

## Editorial: Dental Research Incubators among School and Program Members of the Colombian Association of Dental Schools \*

Editorial: Semilleros de investigación odontológica en las facultades y programas miembros de la Asociación Colombiana de Facultades de Odontología

Editorial: Incubadoras de pesquisa odontológica nas facultades e programas membros da Associação Colombiana de Facultades de Odontologia

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## SUMMARY

The new thematic dossier published by Universitas Odontologica in its 42nd volume of 2023 is a compilation of studies that have been conducted within research incubators in dentistry. Colombia created the figure of the research incubator for undergraduate and graduate students about two decades ago in order to promote formative research, not as an isolated process, but as an integral part of institutional research groups and lines. This model has spread throughout Latin America. The dental

discipline has been promoting research among its faculties and associated programs for many years, for which the research incubator model has allowed a step forward in the scientific development of the country from the academia. This editorial describes how dental incubators are structured and how they work at the national and institutional levels.

**Keywords:** Colombia; dental education; dental research; dentistry; formative research; research incubators

## RESUMEN

El nuevo dossier temático que publica *Universitas Odontologica* en su volumen 42 de 2023 es una recopilación de trabajos que se han realizado al interior de los semilleros de investigación en odontología. Colombia desde hace alrededor de dos décadas creó la figura del semillero de investigación para estudiantes de pregrado y posgrado con el fin de promover la investigación formativa, no como un proceso aislado, sino como parte integral de los grupos y líneas de investigación institucionales. Esta práctica se ha extendido a lo largo de América Latina. La disciplina odontológica lleva muchos años promoviendo la investigación entre sus facultades y programas asociados para el cual el modelo de semilleros de investigación ha permitido dar un paso adelante en el desarrollo científico del país desde la academia. En este editorial se describe cómo están estructurados y cómo trabajan los semilleros odontológicos en los ámbitos nacional e institucional.

**Palabras clave:** Colombia; educación odontológica; investigación formativa; investigación odontológica; odontología; semilleros de investigación

## RESUMO

O novo dossiê temático publicado pela *Universitas Odontológica* em seu volume 42 de 2023 é uma compilação de estudos realizados em incubadoras de pesquisa odontológica. Há cerca de duas décadas, a Colômbia criou a figura da incubadora de pesquisa para estudantes de graduação e pós-graduação, a fim de promover a pesquisa formativa, não como um processo isolado, mas como parte integrante de grupos e linhas de pesquisa institucionais. Este modelo se espalhou por toda a América Latina. A disciplina dentária promove há muitos anos a investigação entre as suas faculdades e programas associados, para o que o modelo de incubadora de investigação tem permitido à academia dar um passo em frente no desenvolvimento científico do país. Este editorial descreve como estão estruturadas e como funcionam as incubadoras odontológicas nos níveis nacional e institucional.

**Palavras-chave:** Colômbia; educação odontológica; incubadoras de pesquisa; odontologia; pesquisa formativa; pesquisa odontológica

## INTRODUCTION

### Dossier on Research Incubators in Dentistry

The training of dentists in Colombia, as in most Latin American countries, is carried out at the undergraduate level in a university system that is often called Napoleonic because the educational institutions are structured around professional faculties, as the French emperor established (1). In this context, dentistry programs usually last five years, after which graduates obtain a degree that allows them to do general clinical practice after working one year in their social/rural service and having obtained a license. *Universitas Odontologica*, in its tradition of publishing dossiers on specific and current topics, joined the program of Dental Research Incubators that are promoted by the Colombian Association of Dental Faculties (ACFO). To this end, the journal invited leading professors from ACFO and their respective schools to serve as guest editors. The team wrote a call for applications that was disseminated nationally and internationally. The content of the call for papers appears below (2):

In Colombia, university training in research in the different disciplines is framed within the **Research Incubator** model that is part of the National System of Science, Technology, and Innovation. Beyond the individual and isolated efforts that students can make when developing their undergraduate theses, this model seeks to anchor research learning experiences in institutional strengths and developments and to foster research culture. Research training and the organization of research incubators in dentistry are led by the group of schools that make up the Colombian Association of Dental Schools (ACFO, for its acronym in Spanish) and have formed the interactive network called Research Incubators of Dental Schools (SIFO, for its acronym in

Spanish). The education of future researchers or professionals who base their practice on scientific evidence has a solid foundation in the incubators. All young researchers who have participated or are participating in incubators are invited to submit their studies for peer-review and possible publication in the **dossier on Dental Research Incubators** to be published in volume 42 of 2023 of *Universitas Odontologica*.

For the dossier on **Dental Research Incubators**, original studies with documentary, qualitative, observational, and experimental designs that explore various questions in the different dimensions of dental practice (clinical, basic and laboratory research, administration, education, etc.) will be accepted. The requirement is that such articles are or have been part of a Research Incubator. Likewise, institutional case study papers describing and analyzing experiences, strategies, practices, and results of Research Incubators in each of the schools will be accepted, as well as documents that comprehensively describe and analyze this research training model in Colombian dental schools. Finally, studies from other countries that have educational models equivalent to the incubators in dentistry will be considered.

As a result of the call for papers, we received 14 manuscripts, of which 8 were published in this volume. The included studies cover topics such as biomaterials, quality of life, surgery, epidemiology, professional ethics, pharmacotherapy, orthopedics, and occupational health. Seven of the studies were conducted at Colombian universities (Antioquia-Medellín, Javeriana-Bogotá and Cali, Metropolitana-Barranquilla, Santiago de Cali, Santo Tomás-Bucaramanga, Sinú-Montería, UNICOC-Cali, Valle-Cali, Visión de Las Américas-Medellín) and one at an equivalent program at the University of Costa Rica. Some of these studies were collaborations between authors from different institutions. All papers received approval from the ethics committees of their universities and were subjected to the usual peer review by experts external to the institutions/countries by *Universitas Odontologica*. The following sections of this editorial describe and analyze the characteristics and achievements of incubator programs in schools, and through ACFO.

## **DENTAL RESEARCH INCUBATORS IN ACFO SCHOOLS AND PROGRAMS**

ACFO's flagship program has been the constant support to its affiliated schools and programs in the structuring of incubator groups, in the context prior to and after the pandemic. Research incubators have allowed students to develop scientific skills through projects and activities that promote scientific and collaborative work. Several schools have presented about the process of creating and developing these groups, as well as their integration into institutional educational projects and the formation of the National Network of Research Incubators of Schools of Dentistry (SIFO, for its acronym in Spanish) (3).

Various approaches have been implemented in this regard. In some institutions, incubators are linked to research groups. They receive support from them in the training processes and contribute to the various lines of research. On the other hand, among other institutions, incubator groups operate with greater autonomy and independence, although they are always under the guidance of a professor. They thus contribute to the institutional research groups of the school (3).

There are different approaches to naming research groups. Some universities opt for suggestive and eye-catching names, such as "Alpha and Omega," "Odontogenesis," or "Kimera." At other schools, the names may be abbreviations of the subject area in which research is conducted. For example, SISPUK corresponds to the research incubator of the public health team at the University of Cartagena. A common aspect in these institutions is the way in which the incubator groups are structured. Monitoring and support by the teaching staff are permanent in this process. As a result of this, a characterization of the structure of the research incubators of the dentistry schools that belong to the SIFO-ACFO Network is presented here. The following section presents examples of these schools and the methodology they use to form their incubator groups.

## Structure of Incubators

### *Corporación Universitaria Rafael Núñez, Cartagena*

The creation of research incubators at the Rafael Núñez University Corporation is part of the context of research training. These incubators are important in the academic dynamics of the institution and in the educational experience of students enrolled in the program. Their existence contributes to the construction of a research culture, provides a framework for a flexible curricular structure, promotes projects, creates research groups (made up of students and professors), improves academic quality, and prepares human resources. In accordance with Agreement No. 18 of October 21, 2009 (see Research Lines), a research incubator is considered at the Corporation as a program that fosters engagement and research activity among young people.

In the Dentistry program, research incubators are conceived as spaces for the exercise of freedom and academic criticism, as well as for the expression of creativity and innovation. These spaces enable the participation of students in the management of research projects of various categories, with the purpose of understanding that research is an intrinsic facet of professional education. The group of professors and students of the dental research incubator at the Rafael Núñez University Corporation, known as SEIFO, was founded in 2001. This group follows the guidelines of the statute for research incubators and has as its main goal to promote research, generate a space for academic and scientific discussion, promote interest in research, and develop projects based on contextual problems. Its vision is to become a pioneering group in dental research with a biopsychosocial approach committed to the community to generate changes in local and regional environments, based on the principles of sustainable human development. SEIFO's goals include positioning itself in the network of incubators at the local, regional (Bolívar Node) and national levels; conducting research projects with scientific value and social benefits; and presenting studies at conferences and symposia in which research results are shown. SEIFO's statutes also include a training plan adapted to the research experience achieved by the students who are part of the incubator.

The lead research professor issues calls for applications every six months that establish the eligibility requirements for joining the SEIFO incubator. These requirements are disseminated through institutional communication channels, such as mass emails and the website. Currently, the research incubator group is composed of 32 students and 5 professors. The active students in the incubator (14 of 136) represent 10.3% of the students in the dental program, which exceeds the institutional goal of 5%. The students in the research incubator participate in various research activities according to their level of training, such as journal clubs and training provided by the institution, the regional or national network of SIFO ACFO incubators. The students in the incubator participate in institutional, departmental, and ACFO-sponsored research meetings.

### *Institución Universitaria Colegios de Colombia—UNICOC, Bogotá and Cali*

The Institución Universitaria Colegios de Colombia (UNICOC) includes research as a fundamental part of its educational approach and recognizes it as a driving force to improve the quality of teaching, enhance teacher training, and apply knowledge to reality. Research strengthens the training of students and enables them to create, develop, and apply knowledge for the benefit of society, fostering critical thinking and investigative skills.

Incubators are a relevant strategy in research training that seeks to bring students closer to the practice of scientific research. This is achieved by involving them in activities linked to the development of research projects under the guidance of research professors. Research incubators join as essential elements within the Research Groups. Research incubators include those students who participate in

extracurricular formative research activities. These activities are added to the academic research spaces of the curriculum in which students develop fundamental research skills. These students, driven by their interest, aptitudes, and skills, choose to strengthen their understanding and practice in research methodology, as well as generate new knowledge, with the guidance of an advisor (4).

Both UNICOC Bogotá and UNICOC Cali prioritize the formation of research incubator groups. These groups participate in various activities, such as poster presentations, authoring scientific articles, and participation in expert panels and regional research meetings in the South-Central and South-Western Chapters. In addition, they contribute to the ACFO National Meeting on Dental Research through oral presentations and posters.

#### *Pontificia Universidad Javeriana, Bogotá*

Since 2012, the Dental Research Center (CIO) of the Universidad Javeriana has strengthened its research incubators. Students who participate in the incubators conduct research and critical reading of literature and write conceptual review articles with the support of one or more tutors. Students are also trained in laboratory and diagnostic techniques.

The CIO has four incubators registered with the Vice-Presidency of Research. The first, the Translational CIO Incubator, aims to promote the development of diagnostic and therapeutic tools based on advances in basic sciences in areas such as dental tissue biology and bioengineering, dental caries and periodontal disease, genetics of dentomaxillofacial abnormalities such as cleft lip and palate and amelogenesis imperfecta, and systemic diseases related to dental and craniofacial disorders, such as sleep apnea. The second is the Clinical CIO Incubator, which, as its name indicates, seeks to strengthen skills in clinical research lines. The third, the Bacterial CIO Incubator, seeks to complement undergraduate and graduate training in microbiology and oral pathologies such as oral microbial ecology, susceptibility of microorganisms, phenotypic and genotypic characterization of microorganisms, and evaluation of natural products with biological activity. The fourth is the Society and Oral Health Incubator, which promotes the study of the social determinants of health and their consequences on oral health in topics such as social inequalities and oral health of populations, public policies in Colombia and mechanisms to improve oral health education (5).

#### *Universidad Autónoma de Manizales, Manizales*

At the Dental School of the Autonomous University of Manizales there are various research incubators that cover diverse areas of knowledge. Among them, the Oral Health incubator (INSAO) and the Public Health incubator stand out.

#### *Universidad CES, Medellín*

CES University established a group of research incubators called Oral Quest. This incubator was created by students of the undergraduate program in Dentistry with the purpose of strengthening knowledge and research processes, deepening, and applying the scientific method. The objective of the incubator is to equip students with observation, exploration, and teamwork skills to conduct research projects. The educational space focuses on providing comprehensive training to students of the Dental School. In the O-Quest incubator, democracy is encouraged among members to facilitate the socialization of ideas, proposals, and reflections, in order to generate new research projects, always in search of excellence. Through its interdisciplinary approach, it seeks to strengthen academic development in order to improve the scientific progress of students, faculty, and ultimately, the university (6,7).

### *Universidad Cooperativa de Colombia, Bogotá, Medellín, Pasto, and Villavicencio*

The Universidad Cooperativa de Colombia (UCC) in Bogotá hosts two research incubators linked to the research group. The Basic Sciences Incubator, known as KIMERAS, meets regularly with an average of 8 students to address topics related to oral cancer, premalignant lesions, oral cancer biomarkers, and microbiology of caries and periodontal disease. The Public Health Incubator, called Mentas Pensantes, also meets regularly with a group of about 12 students who focus on oral health education, social and demographic determinants of oral health, and oral health education in communities with disabilities. On the other hand, the UCC, on its Medellín campus, has a group of research incubators known as SIUCFO, an acronym for the Universidad Cooperativa, Escuela Dental Research Incubator.

Students from the UCC incubator, Pasto campus, participate in events in which they present their research projects and experiences, both within the university and at regional, national, and international meetings. Likewise, they are part of the research projects currently conducted by the dental program, such as proposals, ongoing projects, and completed projects. In 2019, there were approximately 45 students in the Dental School incubators: EXÓN (basic sciences), SABERCIEN (epidemiology of oral and craniofacial diseases), and SAPIENTIAE (public health, social and human sciences in dentistry). The dental program at UCC Villavicencio has the Meta Dental Research Group GIOMET, which was registered in 2007 in Minciencias (code COL0093979) and has been classified in category B since 2013.

### *Universidad de Antioquia, Medellín*

The Odontogenesis research incubator is housed in the Research Center of the Dental School and provides a space for undergraduate students (mainly), graduate students, graduates, and professors for their research training. Participation in the incubator is voluntary and complementary to the curriculum. Its goal is to foster research capabilities, promote interaction between researchers, professors, and students, foster interinstitutional and interdisciplinary collaboration, and manage research strategies. The goals are to promote research training, develop skills, and generate experiences linked to research, allowing members of the incubator to explore their potential and capabilities to achieve learning in the context of formative research. The principles that guide its operation are visibility, recognition, stability, sustainability, participation, interinstitutional relationships, and interdisciplinary work. The incubator follows a schedule with activities planned for the entire semester and holds biweekly meetings (8).

### *Universidad de Cartagena, Cartagena*

Research incubators at the University of Cartagena are legally constituted and operate in accordance with university regulations that establish guidelines, incentives, and responsibilities. The formation and supervision of these groups falls to the research groups. One of these examples is SISPUK, which is the research incubator linked to the university's public health group. Its mission is to promote research interest in undergraduate and graduate students so that they acquire critical and reflective skills in public health, address social problems, and contribute to their solution. The vision of this incubator is to be recognized by Minciencias, generate an impact through research skills among its members, and contribute to the improvement of the health of populations. Its research areas address topics such as chronic disorders and oral health, healthy lifestyles, and evaluation of public policy in oral health.

On the other hand, the SEINGITOUK-Universidad de Cartagena research incubator is a group of incubators under the supervision of the Interdisciplinary Group for Dental Research and Treatments of the same university. Its mission is to merge research in dentistry with fundamental aspects of biomedical sciences, such as theoretical and computational chemistry, to address dental pathologies. Its objective is to establish research and collaboration networks with national and international universities to find innovative therapeutic solutions in dentistry. In the medium and long term, they seek to be recognized

at national and international levels and promote innovative therapies for the needs of local and global communities. Their lines of research include biotechnology and oral morphophysiology.

#### *Universidad del Sinú, Cartagena y Montería*

The University of Sinú (UniSinú), on its Cartagena campus, consists of two research incubators in dentistry: the Dental Research Incubator of the University of Sinú (SIOS) and the PROMOUC Research Group.

UniSinú Montería, on the other hand, has the ODIN group's research incubator, which is made up of more than 20 students who act under the coordination of research professors who guide and advise the students. The research incubators are made up of active undergraduate and graduate students, as well as alumni of the program, who can join as guest professors. Likewise, students from other institutions who share an interest in formative research are welcomed. The members of the research incubators of the Universidad del Sinú— Elías Bechara Zainúm can assume roles as incubator leaders, monitors with organizational responsibilities, young seed students, and support tutor professors.

The research incubator allows young participants to strengthen their academic training through actions such as reflecting on the topics that interest them most; developing skills for critical analysis and argumentation; participating in inter-institutional research networks and events; and receiving support in the process of professional education.

#### *Universidad del Valle, Cali*

The Universidad del Valle has a research incubator linked to the ACFO incubator network. This incubator also contributes to the organization of the research meeting of the Suroccidente Node. The supervision of this incubator falls to a tutor professor. In addition, the various research groups at the university involve undergraduate students, as members of their incubators, in their research proposals (9).

#### *Universidad El Bosque, Bogotá*

Universidad El Bosque established a research incubator policy in 2013. These spaces are led by students and have a support professor. The incubators are related to research groups at the university and have contributed to fostering a research culture among students. One of these incubators is UBSIFO (Universidad El Bosque Research Incubators School of Dentistry), which provides support to students up to the sixth semester, contributing to their training in research and addressing various topics under the coordination of professors specialized in each of the topics.

#### *Universidad Metropolitana, Barranquilla*

The Universidad Metropolitana has an incubator in the dental program called Metropolitan Dental Research Incubators (SIOM, for its acronym in Spanish). This group of young people joins SIOM voluntarily to participate in extracurricular activities that promote the development of research skills, critical thinking, leadership, and continuing education in research.

#### *Universidad Nacional de Colombia, Bogotá*

At the National University of Colombia, the School of Dentistry promotes the Alfa-Omega Research Incubator. The main objective of this incubator is to form an interdisciplinary and multidisciplinary group of students and professors who, through a modern and dynamic approach, propose solutions to present and future challenges in oral health. The mission of the incubator is to train researchers and

promote academic research development at the School of Dentistry, with the purpose of contributing to the advancement of knowledge and improvements in the various areas of the dental profession. The incubator has strengthened the academic community by cultivating a scientific, ethical, and humanistic foundation in students, allowing them to address the demands and trends of the contemporary world in a responsible manner (9).

#### *Universidad Santiago de Cali, Cali*

The Universidad Santiago de Cali prioritizes research as a fundamental element for the development of professionals. In this sense, it encourages research training and the participation of students in its 64 research incubators, distributed among its seven schools. The School of Health, in particular, has 21 incubators registered with the General Directorate of Research, of which 5 are dedicated to the dental program. These incubators bring together a significant number of students who share their research projects in the school's internal formative research meetings. In addition, they represent the program in regional and national meetings, such as the ACFO event organized by the universities of the Southwest Node and the ACFO national research meeting, as well as in the RedColsi research incubator meeting. Students also get involved in teaching projects as research assistants, always linked to an incubator (11).

#### *Universidad Santo Tomás, Bucaramanga*

The Universidad Santo Tomás conceives research incubators as an educational strategy in which institutional training plans are developed as well as training plans associated with specific projects, which are financed through internal calls for incubators. The incubators are linked to the Dental School or to the departments. The SIFOUSTA incubator is part of the school and its research groups Comprehensive Oral Health (SIB) and Stomatognathic System and Morphophysiology (SEYMF) in which the University's Department of Basic Sciences also participates. Likewise, the Oral Microbiology AND Cellular Biology (OMACB) incubator is linked to the SEYMF group and the SESIB incubator is part of the SIB group, specifically its line of safety and health at work. The fundamental purpose of this strategy is to contribute to the comprehensive training of future dentists, placing special emphasis on social and community activities that allow forging a dentist sensitive to the problems of their region.

### **SIFO-ACFO Dental Research Incubator Network**

The SIFO network's main objective is to articulate the various research groups of the schools and programs associated with ACFO. These incubators function as an academic community that is linked to the ACFO research system through its connection with the research groups and centers of excellence. They play a key role in the training of new generations of researchers, allow students to enter the research field, and identify those students with a scientific vocation who, in the long term, can be linked to research groups. Likewise, the SIFO network seeks to promote quality in the education of human resources, the development of dental practices, and the formulation of policies that benefit the health of the population, education, and research.

SIFO network activities are divided into two axes: virtual and in-person. In the virtual area, webinars and other online activities are held with a focus on learning about the various areas of dentistry, evidence-based health, and research. Interaction is maintained through social networks, email communications, and the ACFO website, which includes periodic meetings of the network's board of directors. The in-person component includes events such as the ACFO National Research Meeting (ENIO) and the SIFO-ACFO Incubator Meeting, which is held annually during ENIO. Participation in this event allows incubators to publicize the results of their work in the academic community. During ENIO, the National

Dental Research Incubator Camp also takes place. In addition, regional meetings, academic research actions, and other publicity, communication, integration, and participation activities are held.

It is worth noting that students linked to incubators have carried out a variety of training activities that have strengthened cohesion among participants. Among other initiatives, competitions, calls, knowledge and skills marathons, clinical and artistic photography competitions, and cultural exhibitions have been organized within the nodes. These activities have not only contributed to academic training, but also to fostering camaraderie.

Furthermore, there has been an observed growth in the autonomy and democratic participation of the students participating in incubators. This has been shown in the nomination and election of their own representatives to the SIFO-ACFO Board of Directors. The SIFO-ACFO Board of Directors includes members from various ACFO-affiliated dental schools and programs, reflecting an equitable and diverse representation (Figures 1 and 2).



Figure 1  
SIFO-ACFO Network Board of Directors 2022-2023



Figure 2  
SIFO-ACFO Network Board of Directors 2023-2024

## CONCLUSION

Research incubators, as a strategy for formative research and research promotion, have had a relevant development that contributes to the teaching and research missions of higher education institutions in Colombia and other Latin American countries (12-15). This editorial article has analyzed such development in the dental discipline. In addition to institutional advances, ACFO has played a leading role in making incubators a matter of national scope.

Each of the research incubators described here has a tutor or guiding professor, who is responsible for the continuous motivation of/among the students, in order to promote research in all areas of oral health on an ongoing basis. In this way, it consolidates and gives meaning to the education of future dental professionals interested in scientific evidence and its application in a professional practice with a sense of quality and service.

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\* Editorial

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