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« Non-diluted seawater enhances nasal ciliary beat frequency and wound repair speed compared to diluted seawater and normal saline »

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Arnaud Bonnomet, PhD , Emilie Luczka, PhD ,
Christelle Coraux, PhD and Ludovic de Gabory,
MD, PhD

Non-diluted seawater enhances nasal ciliary beat frequency and wound repair speed compared to diluted seawater and normal saline

Arnaud Bonnomet, PhD^{1,2}, Emilie Luczka, PhD¹, Christelle Coraux, PhD¹ and Ludovic de Gabory, MD, PhD³

Background: The regulation of mucociliary clearance is a key part of the defense mechanisms developed by the airway epithelium. If a high aggregate quality of evidence shows the clinical effectiveness of nasal irrigation, there is a lack of studies showing the intrinsic role of the different irrigation solutions allowing such results. This study investigated the impact of solutions with different pH and ionic compositions, eg, normal saline, non-diluted seawater and diluted seawater, on nasal mucosa functional parameters.

Methods: For this randomized, controlled, blinded, in vitro study, we used airway epithelial cells obtained from 13 nasal polyps explants to measure ciliary beat frequency (CBF) and epithelial wound repair speed (WRS) in response to 3 isotonic nasal irrigation solutions: (1) normal saline 0.9%; (2) non-diluted seawater (Physiomer[®]); and (3) 30% diluted seawater (Stérimar). The results were compared to control (cell culture medium).

Results: Non-diluted seawater enhanced the CBF and the WRS when compared to diluted seawater and to normal saline. When compared to the control, it significantly enhanced CBF and slightly, though nonsignificantly, improved the WRS. Interestingly, normal saline markedly reduced the number of epithelial cells and ciliated cells when compared to the control condition.

Conclusion: Our results suggest that the physicochemical features of the nasal wash solution is important because it determines the optimal conditions to enhance CBF and epithelial WRS thus preserving the respiratory mucosa in pathological conditions. Non-diluted seawater obtains the best results on CBF and WRS vs normal saline showing a deleterious effect on epithelial cell function. © 2016 The Authors International Forum of Allergy & Rhinology, published by ARSAAOA, LLC.

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Key Words: seawater; saline; ciliary beat frequency; wound repair; nasal mucosa

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¹National Institute of Health and Medical Research (Institut National de la Santé et de la Recherche Médicale [INSERM]) Scientific Mixed Research Unit UMRS-S 903, Federative Structure Health Research Champagne-Ardenne-Picardie (SFR CAP-Santé) FED 4231.

University of Reims Champagne-Ardenne, Reims, France; ²Cellular and Tissue Imaging Platform (PCTI), University of Reims-Champagne-Ardenne, Reims, France; ³Ear Nose and Throat (ENT) Department, University Hospital of Bordeaux, Hôpital Pellegrin, Bordeaux, France

Correspondence to: Ludovic de Gabory, MD, PhD, Department of Otorhinolaryngology, University Hospital of Bordeaux, Hôpital Pellegrin, Centre F-X Michalet, Place A. Raba-Léon, F-33076, Bordeaux Cedex, France; e-mail: ludovic.de.gabory@chu-bordeaux.fr
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Nasal mucosa plays a particularly important protective role. The mucociliary clearance mechanism acts as a highly effective, nonspecific waste disposal system that is sometimes insufficient to prevent allergic response or microbial infection to airborne allergens, pollutants or pathogens.

In vitro and in vivo studies have revealed the air pollutants attenuating properties on ciliary beat frequency (CBF).¹⁻³ Other studies have shown an impaired CBF in patients with allergic rhinitis or asthma.⁴⁻⁷ Certain topical antibiotics have been shown to reduce the CBF

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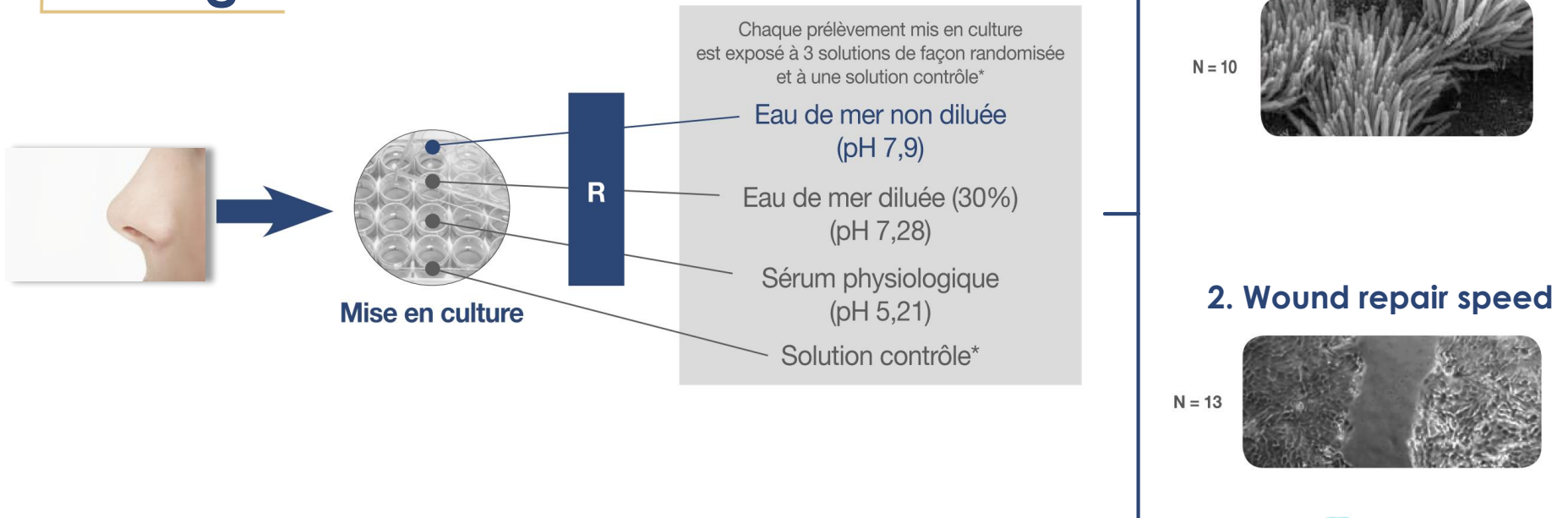
Functional superiority of Physiomer

Non-diluted seawater enhances nasal ciliary beat frequency and wound repair speed compared to diluted seawater and normal saline - **Bonnomet et al. 2016**

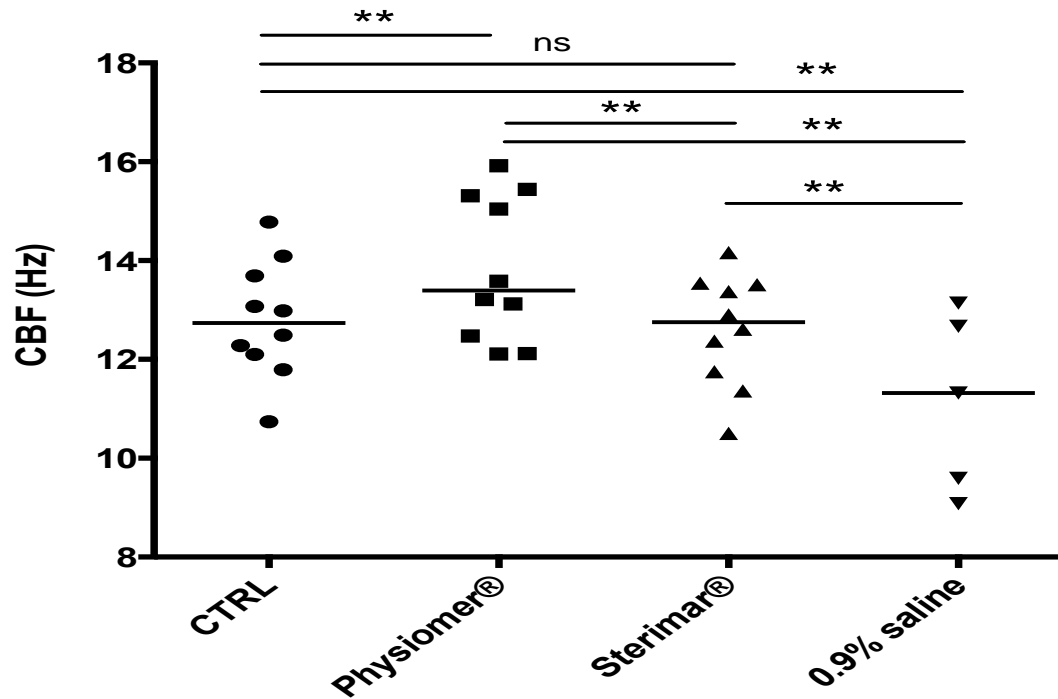
+ Objective

To investigate and compare the functional impact of 3 commonly used isotonic nasal irrigation solutions.

+ Design



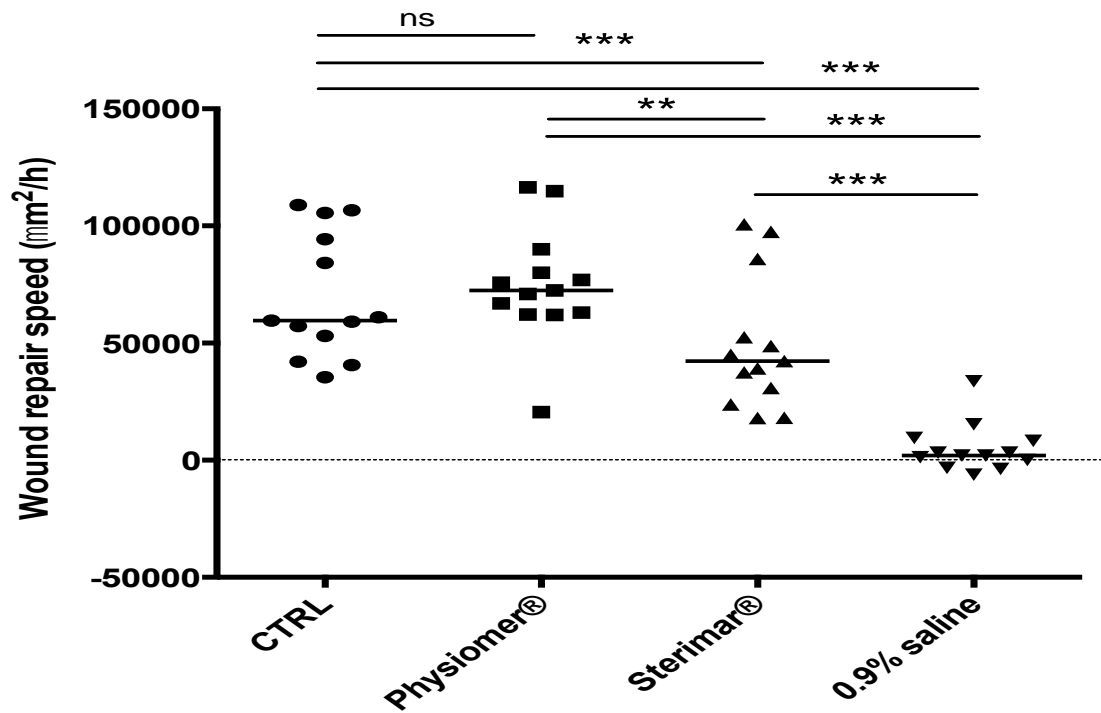
FASTER ciliary beat frequency with Physiomer vs diluted seawater and normal saline



- The ciliary beat frequency **is significantly higher on exclusive 100% seawater (Physiomer)** than in generic diluted seawater, saline 0,9% and control
- The isotonic **saline solution has deleterious effect** on cell viability

Better efficacy in URTI's

FASTER nasal regeneration with Physiomer vs diluted seawater and normal saline



- **Physiomer shows a significantly higher speed of healing** compared to generic diluted seawater (Stérimar) and normal saline
- **No healing with isotonic saline** : deleterious action

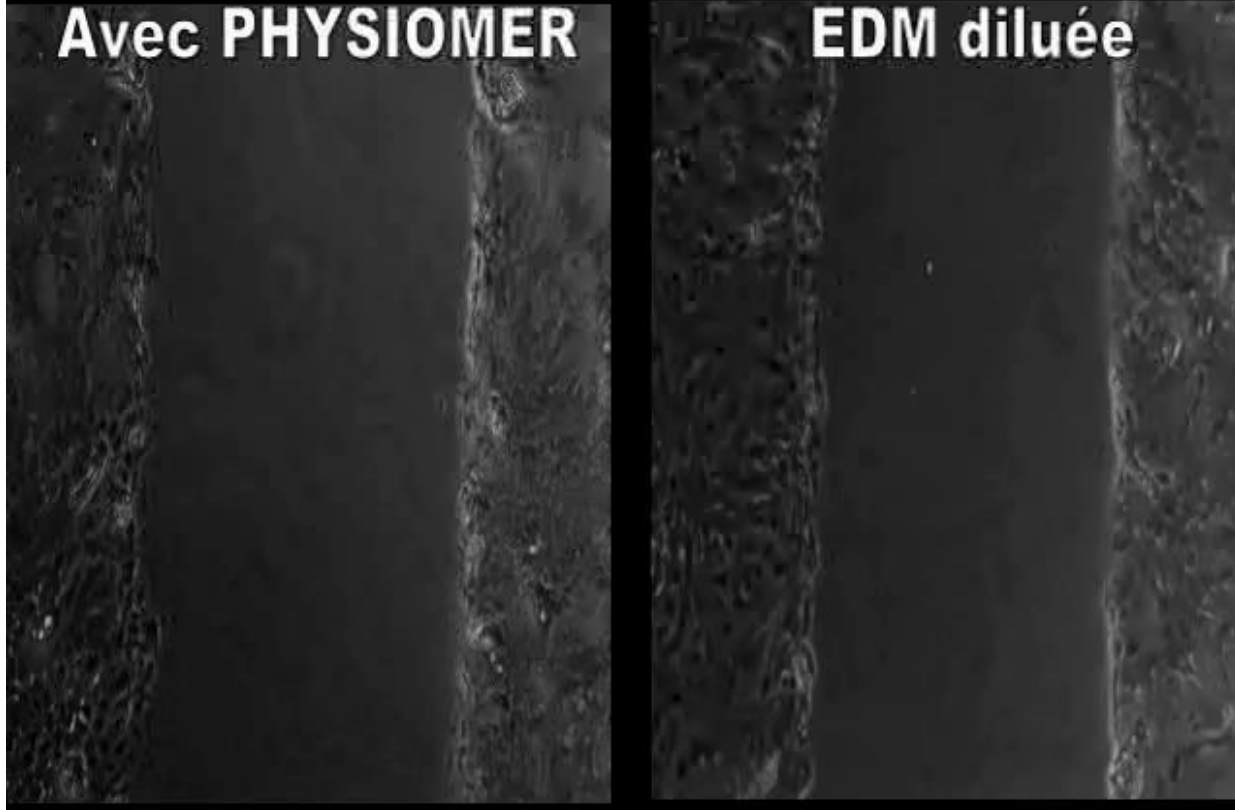
Better efficacy in URTI's and post-operative care

Physiomer superiority

Réparation cellulaire

Avec PHYSIOMER

EDM diluée



Conclusion:

- Physicochemical features of the nasal wash solution is important because it determines the optimal conditions to enhance CBF and epithelial WRS thus preserving the respiratory mucosa in pathological conditions
- Non diluted seawater obtains the best results on CBF and WRS versus normal saline showing a deleterious effect on epithelial cell function