

# Oat flour increases hyaluronic acid secretion providing possible mechanism for moisturization effects

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# Introduction, Objectives, and Methods

## Introduction

- Hyaluronic acid (HA) is a key molecule involved in skin hydration. One of the unique properties of HA is its high-water binding and retention capacity,<sup>1</sup> and as such has been included in skin formulations and treatments ranging from creams, gels, lotions, and serums to facial and dermal fillers and implants. The benefits have been shown to include antidryness, antiwrinkle, antiaging, face rejuvenation, among others.<sup>2,3</sup>
- HA is naturally present in skin as part of the extracellular matrix, but decreases due to age, inflammation, and stress, resulting in a compromised barrier and clinically drier skin.<sup>3</sup> In a previously presented stressor model, skin fibroblasts treated with the stress hormone cortisol showed a statistically significant decrease in HA secretion vs untreated controls. However, when the cells were pretreated with oat flour in addition to the cortisol, the oat flour mitigated the effect of cortisol on HA secretion, suggesting a protective effect of the oat flour on the fibroblasts in a stress-induced environment.<sup>4</sup>
- Moisturizers containing oat flour (*Avena sativa*) have been shown in clinical studies to improve the hydration of the skin, measured with instrumentation and assessed by the clinician and the subject.<sup>5</sup>

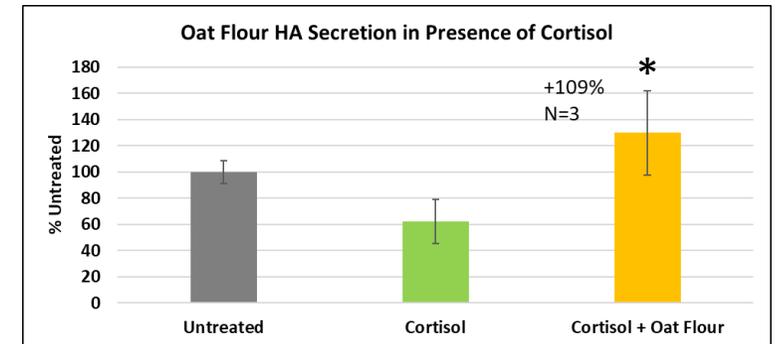
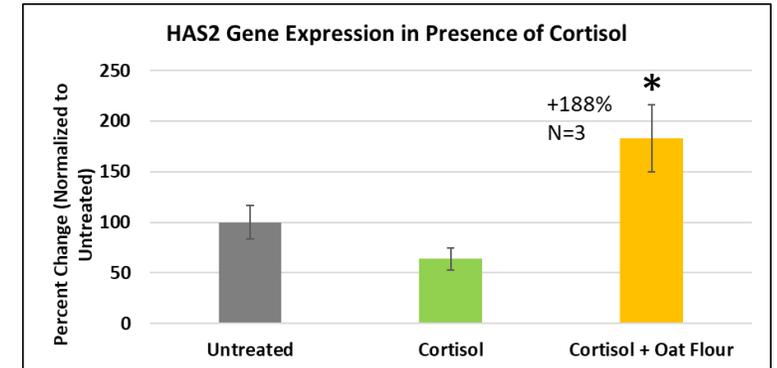
## Objective

- To investigate the mechanism by which oat supports skin hydration through endogenous HA production, even in the absence of stress, to provide clinical moisture and hydration benefits.

## Methods

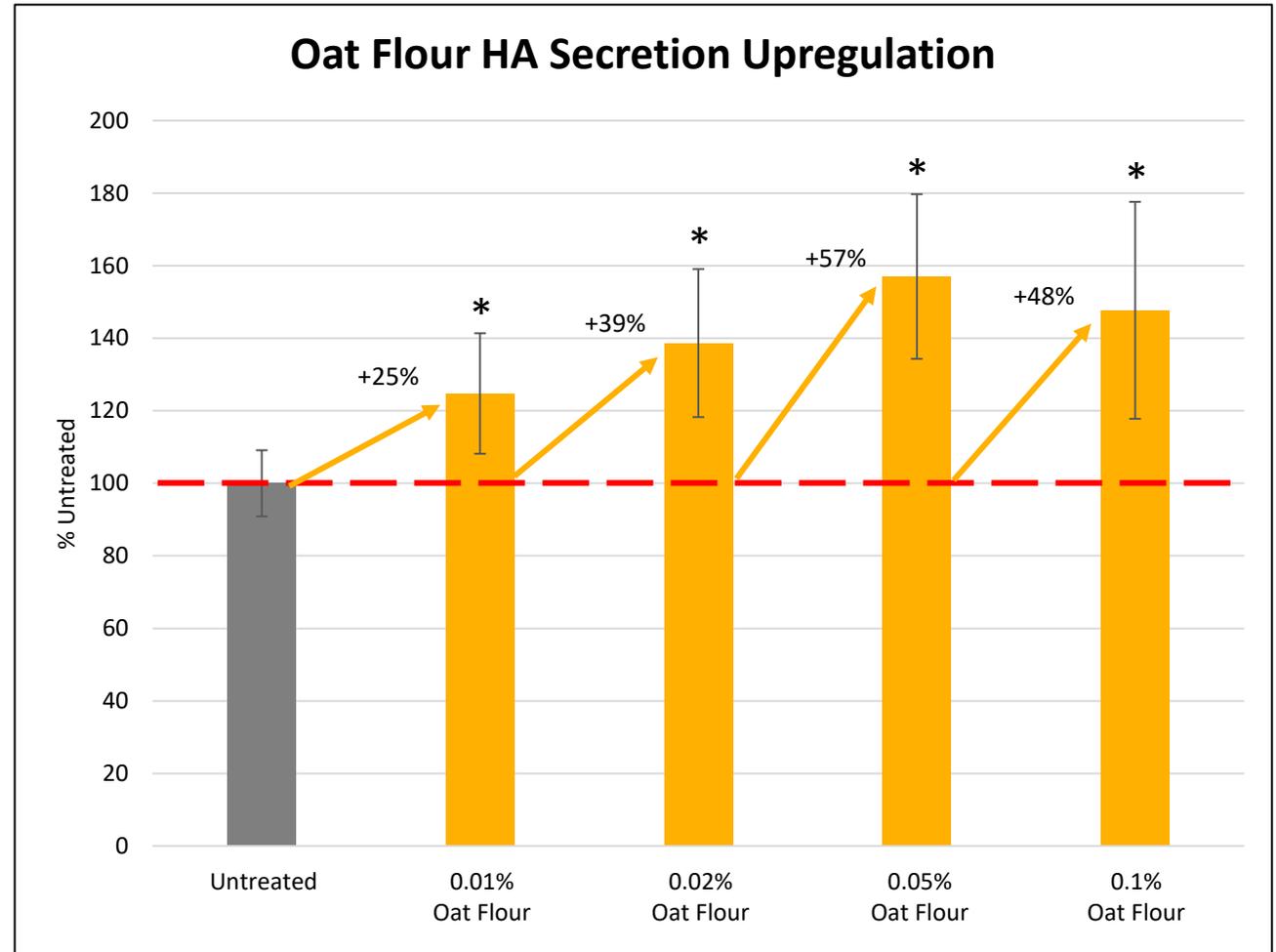
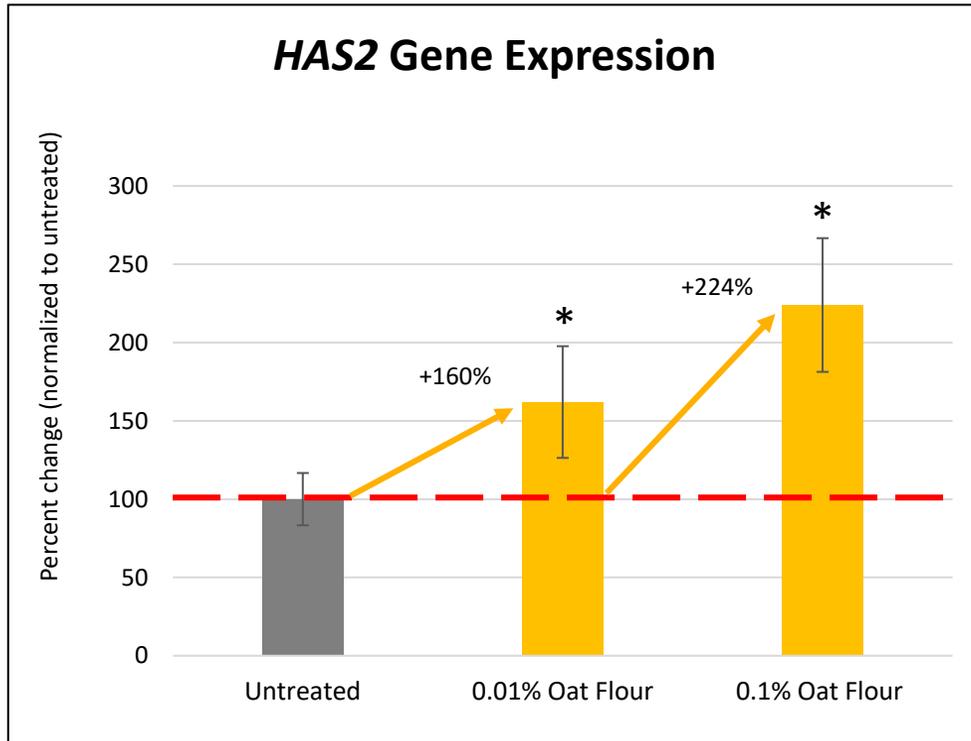
- Human dermal fibroblasts were treated with oat flour at various concentrations as described previously<sup>4</sup> and were evaluated for secreted HA and gene expression of HA-synthase 2 (*HAS2*).
- A single-center, randomized, evaluator-blinded clinical study was conducted to assess the moisturization efficacy of a lotion over the course of 72 hours after a single application.

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\* p<0.05 vs cortisol.

# Results – Oat Flour Increases *HAS2* Gene Expression and HA Secretion

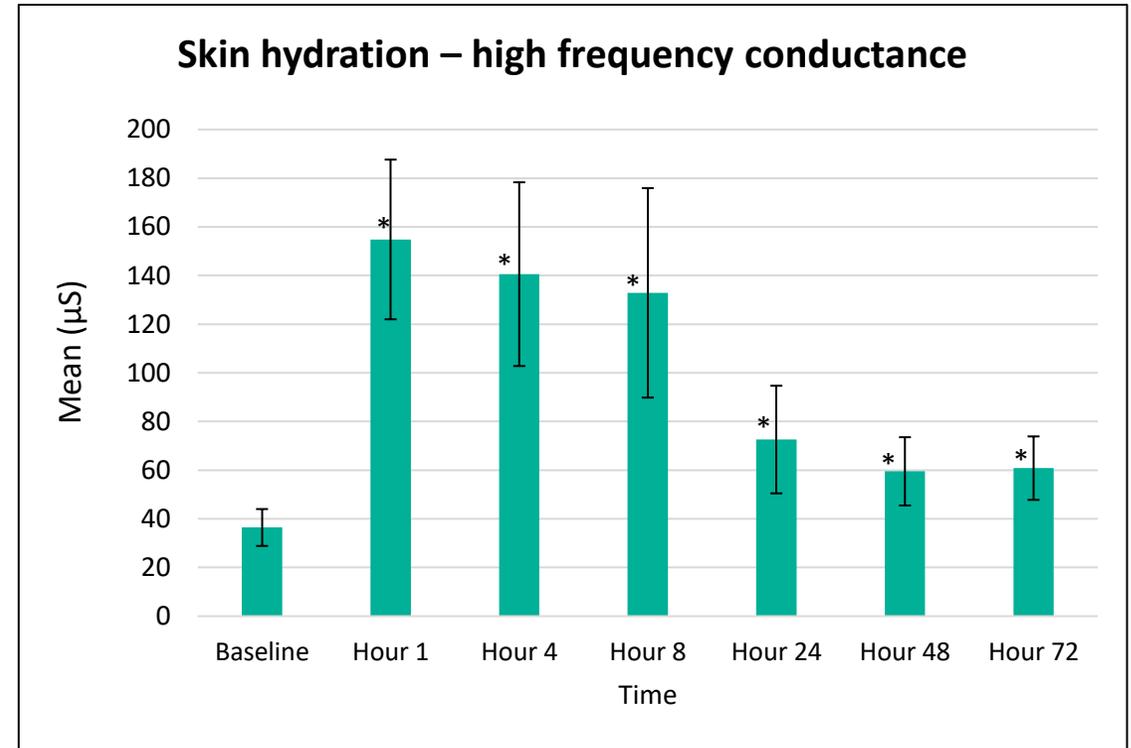
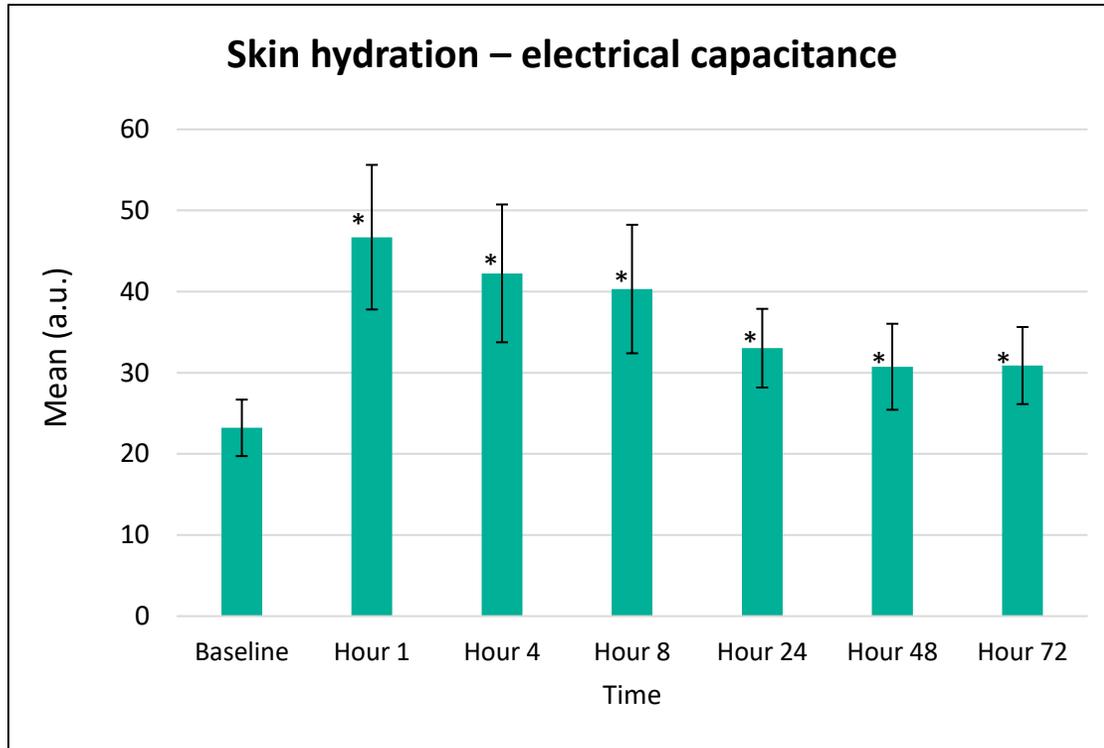


- Oat flour increases the expression of the *HAS2* gene and HA secretion in human fibroblasts.
- Oat flour promotes HA secretion in a dose-dependent manner.

\*p<0.05 vs untreated.

# Results – Clinically proven to provide 72-hour moisturization with an oat-containing lotion

- 32 female patients 26–65 years of age completed the study, including all skin tones.



- Statistically significant improvement in skin hydration measured through both capacitance and conductance after a single application demonstrates immediate benefits to skin as well as long-term hydration through 72 hours (p<0.001).

# Conclusions

- This study identified a novel mechanism by which oat improves skin hydration—through upregulation of HA production. *In vitro*, human dermal fibroblasts cultured with oat flour produced 50% more HA, and greater than 200% more expression of the HA synthase gene compared with untreated cells.
- Oat flour boosted HA secretion in a dose-dependent manner, in line with our previous observation that oat flour also reversed the inhibitory effect of exogenous stress hormone cortisol on HA synthesis.
- These *in vitro* results, in conjunction with our previous findings on the effect of oat in mitigating the effect of cortisol on HA secretion, boosting of ceramide production, anti-inflammation, and balancing of skin pH,<sup>1,2</sup> highlight the multifaceted mechanism of oat in improving the skin barrier, suggesting a mechanism of action by which oat-containing moisturizers provide hydration in the clinical setting, as shown by the results of this clinical study measuring extended skin hydration (72 hours) after a single application. It is also worth noting that, in addition to the individual benefits of ingredients such as oat flour (*Avena sativa*), the overall formula composition is important for moisturization.

1. Thomas J, et al. 42923 Oat components provide holistic skin protection against both internal and external exposomal stressor-induced damages, increase ceramide production and balance skin pH in vitro. *J Am Acad Dermatol.* 2023;89:AB201. doi: 10.1016/j.jaad.2023.07.805. 2. Ilnytska O, et al. Colloidal oatmeal (*Avena sativa*) improves skin barrier through multi-therapy activity. *J Drugs Dermatol.* 2016;15:684-690.