



**1st International Congress on Saliva Science:  
Advancing Research, Education, and  
Innovation**

and

**2nd Annual meeting of the Project – Inclusive  
Digital Material on Saliva Science for the  
Curricula of European Higher Education  
Institutions (EdU\_Saliva)**

12<sup>th</sup> September 2025  
Évora, Portugal

**BOOK OF ABSTRACTS**

1st International Congress on Saliva Science: Advancing Research, Education, and Innovation



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the European Union



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<https://maps.app.goo.gl/fjV899WBUDTSEB136>

## Preface

The ERASMUS+ Edu\_Saliva project has as its overarching goal the promotion of saliva as a biological fluid of remarkable potential, encouraging its study and application across diverse fields. This because saliva offers unique advantages for research, education, and innovation, making it a valuable resource for disciplines ranging from animal and food sciences to the animal and human biomedical domain.

Within the framework of this project, the first edition of the Congress on Saliva Science: Advancing Research, Education, and Innovation (in-person and online) was held, on 12th September 2025, in the University of Évora, Portugal. This inaugural meeting brought together researchers from different backgrounds to share knowledge and explore the role of saliva in science, teaching, and beyond.

With two distinguished keynote speakers—one from the field of psychology and the other from nutrition—alongside eight oral presentations and ten poster communications, the congress provided a fertile ground for scientific exchange. It fostered stronger collaborations and opened the door to new ones, highlighting the richness and interdisciplinary relevance of saliva research.

This event marks only the beginning of what is envisioned as a growing and annual congress. The success of this first edition reinforces the importance of creating a platform where science, education, and innovation converge around the study of saliva.

This book of abstracts brings together the contributions from diverse research teams that participated in this event.

## Programme

9:15 – 9:45	<b>Welcome</b>
9:45 – 10:15	<b>Invited Presentation</b> <i>Psychophysiology of stress: cortisol and behavior</i> By Anabela Pereira – University of Evora.
10:15 – 10:45	<b>Oral Presentations</b> <ul style="list-style-type: none"> <li>• “Introducing High School Students to Biomedical Research through Salivary Biomarkers: Experience from the IDIES Educational Program”. Franco Martinez et al.</li> <li>• “Saliva as a non-invasive matrix to monitor the immune status of newborn calves”. Gomes da Silva et al.</li> </ul>
10:45 – 11:00	Coffee Break
11:00 – 11:30	<b>Invited Presentation</b> <i>Placing sensory science in scientific health research - and how saliva can help to do so</i> By Hannah Jilani – University of Bremen.
11:30 – 12:00	<b>Oral Presentations</b> <ul style="list-style-type: none"> <li>• “Beyond Xerostomia: Salivary Omics Connecting Treatment and Oral Perception”. Carreira et al.</li> <li>• “Feasibility study to assess the relation between salivary <math>\alpha</math>-amylase and glycemic responses after consumption of gelatinized starch ingested at different eating rates”. Santos et al.</li> </ul>
<b>12:00 - 13:00</b>	<b>Lunch and poster session</b>
13:00 – 14:00	<b>Oral Presentations</b> <ul style="list-style-type: none"> <li>• Saliva in Veterinary Education: Transforming Perceptions through Active Teaching. Perez-Rubio et al.</li> <li>• Studying stress in students and animals in an animal-based practical session through saliva: a One-Health approach. Muñoz-Prieto et al.</li> <li>• “Triggered by food: what can our saliva tell us?”. Simões et al.</li> <li>• “ALTFoodSense Project – Artificial Saliva-Based Technologies to Enhance Sensory and Nutritional Properties of Food”. Consortium ALTFoodSense.</li> </ul>
14:00 - 14:15	<b>Congress closure</b>
14:15 – 14:30	Coffee Break
14:30 – 16:30	Edu_Saliva Project meeting ( <i>only for Edu Saliva Consortium members</i> )

## Poster Presentations

- *Can Music Make You Salivate? Exploring the Effects of "Sweet" Music on Salivary Flow and Composition*  
Guedes et al., Iscte – University Institute of Lisbon
- *What Does Saliva Say About Pain? Immunological Response to the Treatment of Burning Mouth Syndrome*  
Lopez-Jornet et al., University of Murcia
- *Inter-Individual Variability in Salivary Proteome Modulates Aroma Release from Orange Flavour*  
Pérez Jiménez et al., University of Évora
- *Relationship between salivary protein profile and perception of tannin-Induced astringency*  
Ramos et al., University of Evora
- *Saliva as an indicator of well-being or stress in children during play activities (RightPlay Project)*  
Roque et al., University of Evora
- *Evaluation of inflammatory biomarkers in saliva from patients with chronic respiratory diseases and controls*  
Hundt et al., University of Evora
- *Salivary stress biomarkers in mother-child pairs – preliminary results from the ARTEMIS project*  
Meira et al., University of Evora
- *HealthyW8: Evaluation of health parameters related to obesity prevention through saliva*  
Mendes et al., University of Evora
- *The Role of Salivary Microbiology in the Bioaccessibility of Glucosinolates and Isothiocyanates During Oral Processing of Broccoli”.*  
Gudiño Rubio et al., University of Extremadura
- *Influence of the biochemical composition of saliva on flavour development in different dog breeds*  
Rabasqueira et al., University of Evora

## Abstracts - Oral Communications

## Introducing High School Students to Biomedical Research through Salivary Biomarkers: Experience from the IDIES Educational Program

Lorena Franco-Martínez<sup>1</sup>, Asta Tvarijonaviciute<sup>2</sup>, Vladimir Mrljak<sup>1</sup>, Isabel Barranco Cascales<sup>3</sup>, Silvia Martínez-Subiela<sup>2</sup>

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**Keywords:** education, secondary education, saliva, teaching innovation project, student research.

### Abstract

IDIES (Research and Development in Secondary Education Institutes, originally Investigación y Desarrollo en Institutos de Educación Secundaria) is an educational program launched in 2014 to introduce first-year high school students to scientific research. Each year, the program connects secondary schools across the Region of Murcia (Spain) with local leading research institutions. Small student teams (3–4 per project), guided by their schoolteacher and several researchers, collaborate on a hands-on research project and present their work in a scientific conference.

Since 2019, our research group has led four IDIES projects focused on salivary biomarkers: (1) Stress Correlation Between Dogs and Their Owners Through Non-Invasive Sampling (2019), (2) Stress in High School Students: A Study of Salivary Biomarkers in Relation to Different Academic Activities (2019), (3) Circadian Rhythm and Stress Markers in Saliva (2021), and (4) Salivary Extracellular Vesicles (2023). Using saliva as the main biological sample allowed students to coordinate sample collection with their peers and family members. Thanks to the simplicity of saliva processing, they were also able to perform most of the sample handling and measurements themselves. Overall, the four projects were carried out as planned and the experience was considered highly rewarding by both students and researchers. Thus, we plan to continue introducing saliva-based research to secondary school students in future editions.

## Saliva as a non-invasive matrix to monitor the immune status of newborn calves

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**Keywords:** animal welfare; colostrum; passive immune transfer

### Abstract

Newborn calves have a naïve immune system and hypogammaglobulinemia, making them reliant on the transfer of passive immunity from colostrum. The calves' immune status is usually monitored through blood serum biomarkers. In this study, we evaluated the immune status of the newborn calf during the first week of life through salivary biomarkers. From a dairy farm in Évora, Portugal, corresponding saliva and serum samples were collected from 20 calves at birth (d0), and at days 1, 2, and 7 of life. Colostrum intake was registered, and a sample of colostrum was taken to assess its quality. In saliva and serum, the concentrations of IgG, IgA, and IgM were assessed by ELISA. Additionally, the levels of myeloperoxidase, calprotectin, adenosine deaminase, and gamma-glutamyl transferase were measured using an automated chemistry analyser. All analytes, except for myeloperoxidase, increased after colostrum intake (d1) in both saliva and serum and declined thereafter. Biomarkers of innate (myeloperoxidase and calprotectin) and cellular immunity (adenosine deaminase) showed higher concentrations in saliva, while components of humoral immunity (immunoglobulins and gamma-glutamyl transferase) were more concentrated in serum. These results suggest that saliva can serve as a valuable, non-invasive matrix for monitoring the immune status of neonatal calves during early life.

## Beyond Xerostomia: Salivary Omics Connecting Treatment and Oral Perception

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**Keywords:** Xerostomia; Saliva Omics; Pilocarpine Treatment; Oral perception;

### Abstract

Xerostomia, characterized by the subjective sensation of dry mouth, negatively impacts oral health, food perception, and overall quality of life. Despite its high prevalence and the absence of a cure, current treatment focuses on symptomatic relief, while objective monitoring of treatment response remains challenging. Saliva, as a non-invasive biofluid rich in proteomic and metabolic information, offers a promising avenue for deepening the characterization of this condition.

In our study, we applied proteomic and metabolomic approaches to saliva samples collected longitudinally over more than six months from patients with xerostomia undergoing daily pilocarpine treatment. Both unstimulated and stimulated saliva were analysed to characterize molecular alterations associated with treatment progression. Additionally, we conducted ex-vivo assays to evaluate the release of volatile compounds and the protein precipitation capacity of saliva samples as indirect indicators of retronasal aroma perception and astringency, respectively.

Our results highlight the utility of saliva as a diagnostic and research tool in monitoring xerostomia treatment outcomes, bridging molecular changes with functional shifts in oral perception during therapeutic intervention. By demonstrating the applicability of salivary omics in this context, we emphasize the potential of saliva science in developing personalized, patientcentred care strategies, as well as inclusive, data-driven educational resources within clinical and academic environments.

This work was funded by FCT - Foundation for Science and Technology which granted a PhD acknowledge fellowship to L. Carreira under the reference SFRH/BD/06273/2021 and Funded by European Commission.

## Feasibility study to assess the relation between salivary $\alpha$ -amylase and glycemic responses after consumption of gelatinized starch ingested at different eating rates

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**Keywords:** amylase, saliva, genetics, glycemia, postprandial

### Abstract

**Objective:** A feasibility study was conducted to propose the most appropriate design and type of measurements (either biological or behavioral) to assess the association between salivary  $\alpha$ -amylase activity (SAA) and glycemic responses after the ingestion of a starchy food.

**Subjects and Methods:** Crossover study in 10 healthy, normal-weight, normoglycemic young male subjects. Glycemia and insulinemia were measured during 2 hours after an oral challenge with 75 grams of glucose (first visit) or 50 grams of 70% gelatinized potato starch ingested at two different eating rates (“fast” versus “slow”; randomized second and third visits). We measured salivary flow, cortisol, transferrin, total protein,  $\alpha$ -amylase levels (western blots), and SAA ([www.salimetrics.com](http://www.salimetrics.com)). *AMY1* gene copy numbers (CN-AMY1) were determined by qPCR from the DNA of leukocytes.

**Results:** We found a high variability in SAA after correction by salivary flow. We found significant associations between SAA and CN-AMY1 after correction by salivary flow ( $r=0.69$ ;  $p=0.03$ ). Glycemic and insulinemic responses did not show relevant associations with either SAA or *AMY1* copy numbers. No relevant differences were found when comparing glycemic responses by eating rate. **Conclusion:** Genetic variation in the *AMY1* gene is related to  $\alpha$ -amylase activity/levels, with negligible association with glycemic responses. Supported by FONDECYT 1241497.

## **Saliva in Veterinary Education: Transforming Perceptions through Active Teaching**

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**Keywords:** Saliva, Diagnostics, Students' knowledge, Survey

### **Abstract**

The objective of this study was to evaluate veterinary students' knowledge and opinions regarding the use of saliva as a diagnostic sample and to determine how targeted lecture might influence their perspectives. To this end, a nine-question survey was conducted with third-year students enrolled in Veterinary Clinical Pathology subject both prior to and following a specific lecture. The questionnaire covered aspects such as familiarity with the use of saliva as a sample, perception of its advantages and limitations, opinion on its reliability in different diagnostic contexts and interest in further training on the topic. The results revealed a significant educational impact of the lecture, as students who were initially sceptical or unfamiliar with the topic, developed a better understanding of the practical advantages and methodological challenges associated with using saliva. Overall, there was a marked increase in the knowledge about the use of saliva in veterinary medicine, a greater acceptance of saliva's clinical applicability, and an increased interest in further training. The results demonstrate the positive pedagogical impact of the lecture and, due to its high acceptance by the students, reinforce the importance of incorporating the study of alternative samples in veterinary curricula, thus promoting more accessible and welfare-focused diagnostic methods.

## Studying stress in students and animals in an animal-based practical session through saliva: a One-Health approach

Alberto Muñoz-Prieto<sup>1</sup>, José Joaquín Cerón Madrigal<sup>1</sup>, Silvia Martínez-Subiela<sup>1</sup>, Asta Tvarijonavičiute<sup>1</sup>

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**Keywords:** saliva biomarkers, veterinary education, animal welfare, student stress

### Abstract:

This study aimed to assess the animal welfare and emotional well-being of veterinary students during a practical session that involved teaching the main procedures of physical handling and clinical examination in sheep. Saliva from 17 sheep and 20 students was collected before and after each session. Stress was assessed by measuring cortisol and alpha-amylase levels. Additionally, students completed validated Likert-scale questionnaires addressing general, academic, and coping-related stress. To explore the role of participation, students were assigned either a leadership role (A) or a supporting role (B) within each group.

Results showed a significant post-session increase in salivary cortisol in sheep ( $p = 0.01$ ), while alpha-amylase levels remained stable, suggesting only mild stress. In students, those in the supporting role exhibited significantly higher post-session levels of both cortisol ( $p = 0.008$ ) and alpha-amylase ( $p = 0.028$ ), along with elevated scores in stress related to academic activity. No baseline differences were found between groups.

These findings indicate that salivary analysis is a feasible and informative tool for evaluating stress in animals and students in educational settings. Moreover, the type of role assumed during practice appears to influence stress perception and physiological response, underscoring the value of active engagement in mitigating student stress during clinical training.

## Triggered by food: what can our saliva tell us?

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**Keywords:** Saliva; Cephalic phase salivary responses; Food

### Abstract:

The rapid release of saliva into our mouths we experience when smelling or seeing our favorite food is one of the most widely perceived physiological responses. This “mouthwatering sensation” occurs even before the first bite and plays an essential role in food oral perception and processing.

Although the concept of cephalic phase salivary response is well described in the literature, it is still not well understood whether sensory stimulation by food can change saliva composition and how these changes may influence our sensory expectations, food preferences and choices.

Works from our lab have been systematically trying to investigate potential changes in salivary proteome triggered by visualization of foods presented as pictures [1], odorants [2] and most recently real foods [unpublished]. Collectively these studies strengthen the existence of salivary responses to food cues, suggesting changes at salivary secretion rate and proteomic profile level according to the sensory characteristics and hedonic value of the food stimulus.

Findings from previous studies will be presented, focusing on how saliva can be influenced by food-related sensory stimulation. These changes may provide valuable insights into several aspects, including physiological and behavioral mechanisms underlying the regulation of ingestive behavior. This is particularly relevant in the current overexposure environment, where individuals are constantly exposed to highly palatable and sensory-rich foods. Ultimately, we will discuss how studying saliva may offer an approach to understanding individual differences in food preferences. This knowledge may support research in the context of nutrition and have potential for design interventions targeting eating-disorders and increase the consumption of healthy diets.

**References:**

- [1] Marques, E., Simões, C., Pérez-Jiménez, M., e Silva, F. C., & Lamy, E. (2025). Start looking at saliva: Effect of visualization of food images on salivary proteome. *Food Research International*, 209. <https://doi.org/10.1016/j.foodres.2025.11630>
- [2] Carreira, L., Castelo, P. M., Simões, C., Capela e Silva, F., Lamy, E. (2020). Changes in Salivary Proteome in Response to Bread Odour. 1–18. <https://doi.org/10.3390/nu12041002>

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## ALTFoodSense Project – Artificial Saliva-Based Technologies to Enhance Sensory and Nutritional Properties of Food

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**Keywords:** artificial saliva-based technology; predictive models for food acceptance; saliva-food interactions; nutrient bioavailability; food oral perception.

### Abstract

The ALTFoodSense project aims to transfer existing scientific knowledge into practical tools that help to predict sensory and nutritional characteristics of food products. This is based on the innovative use of artificial saliva to simulate the food-saliva interactions occurring in the mouth, through objective and reproducible assessments. This approach offers a promising complementary tool to traditional sensory panels and physicochemical analyses, addressing limitations in reproducibility, cost, and applicability to novel food matrices.

By combining insights from different fields such as saliva biochemistry and sensory science, ALTFoodSense introduces the “SensePredict” technology, a prototype capable of predicting organoleptic sensations and nutrient bioavailability based on the interactions between food components and saliva. By considering the variability of saliva composition among different consumer groups (e.g. gender, age, ethnicity), this technology not only provides quality control, but also supports the development of targeted food products for specific consumer groups with distinct salivary and nutritional profiles.

ALTFoodSense also promotes the transfer of scientific results not only to the food industry sector, but also to students and other professionals. This aligns directly with the goals of the EdU\_Saliva, supporting the inclusion of saliva science into higher education through accessible, innovative, and interdisciplinary teaching tools.

## Abstracts – Posters

## Can Music Make You Salivate? Exploring the Effects of "Sweet" Music on Salivary Flow and Composition

David Guedes<sup>1</sup>, Carla Simões<sup>2</sup>, Marília Prada<sup>1</sup>, Margarida V. Garrido<sup>1</sup>, & Elsa Lamy<sup>2</sup>

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**Keywords:** taste perception, music, cross-modality, saliva, salivary alpha-amylase

### Abstract

Previous studies have demonstrated that listening to musical soundtracks classified as “sweet” can influence how sweet foods are perceived. One possible mechanism behind this phenomenon is that music triggers physiological responses that contribute to taste perception. However, this explanation remains underexplored, particularly in relation to specific physiological indicators. In this study, we examined whether music crossmodally associated with sweetness affects salivary flow and composition, including alpha-amylase enzymatic activity. Thirty individuals with a normal body weight ( $M_{age} = 31.97$ ,  $SD_{age} = 8.81$  years; 60% female) provided saliva samples while exposed to high-sweetness music (HS), low-sweetness music (LS), and a silent condition. The results showed: (i) a link between salivary protein profiles and sweet taste sensitivity; (ii) an increase in alpha-amylase activity when participants listened to music compared to silence, without any change in saliva volume; and (iii) no significant differences in salivary responses between HS and LS music. Despite the previous research suggesting that music can alter taste perception based on its sweetness associations, our findings indicate that such perceptual effects do not appear to be mediated by changes in salivary flow or composition.

## What Does Saliva Say About Pain? Immunological Response to the Treatment of Burning Mouth Syndrome

Pia Lopez-Jornet<sup>1</sup>, Ana Garcia Martinez<sup>1</sup> Luis Pardo Marin<sup>2</sup>, Eduardo Pons-Fuster<sup>3</sup>, Asta Tvarijonaviciute<sup>2</sup>

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### Abstract:

Burning mouth syndrome (BMS) is a chronic pain disorder characterized by a persistent intraoral burning sensation without visible clinical lesions. Its multifactorial etiology makes treatment complex. This study aimed to evaluate the effectiveness of low-level laser therapy and clonazepam in BMS patients, while also analyzing the behavior of salivary inflammatory biomarkers before and after treatment.

A single-blind, randomized clinical trial was conducted with 89 patients allocated into four groups: laser + clonazepam, laser only, clonazepam only, and placebo (sham laser). Pain intensity was measured using a visual analogue scale (VAS), and salivary levels of multiple cytokines and proinflammatory proteins were assessed pre- and post-treatment.

Significant reductions in VAS scores were observed in the laser groups, accompanied by decreased concentrations of IL-7, IL-8, IL-17, IL-21, TNF- $\alpha$ , fractalkine, MIP-1 $\alpha$  and MIP-1 $\beta$ . Clonazepam also induced immunological changes, particularly in IL-2, IL-4, and IL-13. No relevant biomarker or clinical changes were found in the placebo group.

These findings support the role of saliva as a valuable, non-invasive medium for monitoring local immunological responses in BMS. Low-level laser therapy emerges as a promising treatment, with measurable effects on both symptoms and salivary biomarkers.

## Inter-Individual Variability in Salivary Proteome Modulates Aroma Release from Orange Flavour

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**Keywords:** saliva-aroma interactions, salivary proteins, oral perception, individual variability, aroma release.

### Abstract

Investigate the impact of saliva composition on sensory perception is critical for understand individual variability in flavour perception. This study explores how inter-individual differences in salivary proteins influence the release of aroma compounds from an orange flavour. Unstimulated saliva samples from 18 individuals were analysed for flow rate, total protein content, and protein profiles using SDS-PAGE and 2-DE. Saliva–flavour mixtures were prepared and volatile release assessed via HS-SPME-GCxGC-ToFMS. Results revealed significant variability in the abundance of salivary proteins, which correlated with differences in the release of aroma compounds from orange flavour. Terpenes, particularly monoterpenes and sesquiterpenes, showed increased release in the presence of saliva, while acetate esters and aldehydes exhibited decreased release. Spearman correlation analysis highlighted associations between the release of specific volatile families (e.g. terpenes, acetate esters) and the abundance of individual salivary proteins, such as glutathione S-transferase, amylase, and immune-related proteins. These findings suggest that specific salivary proteins can enhance or suppress the release of aroma compounds, depending on their characteristics. These insights contribute to understanding the biochemical mechanisms underlying flavour perception variability. This study supports the use of saliva-flavour models to investigate complex processes such as flavour perception.

## Relationship between salivary protein profile and perception of tannin-Induced astringency

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**Keywords:** astringency, tannins, saliva, protein profiles of saliva.

### Abstract

Astringency is the sensation of dryness or roughness in the mouth, often described as a "corky" feeling. This phenomenon is associated with the presence of tannins, occurring in wine and in plant-based foods rich in polyphenols. Tannins (polyphenols) interact with salivary proteins, forming complexes that precipitate, compromising the lubrication of the oral mucosa and resulting in the sensation of roughness/astringency. This sensory characteristic has become a challenge for the food industry, as it is not well-appreciated by consumers.

This study investigated the relationship between the salivary protein profile and the perception of tannin-induced astringency. Eleven participants (6 women and 5 men) evaluated the astringency intensity of tannin solutions. The protein profiles of saliva samples collected before (baseline saliva), during exposure to the stimulus, and immediately afterward were compared and correlated with the perceived astringency intensity. Furthermore, this intensity was correlated with the capacity of different proteins to precipitate tannins, assessed by *ex vivo* incubation of baseline saliva samples with solutions of these compounds.

Data from the present study can aid in understanding the mechanisms of saliva\*tannin interaction and the mechanisms of astringency development, and may be useful, in the future, for the formulation of sensorially appealing foods.

## Saliva as an indicator of well-being or stress in children during play activities (RightPlay Project)

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**Keywords:** children, stress, immune system, salivary biomarkers, playing

### Abstract

Saliva is a biological fluid rich in biomarkers that can reflect physiological and emotional changes, and is a non-invasive, safe and practical tool for monitoring well-being or stress in children. During play activities, social interaction and physical contact can trigger responses in the hypothalamic-pituitary-adrenal axis and the sympathetic-adrenal-medullary axis, altering the concentration of hormones such as cortisol and enzymes such as salivary amylase, respectively, and other salivary analytes. The RightPlay project, through the implementation of a psychomotricity program, aims to explore these biomarkers to understand how fighting and chasing games influence the emotional and physiological state of preschool children. Saliva analysis makes it possible to identify variations in the levels of stress or relaxation after playtime, while respecting the naturalness of children's experiences. The quantification of salivary analytes through laboratory techniques such as ELISA or enzyme activity protocols contributes to a more objective assessment of the impact of playing on children's development. Thus, the study of saliva appears to be a practical and effective method for promoting interventions that favor children's well-being and emotional balance, strengthening the importance of play as an essential part of healthy growth.

## Evaluation of inflammatory biomarkers in saliva from patients with chronic respiratory diseases and controls

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**Keywords:** Human Biomonitoring; C Reactive Protein, COPD, biomarkers of effect

### Abstract

A shift to indoor living has led to an increase of exposure to indoor contaminants, leaving us with a need to evaluate inflammation in various populations. Concentration of C Reactive Protein (CRP) in plasma has been used as a biomarker to assess acute inflammation, but its collection is more time and budget consuming than salivary CRP. Therefore, salivary inflammation biomarkers have been increasingly used.

This study, grounded in HERO project, aims to characterize the sociodemographics (age, sex, smoking habits) and salivary inflammatory biomarkers (CRP) in participants with chronic respiratory diseases and controls.

Patients were recruited from a local hospital. Self-administered questionnaires and an interview were used to collect data. Morning saliva was collected and analyzed for CRP using a Salimetrics salivary CRP indirect sandwich ELISA kit.

To date, thirteen patients with COPD (35-72 years, 81% female) and 9 Controls (21-72 years, 66% female) were included. CRP levels in COPD patients varied from 70 to 543 pg/mL, while the Controls varied from 202- 2018 pg/mL.

Female CRP concentrations were significantly higher than their male counterparts ( $p=0.0328$ ,  $U=13$ ) and COPD concentrations were significantly lower than the control CRP concentrations ( $p=0.00151$ ,  $t=0.028$ ); No correlation between BMI and CRP was found.

Our results were within the same order of magnitude as the ones reported in the literature for healthy non-smoker concentrations. Our results will ultimately be correlated with the values of contaminants determined by HERO.

## Salivary stress biomarkers in mother-child pairs – preliminary results from the ARTEMIS project

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### Abstract

The ARTEMIS project investigates health risks from exposure to environmental contaminants in children (6-11 years) and women of childbearing age, focusing on endocrine disrupting chemicals (EDCs). For the first time in Portugal, salivary cortisol was used to assess stress in mother-child pairs, alongside biomarkers of exposure. Participants consented and provided sociodemographic, health and lifestyle data.

In this first phase of the project, salivary cortisol was measured upon waking (S1) and after 30 minutes (S2), capturing the *cortisol awakening response* (CAR), a key stress marker. From the 24 saliva samples analysed (6 pairs), children's cortisol ranged between 0.202-0.454 µg/dL and mothers' between 0.255-0.763 µg/dL, both within healthy limits except for one child (0.81-0.87 µg/dL). Most showed positive CARs (+39.01% ± 30.74), but 2 children and 2 adults had a negative CAR. In the future, EDCs levels will be quantified, and possible correlations between the levels of cortisol and the levels of the biomarkers of exposure will be investigated to understand whether exposure to these environmental contaminants may be associated with deviant responses to stress.

## HealthyW8: Evaluation of health parameters related to obesity prevention through saliva

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### Abstract

HealthyW8 is a European initiative focused on promoting sustainable lifestyle changes, with the aim of supporting individuals in the adoption and long-term maintenance of healthy habits in vulnerable stages of life. This multidisciplinary project integrates behavioral science, digital health tools, and the monitoring of biological markers to better understand how lifestyle modifications influence health trajectories in real-world contexts.

Within the scope of this project, the use of non-invasive methods for collecting biological samples proves particularly relevance for assessing physiological changes associated with shifts in daily behaviors. Among the available biofluids, saliva stands out as a valuable and still underexplored matrix, offering several advantages: it is easy to collect, non-invasive, and contains numerous analytes that reflect both local and systemic physiological processes. These include inflammatory responses, oxidative stress, enzymatic activity, and proteomic alterations related to metabolic status and general well-being.

This preliminary study, in the context of HealthyW8 project, aims to assess the relationship between salivary protein profile and physical activity parameters, as well as to assess the changes in this profile induced by acute practice of exercise, in children. Saliva samples are collected at two distinct time points — before and after 45 minutes exercise. The application of targeted proteomic and enzymatic analyses, allow to identify the main salivary protein components related with physical activity, in children. This is a starting point for the tasks, considered in HealthyW8 projects, where the feasibility of integrating salivary analysis into broader digital strategies for public health promotion is explored.

This research is funded by the European Union through the project “ Horizon-Europe (HORIZON-HLTH-STAYHLTH-01-05-twostage”.

## The Role of Salivary Microbiology in the Bioaccessibility of Glucosinolates and Isothiocyanates During Oral Processing of Broccoli

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**Keywords:** Broccoli, oral processing, oral microbiota, glucosinolates, isothiocyanates.

### Abstract

The bioaccessibility of health-promoting compounds such as glucosinolates in broccoli is influenced during oral processing. These compounds are precursors to isothiocyanates, which have anticancer properties. While previous research has focused on chemical and enzymatic factors affecting glucosinolate hydrolysis, the role of the oral microbiota and individual variability in salivary composition in the release of isothiocyanates remains largely unexplored. Understanding how different microbial profiles contribute to this conversion could enable tailored dietary strategies to maximize the health benefits of products like broccoli.

For this study, saliva samples were collected from 23 individuals of varying ages, sexes, and dietary habits to encompass diverse microbial profiles, and an in vitro simulation of oral digestion was conducted by exposing broccoli sprouts to these samples. Genomic techniques were employed to identify the microbial strains present, and following digestion, total glucosinolates were quantified by spectrophotometry method while isothiocyanates were measured using community composition and isothiocyanate levels were examined, with particular emphasis on taxa linked to enhanced isothiocyanate production.

The findings revealed high interindividual variability in isothiocyanate levels produced during oral processing of broccoli. Notably, some samples exhibited significantly elevated concentrations, correlating with specific microbial profiles. This indicates that the oral microbiota significantly influences the bioactivation of glucosinolates, which could enhance their health benefits.

## **Influence of the biochemical composition of saliva on flavour development in different dog breeds**

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**Keywords:** salivary proteome, dog breeds, pet food industry, bred-specific nutrition, dog oral perception.

### **Abstract**

Saliva is the fluid that bathes the oral cavity and has multifunctional characteristics, being considered a suitable biological fluid for scientific research and clinical settings. Moreover, saliva is involved in in-mouth flavour perception. Although the dog is a common companion animal and its saliva has already been the subject of some studies, the composition of the salivary proteome, and especially the differences between different breeds, remains to be elucidated. In practical terms, the pet industry is interested in launching pet foods adapted to different specific characteristics, with the existence of foods specifically directed to different dogs breeds. Although industry makes studies of acceptance, in these animals, registers about their sensory perception are difficult.

The proposal of the PhD thesis, in Veterinary Sciences, that is now starting, is to understand how differences in salivary proteome from different dog breeds may result in different in-mouth sensory perception. Different approaches (*in-vivo* and *ex-vivo*) will be used to characterize dog saliva proteome and its effect in food aroma release and final perception.

It is expected that this work may contribute to advances in the formulation of industrial dog foods, with formulations targeted at specific breeds of dogs having higher likelihood of acceptance and success.

