Clinically Effective Scar Treatment via a siRNA Transdermal Gene Silencing Technology: From Bench to Bedside and Beyond

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The sequence-specific gene-silencing by small interfering RNA (siRNA) can be used as a new therapeutic approach for treatment of a variety of diseases that are incurable by conventional drugs. However, siRNA therapeutics suffer from poor stability in physiological conditions and off-target effects that has continued to inhibit their widespread applications,

Our disruptive solution is a siRNA transdermal gene silencing technology that overcomes these challenges by the engineering of a polymeric nanoplex with tunable electrostatic (surface charge) properties that provides both siRNA protection against instability and cell-targeting properties. This technology has been clinically tested to be effective and safe for scar treatment and prevention, and it has been commercialized via a Singapore start-up RNAscence Biotechnology (www.biorna.sg). The BioRNA antiscar patch is a Class A Medical Device registered under Singapore Health Sciences Authority (FDA Class 1 equivalent), and its siRNA transdermal gene silencing technology sets a new standard, achieving 35% better scar reduction compared to silicone patch demonstrated in clinical studies in Singapore. Launched in April 2024, it has rapidly gained traction in Singapore and overseas including Australia and China, with more than 12000 units sold with a strong pattern of repeat orders.

As the co-founder of RNAscence BioTechnology and co-inventor of the technology, I will share my journey from ideation, development, translation and commercialization of this first-in-class scar treatment product.

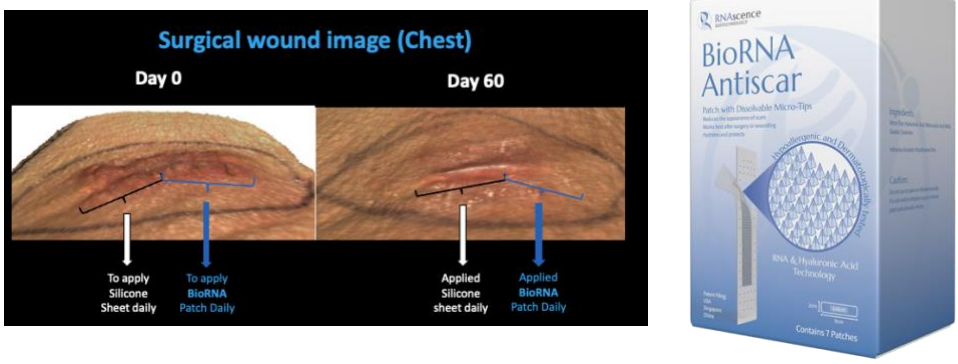

Fig 1. Photos showing day 0 and day 60 of treatment using silicone patch versus BioRNA antiscar patch. Clinical trial at the National Skin Centre, Singapore. 30 patients. Measurements made using 3D scanner.

Reference

1. **TTY Tan*** et al. Silencing siRNA microneedle patches versus silicone sheets in reducing post-surgical scars: a randomized single-blinded intra-individually controlled clinical trial. ***British J of Dermatology***. 2024 Dec 23;192(1):19-26
2. **TTY Tan*** et al. Crosstalk Between Fibroblasts and Immune Cells in keloids. ***British J of Dermatology***. 2024 Nov 16:ljae449
3. **TTY Tan*** et al. The Potential of RNA Therapeutics in Dermatology. ***Annals Acad Medicine, Singapore.*** 2024 Feb 28;53(2):113-116
4. **TTY Tan*** et al. Scar prevention through topical delivery of gelatin-tyramine-siSPARC nanoplex loaded in dissolvable hyaluronic acid microneedle patch across skin barrier, ***Biomat Science***, 2022, 10 (14), 3963.
5. **TTY Tan*** et al, Positive- charge tuned gelatin hydrogel-siSPARC injectable for siRNA anti-scarring therapy in post glaucoma filtration surgery, ***Scientific Reports***, 2021, 11:1470.