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## Development of hyaluronan-based dissolving microneedle arrays for dermal vaccination

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# **Development of hyaluronan-based dissolving microneedle arrays for dermal vaccination**

**Mara Leone**

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**Development of hyaluronan-based dissolving microneedle arrays  
for dermal vaccination**

PhD thesis with summary in Dutch

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Cover : the fluorescence microscopy images provide a view parallel to the skin surface and depict fluorescein amine-labeled hyaluronan (green), rhodamine B-labeled trimethyl chitosan (white) and lumogallion-labeled diphtheria toxoid (red) released in *ex vivo* human skin.

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# **Development of hyaluronan-based dissolving microneedle arrays for dermal vaccination**

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in 1987

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To my family,  
to Paolo,  
for being always by my side  
giving me strength, support and endless love



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