CLAIMS

1. An array of hollow microneedles for rapid, high-volume, intradermal infusion with minimal pain, the array comprising:

10 to 30 hollow microneedles having a length of greater than 100 μm, with a microneedle spacing of no less than 1.5 mm on average between adjacent microneedles;

the microneedle array capable of pumping greater than 200 μL through the hollow microneedles at a rate of greater than 20 μL/min.

2. The microneedle array of claim 1, wherein the array has 13 to 20 microneedles.

3. The microneedle array of claims 1 or 2, wherein the hollow microneedles have an average channel bore of 20 to 50 μm^2 cross-sectional area.

4. The microneedle array of any preceding claim, wherein the microneedles have a length of between 500 μm and 750 μm.

5. The microneedle array of any preceding claim, wherein the microneedles have a spacing density of 30 to 50 microneedles per cm^2.

6. The microneedle array of any preceding claim, wherein the microneedles have an exit hole located on a sidewall of each microneedle.

7. The microneedle array of any preceding claim, wherein the microneedles are spaced an average of at least 2 mm apart from each other.

CLAIMS

1. An invention not claimed in any divisional application.