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Delivery of Insulin encapsulated microneedles through a novel applicator in a minimal invasive manner

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Insulin is a peptide hormone which regulates metabolism of fats and carbohydrates by absorption of glucose. When insulin production of body is inadequate, glucose level of blood increases and results in diabetes. Delivery of insulin is regarded as the most important part of diabetes treatment. Insulin helps body to maintain the necessary blood glucose level and patients must inject prescribed dosages of insulin daily to themselves. Continuous injection of insulin is often uncomfortable for patients and the needle causes injury and pain to the skin. On the other hand, the needle wastes are not environmental friendly and require complex procedure to recycle. Therefore, we developed dissolving microneedles that are capable of delivering insulin upon insertion into the skin. The backbone used to fabricate microneedles was carboxy methyl cellulose (CMC) and Humalog insulin was encapsulated into the microneedles. Previously, dissolving microneedles were fabricated over patches for application. However, we found that patches reduce the insertion rate of microneedles by 60% in normal skins and by 80% in hairy skins. To solve this problem, we also developed a novel micro-pillar based applicator which is capable of inserting microneedles into skin in a minimal invasive manner within less than 1 second. Our data showed up to 97% delivery of insulin encapsulated microneedles, when delivered by micro-pillar applicator.

Biography

Shayan F Lahiji has completed his BS and MS from Yonsei University (South Korea) and is currently doing his PhD at the same university. Because of his outstanding contribution to science and new novel delivery systems, he has been awarded in different fields of science for "The best poster presenter" from 3rd World Biotechnology Conference, "The best research award" from Yonsei University and "The best academic poster" from BK21 PLUS Research Symposium and more. He has published papers in reputed journals such as "Scientific Reports" from Nature Publishing Group and "Biomaterials" from Elsevier.

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