flowgy

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Flowgy is a medical tool designed to
improve ENT diagnosis
and nasal surgery

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01 What is Flowgy?

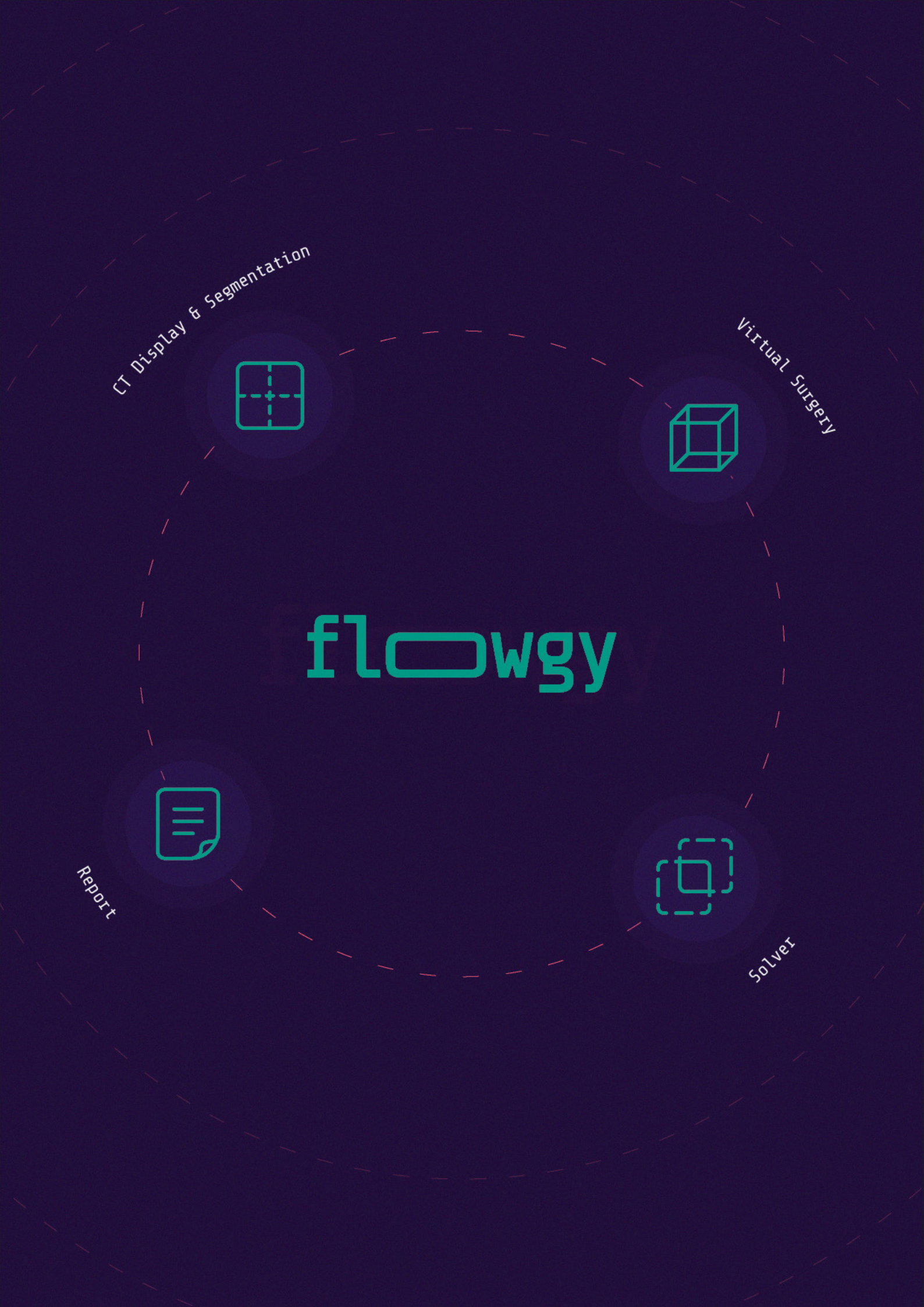
The FLOWGY application is an advanced tool for otolaryngology (ENT) that uses Computational Fluid Dynamics (CFD) to simulate nasal airflow and provide detailed insights into airflow characteristics within a patient's nasal cavity.

Additionally, it enables the simulation of nasal surgeries to evaluate their impact on airflow dynamics, thereby supporting clinical decisionmaking and enhancing the understanding of surgical outcomes.

02
The power of medical efficiency

Flowgy puts in your hands a single medical tool with all the necessary modules to perform from segmentations to virtual surgeries on 3D models generated from the analysis of CT images or similar.

And all this from your own computer.

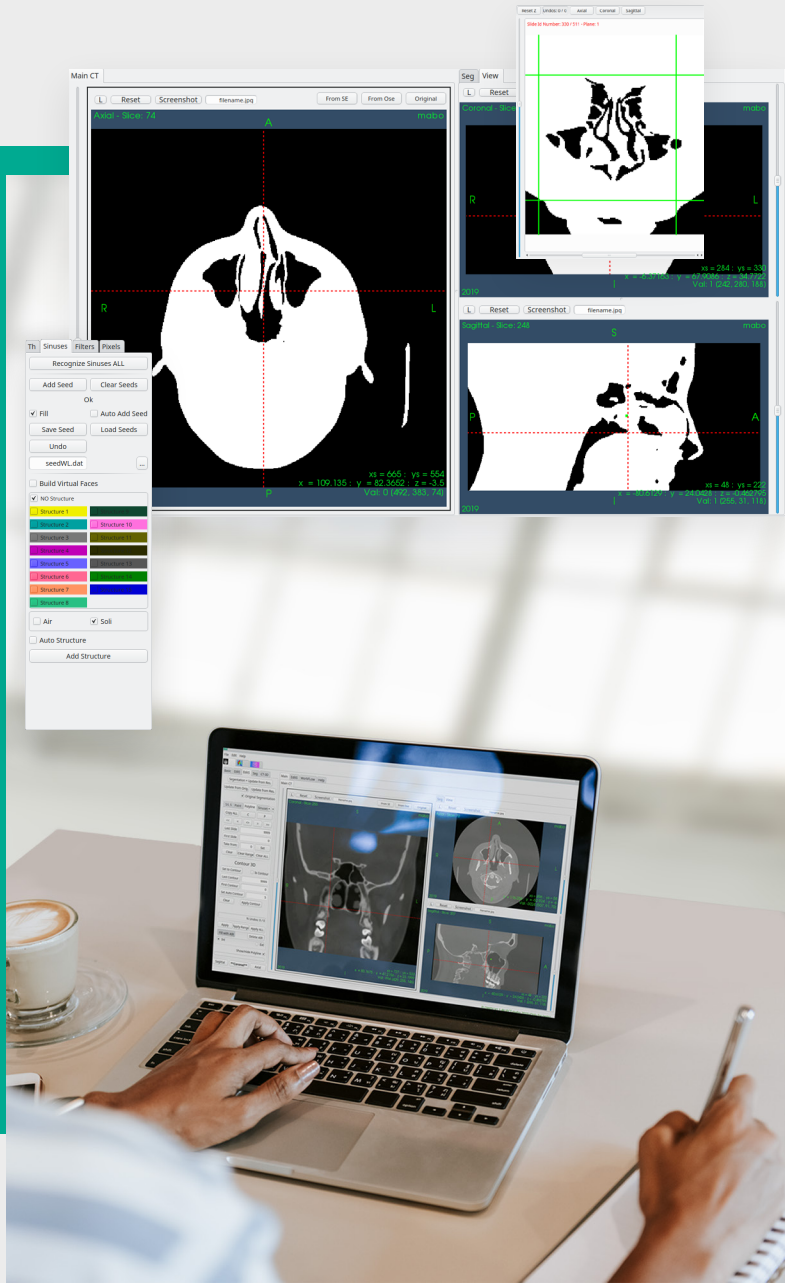

CT Display & Segmentation
Virtual Surgery
flowgy
Report
Solver

CT Display

Using CT scans or similar images you can simulate and analyze, on your own computer, the different fluid flows in the nostrils.

Main Features

- Support for concurrent, linked viewing, and segmentation of multiple images.
- Manual segmentation in three orthogonal planes at once.
- Computing distances and areas in CT images.
- Automatic and selective identification of paranasal sinuses.
- DICOM repositioning. Automatic repositioning of CT scans to ensure that anatomical structures remain in the same position for optimal analysis.
- Support for many different 3D image formats (DICOM, NRRD, STL...)



Segmentation & Surgery

Operates in 2D or directly on a 3D model of the patient. It analyzes the surgical results in a precise and scientific way. Repeat the virtual surgery until the best option for the patient is found.

Main Features

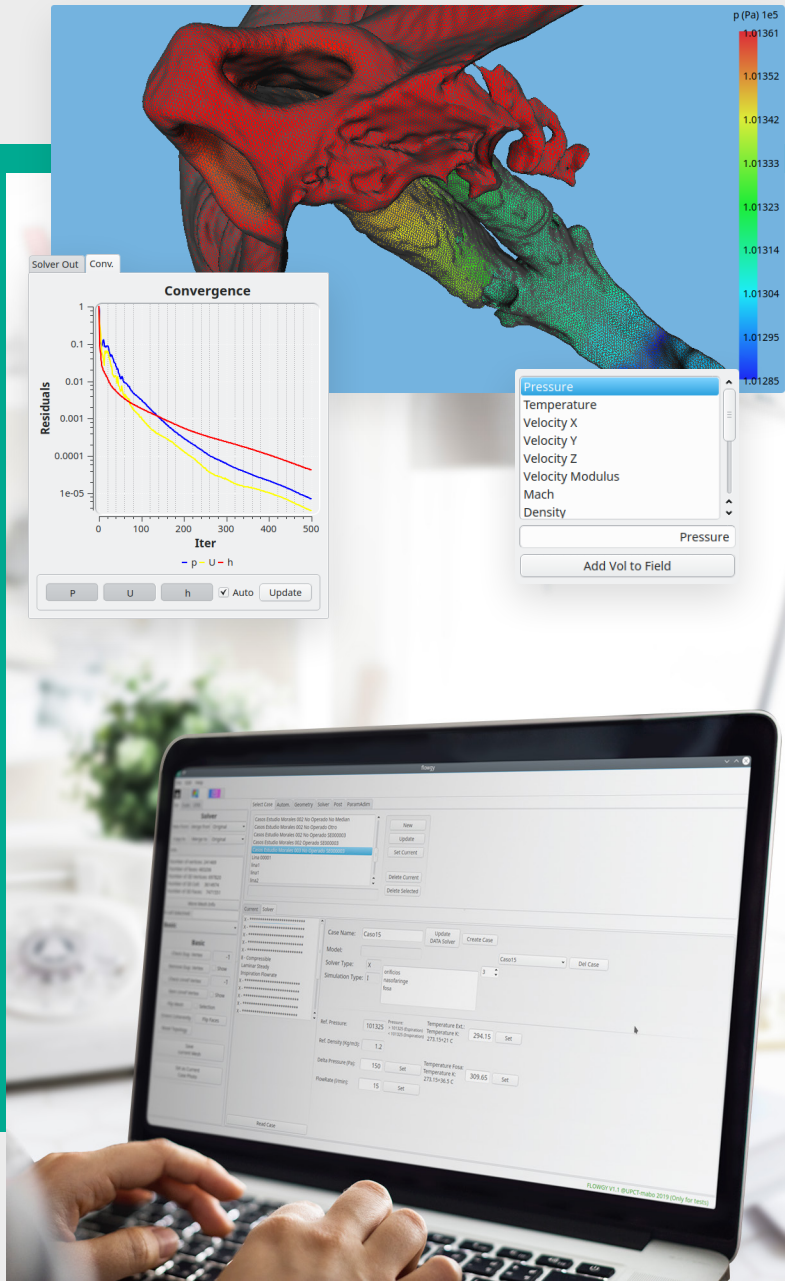
- 2D and 3D surgery (superficial or volumetric) synchronized with the CT scans.
- Endoscopic and first person 3D view.
- Creation and removal of tissue and air.
- Structures. Flowgy allows you to add or create new structures on the 3D model for visualization and control during surgery.
- Automatic generation of surface and volumetric CFD mesh of nasal cavity and boundaries.

Solver

Decide which CFD solutions should act on the anatomical structure and visualize their behavior in real time.

Main Features

- Different types of CFD solutions (laminar, compressible, inspiration and expiration)
- Different boundary conditions (flow rate, pressure drop, temperatures...)
- Visualization of the CFD solution and the residual convergence in real time.
- Unlimited number of stored CFD solutions.
- Display of flow fields (velocity, WSS, temperature, pressure and mass flow) and streamlines.
- Image capture and disk storage.
- Vector flow field display.

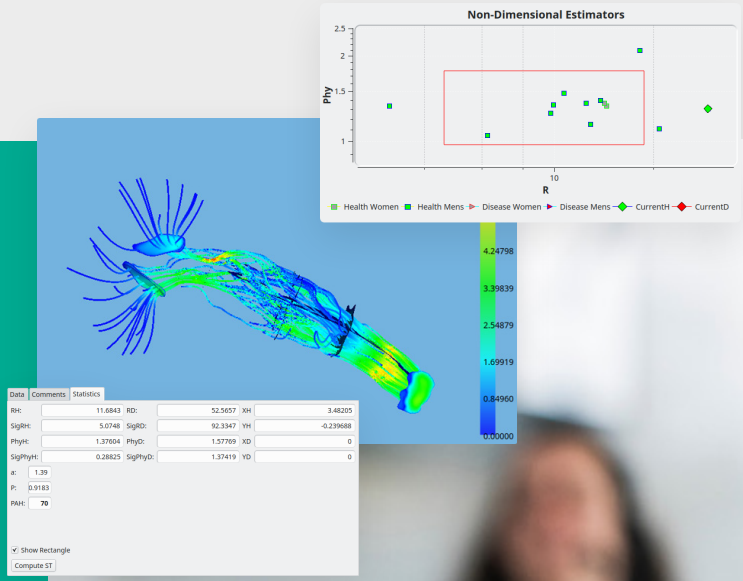


Report

Flowgy allows you to immediately produce personalized quantitative reports of all the parameters you consider relevant to the specific case. Detailed and visualized information in an easy and understandable way that will help you to diagnose and make decisions.

Main Features

- Creation of the report in a few minutes.
- Unlimited reports with selected parameters.
- Report in PDF or digital to reproduce visually in the flowgy App (Flowgy Envision©) for computers, tablets and mobiles.
- “Flowgy envision©” multiplatform (Windows, Android, IOs, Mac and Linux)



RELEVANT SCIENTIFIC PUBLICATIONS

2024

1 — Advancements in veterinary medicine: The use of Flowgy for nasal airflow simulation and surgical predictions in big felids (a case study in lions)

Frontiers in Veterinary Science, Vol. 10

2 — Assessing nasal airway resistance and symmetry: An approach to global perspective through computational fluid dynamics.

International Journal for Numerical Methods in Biomedical Engineering, Vol. 40, No. 7

3 — Beyond skeletal studies: A computational analysis of nasal airway function in climate adaptation.

American Journal of Biological Anthropology, Vol. 184, No. 2

4 — Reducing variability in nasal surgery outcomes through computational fluid dynamics and advanced 3D virtual surgery techniques.

Heliyon, Vol. 10, No. 5

2022

5 — Computational fluid dynamics applied to study the impact of septal perforations on nasal physiology.

Vélez Authors: Tiago Chantre; Rui Oliveira; Manuel A. Burgos; Bruno Cunha; Mafalda Barroso; Mariana Oliveira; Ezequiel Barros; Herédio Sousa. Portuguese Journal of Otorhinolaryngology - Head and Neck Surgery. 60 - 3, pp. 1 - 6. (Portugal): SPORL – CCP | Portuguese Society of Otorhinolaryngology – Head and Neck Surgery, 2022. ISSN 2184-6499.

6 — The evolution, form and function of the human respiratory system.

Authors: Markus Bastir; Daniel Sanz Prieto; José María López Rey; Carlos A. Palancar; Marta Gómez Recio; Miguel López Cano; José María González Ruíz; Alejandro Pérez Ramos; Manuel A. Burgos; Benoit Beyer; Daniel García Martínez. Journal ofAnthropological Sciences. 100, pp. 1 - 32. Istituto Italiano di Antropologia, 2022. doi:10.4436/jass.10014. ISSN 20370644..

2021

7 — 3D form and function of the nasal cavity and nasopharynx in humans and chimpanzees.

Authors: Markus Bastir; Daniel Sanz Prieto; Manuel Burgos. Anatomical Record. Wiley, 2021.

8 — Linking Chronic Otitis Media and Nasal Obstruction: A CFD Approach.

Authors: Manuel A. Burgos, Alejandro Pardo, Rafael Rodríguez, Beatriz Rodríguez-Balbuena, David Castro, Francisco Piqueras, Francisco Esteban (2021). The Laryngoscope. doi: 10.1002/lary.29882

9 — Three-dimensional form and function of the nasal cavity and nasopharynx in humans and chimpanzees.

Authors: Bastir, M., Sanz-Prieto,D. & Burgos, M. (2021). The Anatomical Record, 1–12. doi: 10.1002/ar.24790

2019

10 — 3D analysis of sexual dimorphism, allometry and variation in human airways.

Authors: Bastir M, Megía García I, Torres-Tamayo N, García Martínez D, Piqueras F, Burgos Olmos M. American Journal of Physical Anthropology. 2019. Accepted (forthcoming) doi: 10.1002 /ajpa.23944

2018

11 — A CFD approach to understand septal perforations.

Authors: Burgos M.A., Sanmiguel-Rojas, R. Rodríguez, F. Esteban-Ortega. Eur Arch Otorhinolaryngol (2018)

12 — Nasal surgery handled by CFD tools.

Authors: E. Sanmiguel-Rojas, M.A. Burgos, F. Esteban- Ortega. International Journal For Numerical Methods In Biomedical Engineering. 2018; e3126.

13 — DigBody®: A new 3D modeling tool for nasal virtual surgery.

Authors: M.A. Burgos, E. Sanmiguel-Rojas, Narinder Singh, F. Esteban-Ortega. Computers in Biology and Medicine. Volume 98, 1 July 2018, Pages 118-125, ISSN 0010-4825.

14 — Virtual surgery for patients with nasal obstruction: Use of computational fluid dynamics (MeComLand®, Digbody® & Noseland®) to document objective flow parameters and optimise surgical results.

Authors: Burgos M.A., Sevilla-García MA, Sanmiguel-Rojas E, del Pino C, Fernández-Vélez C, Piqueras F & Esteban F. Acta Otorrinolaringológica Española. 2017 Sep 15. pii: S0001-6519(17)30155-3. doi: 10.1016/j.otorri.2017.05.005.

15 — Robust non-dimensional estimators to assess the nasal airflow in health and disease.

Authors: Sanmiguel-Rojas, Enrique; Burgos M.A.; C. del Pino; M.A. Sevilla-García; F. Esteban-Ortega. International Journal For Numerical Methods In Biomedical Engineering. 2018;34: e2906.

2017

16 — New CFD tools to evaluate nasal airflow.

Authors: Burgos M.A., Sanmiguel-Rojas, C. del Pino, M.A. Sevilla-García, F. Esteban-Ortega. Eur Arch Otorhinolaryngol (2017) 274: 3121.

2014

17 — Effects of the ambient temperature on the airflow across a Caucasian nasal cavity.

Authors: Burgos, M.A., Sanmiguel-Rojas, E, Hidalgo-Martínez, M. y Martín-Alcántara, A. International Journal For Numerical Methods In Biomedical Engineering, 30, (2014), 430-445. DOI: 10.1002/cnm.2616.

We are aiming to create a medical world in which technological innovation is available to all and serves the only purpose of improving people's quality of life