

Transdermal Delivery of Functional Collagen via Polyvinylpyrrolidone Microneedles

Running head: Transdermal Delivery of Collagen via Microneedles

Wenchao Sun,^{1,2,§} Mohammed Inayathullah,^{1,2,§} Martin A.C. Manoukian,^{1,3} Andrey V. Malkovskiy,¹ Sathish Manickam,¹ M. Peter Marinkovich,^{3,4} Alfred T. Lane,³ Lobat Tayebi,^{5,1} Alexander M. Seifalian,⁶ and Jayakumar Rajadas^{1,2,*}

Supplementary Figures Sun et al. Manicript ID ABME-D-15-00033

Supplementary Figure S1. Sun et al.

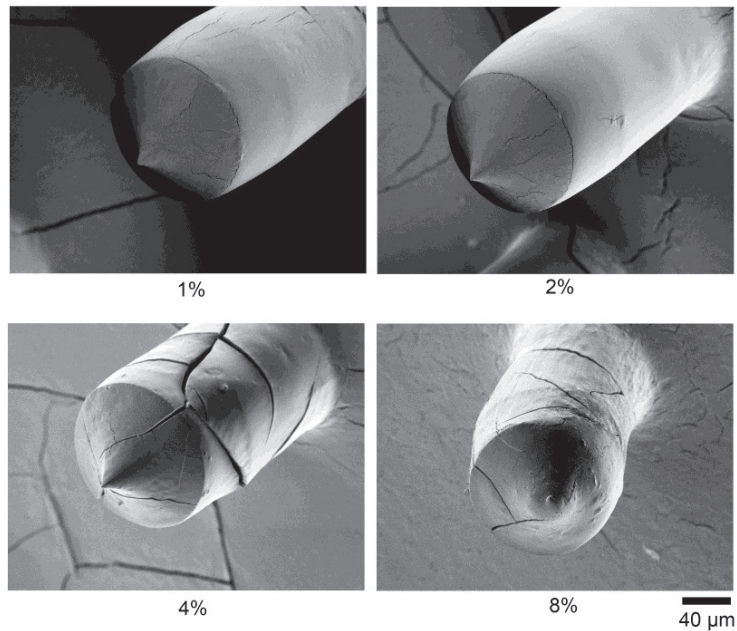


Figure S1. SEM images showing slightly melted needles from 1, 2, 4, 8% C1 microneedles.

At 8%, more bent and dull needles were observed.

Supplementary Figure S2. Sun et al.

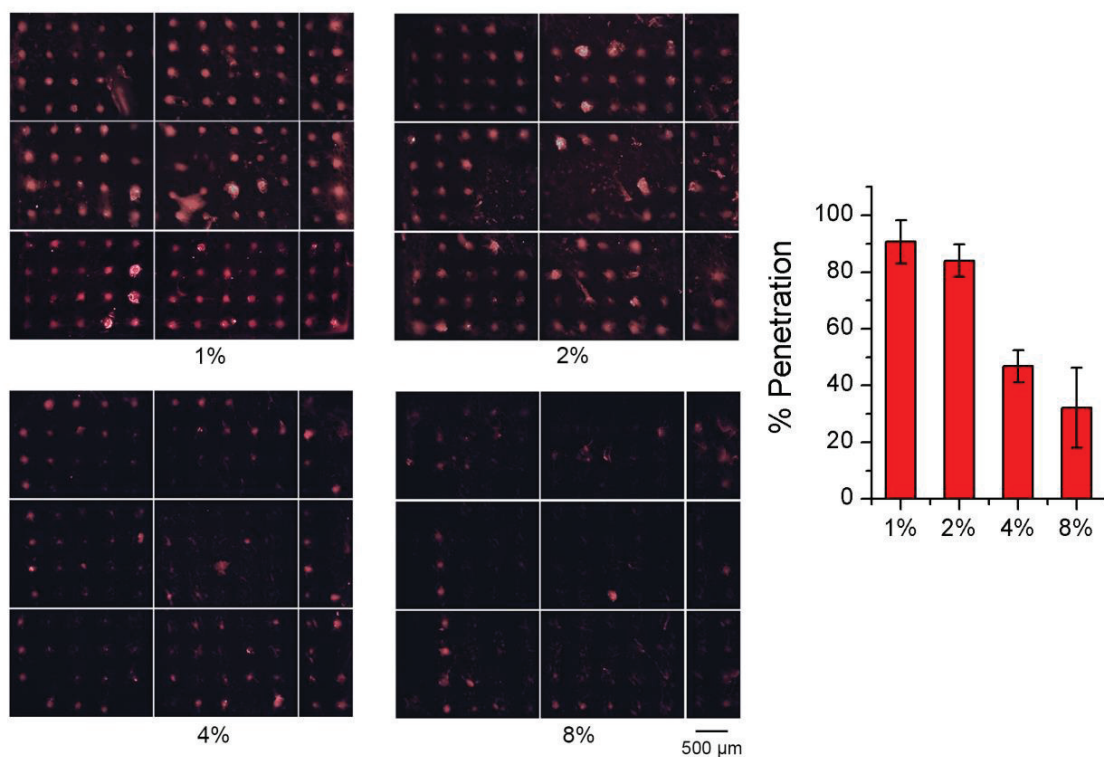


Figure S2. Penetration efficiency of microneedles with different collagen concentrations. All the microneedles contain 1% Rhodamine labeled C1. For 2, 4, 8% C1 microneedles, 1% labeled C1 was mixed with unlabeled C1 to reach the final concentrations. This enables comparison of penetration efficiency, not total protein delivery. Porcine skins were used. After microneedle application, the skin was cleaned to remove collagen on the surface and the needle marks (12×12 array) was examined by a fluorescence stereomicroscope (Leica M165 FC with DSR filter). Each distinct fluorescent needle mark was counted as a penetration site. The penetration efficiency was quantified as the number of needles penetrated/total number of needles (mean \pm SD, $n = 3$).