standardized and reproducible penetration testing
- ☐ Design optimization and data acquisition for marketing or regulatory support

IP Data

IP No. : JP 2024-146369 A
Inventor : Y. Shiraishi, A. Fukaya, T. Yambe
Admin No. : T22-113

Device



- (1) Equipped with a tissue-mimicking model
- (2) Measurement of mechanical deformation in the model
- (3) Adjustable mechanism for model material properties
- (4) Dynamic actuation mechanism simulating tissue motion
- (5) Model mounting unit for test specimens
- (6) Model fluid loading and sampling

Contact

Tohoku Techno Arch Co., Ltd.

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