

# Skin mechanoreceptors for gentle touch and proprioception are connected to oxytocin peripheral system.

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## Introduction

Mechanical forces drive the modelling of tissues. This relies on the transmission of forces between cells by adherens junctions. In skin, multiple mechanisms exist to sense, transduce, and transmit forces. These mechanisms include mechanosensitive ion channels (e.g., Piezo channels), and E-cadherin-based cell-cell adhesions. Keratinocytes express Piezo1, which mediates touch sensation by detecting and encoding tactile information to sensory neurons. [1, 2]. Pleasant touch plays a crucial role in behavior and social communication. Our research suggests that the application of a *Jasminum grandiflorum* extract in ex vivo skin helps to preserve the expression of Piezo1, and the peripheral oxytocinergic pathway

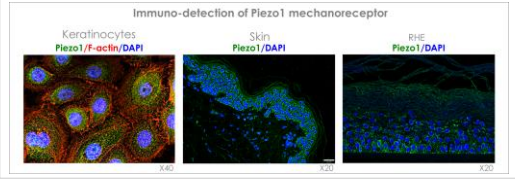
## Methods

Various plant extracts have been screened for their ability to modulate piezo1, and the oxytocinergic pathway. Expression of Piezo1, E-cadherin, oxytocin and its receptor OXTR were monitored by immunohistochemistry and ELISA assay. Dooku1 was used as specific antagonist for Piezo1 inhibition.

## Results

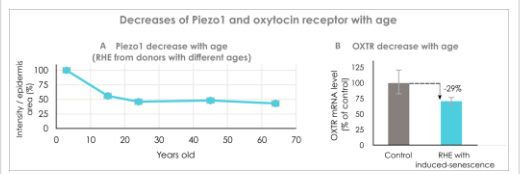
### Piezo1 expression in keratinocytes, skin and reconstructed epidermis

Piezo1 expression was characterized in human keratinocytes, in human ex vivo skin, and in reconstructed human epidermis (RHE). Piezo1 was observed in all layers of the epidermis.



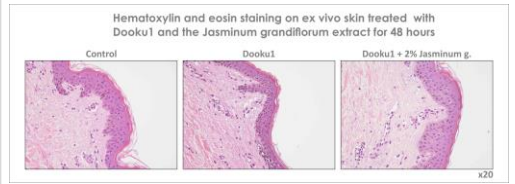
### Decrease of Piezo1 and OXTR expression is associated with aging

Expression studies using RHE models have revealed that the expression of piezo1 decrease can be associated with aging (A). We also observed a decreased expression of OXTR in a senescent RHE (B).



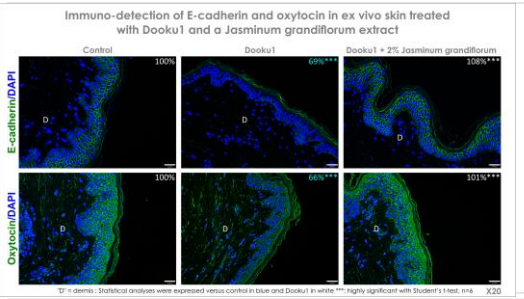
### Piezo1 inhibition caused epidermal sagging, accompanied by structural damages

Hematoxylin and eosin stains showed that Piezo1 inhibition caused epidermal sagging, accompanied by structural damages. Biopsies treated with *Jasminum grandiflorum* extract showed a preserved tissue morphology, without damages, and maintaining its mechanics intact.



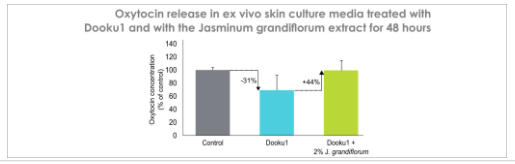
### Piezo1 inhibition decreased E-cadherin and oxytocin expression in ex-vivo skin

Inhibition of Piezo1 by the antagonist Dooku1 decreased the expression level of E-cadherin and oxytocin. Analysis of biopsies treated with *Jasminum grandiflorum* extract showed preservation of E-cadherin and oxytocin expression.



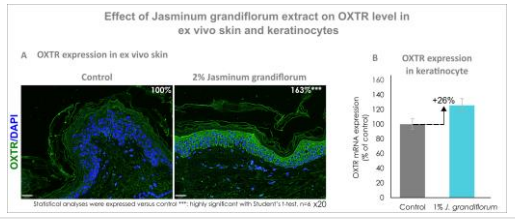
### Inhibition of Piezo1 activity reduced oxytocin release

Oxytocin is a secreted molecule, an inhibition of Piezo1 reduced its release in the ex vivo skin culture media. Application of the *Jasminum grandiflorum* extract resulted in preservation of oxytocin level compared to Dooku1 condition.



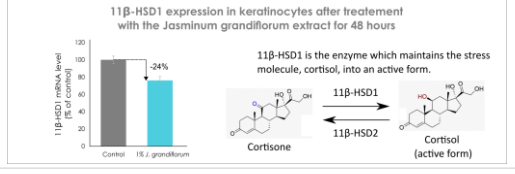
### Application of the Jasminum grandiflorum extract increased OXTR expression

48 hours after treatment, we observed an increase of OXTR in ex vivo skin (A), and an increase of OXTR mRNA in cultured keratinocytes (B).



### Application of the Jasminum grandiflorum reduced expression of active cortisol enzyme-mediated inter-conversion

11β-Hydroxysteroid dehydrogenase type 1, also known as cortisone reductase convert cortisone into the cortisol. 48 hours after treatment with the *Jasminum grandiflorum* extract, we observed a reduced 11β-HSD1 mRNA expression level in keratinocytes.



## Conclusion

Our results showed that Piezo1 expression in the epidermis decreased with age. Moreover, inhibition of piezo1 in ex vivo skin, significantly compromised the integrity of cellular junctions, and the skin oxytocinergic pathway. The *Jasminum grandiflorum* extract has been shown to preserve the skin mechanics, and oxytocin secretion.

## References

1-Dance A. The quest to decipher how the body's cells sense touch. Nature. 2020;577(7789):158-160.  
2-Moehring F, et al. Piezo1 Mediates Keratinocyte Mechanotransduction. bioRxiv; 2020. PPR: PPR189392