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Microneedle delivery: A novel and minimally-invasive drug delivery system to overcome limitations of hypodermic needles

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Transdermal drug delivery is regarded as an important route with high potential for drug delivery to overcome limitations of oral delivery and hypodermic injections. Among various delivery methods available, microneedles have gained interest due to their ability in delivering drugs with a high efficacy compared with topical application. Microneedles are referred to microscopic needles that are capable of delivering pharmaceutical compounds, proteins and even cosmetics into the skin in a minimally invasive manner. There are 3 main categories of microneedles; hollow, solid and dissolving. Dissolving microneedles are polymeric structures fabricated over a patch that encapsulate drug and deliver it into skin upon application. However, due to stiffness properties of skin, only small portion of microneedles get inserted into skin and the rest remains on the patch. Therefore, we developed a patch-less dissolving microneedle delivery system which delivers microneedles into skin through micro-pillar structures without causing pain in less than a second. We tested this system using insulin on diabetic mice and results showed that our micropillar based delivery system was capable of delivering insulin with approximately 60% higher efficacy than microneedles fabricated over patch and at a similar rate as hypodermic injection. Therefore, we believe that this system have a high potential to treat people suffering from diabetes in a minimally invasive manner without the need of hypodermic injection.

Biography

Hyungil Jung has completed his PhD from Cornell University and his Post-doctoral studies from California Institute of Technology (Caltech). Since then, he had received various awards in Biotechnology field such as "Outstanding Contributions", "Best Contribution Award", "Excellence in Research Award", "The 31st Industry-Academic Cooperation Award", "Best Technology Award", "Best Teaching Award" and many more because of his outstanding research ability in Biotechnology field.

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