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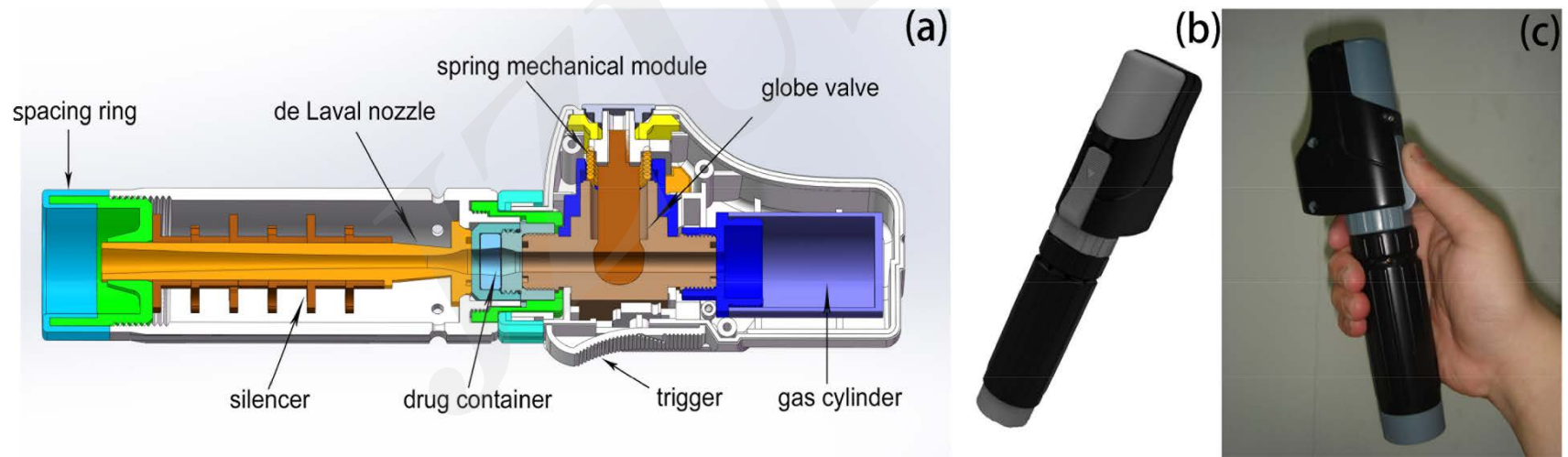
# **Needle-free injection of insulin powder: delivery efficiency and skin irritation assessment**

Key words: Powder needleless injection, Insulin, Transdermal drug delivery, Skin irritation

# Research Summary

Insulin is widely used in treating diabetes but it still needs to be administered by needle injection. This study investigated a new needle-free delivery approach of insulin. The following aspects are *innovation points*:

## 1 Automatically mechanical unit design



## 2 The relative delivery efficiency of insulin powder via a newly designed PNI device was 72.25%. ( See in paper: Table 3; Page 12.)

In paper: Table 3(*Page 12*)

Group	AAC	Relative delivery efficiency of PNI	Absolute delivery efficiency of PNI
N/S	152.34±33.87	-	-
N/S-P	58.99±12.66	-	38.72%
PNI-P	42.62±8.58	72.25%	27.98%
PNI-Raw	0.02±0.008	0.03%	0.01%

**3 The optimized injection conditions for the PNI device revealed minimal skin lesions and are safe to use in practice. The results are as follows: a gas pressure of 3.5 MPa, a cylinder volume of 5 ml and a nozzle distance of 3.5 cm. (see in paper:Table 1,Table 2 and Figure 2;Page 7-8.)**

