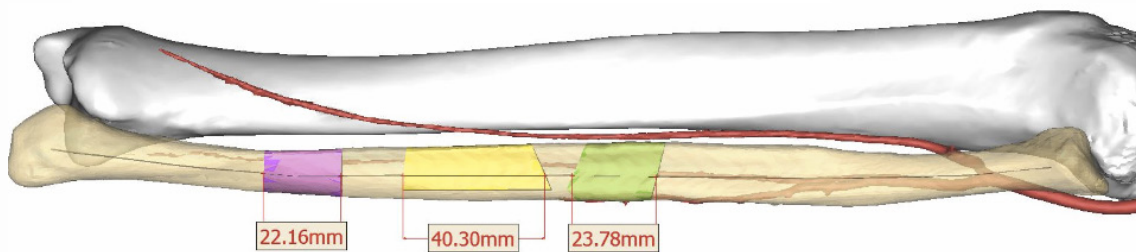


# DTJournal

**1** 2024

**Journal of Diagnostics and  
Treatment of Oral and  
Maxillofacial Pathology**



EDITOR IN CHIEF

Oleksii Tymofieiev, *Ukraine*

SECTION EDITOR, ORAL AND MAXILLOFACIAL TRAUMA

Paul Coulthard, *United Kingdom*

COVER IMAGE COURTESY

Olindo Massarelli, *Italy*

# TANTUM VERDE®

QUICK RELIEF FROM PAIN  
AND INFLAMMATION IN THE  
MOUTH AND THROAT<sup>1</sup>

**AN INTEGRAL COMPONENT OF THE TREATMENT  
OF PAIN AND INFLAMMATION IN THE ORAL CAVITY  
IN 60 COUNTRIES WORLDWIDE!<sup>2</sup>**



Reg. № UA/3920/01/01

**LOCAL ANESTHETIC  
AND ANTI-INFLAMMATORY  
EFFECT<sup>1</sup>**

- **JAWS FRACTURES<sup>3</sup>**
- **IMPLANTS PLACEMENT<sup>4</sup>**
- **WOUNDS OF ORAL CAVITY<sup>5</sup>**



#### SUMMARY OF PRODUCT CHARACTERISTICS

**NAME OF THE MEDICINAL PRODUCT.** Tantum Verde 0.15% mouthwash. **QUALITATIVE AND QUANTITATIVE COMPOSITION.** Each 100 ml contains: active ingredient: benzydamine hydrochloride 0.15 g (equivalent to 0.134 g of benzydamine). **Therapeutic indications.** Treatment of symptoms such as irritation/inflammation including those associated with pain in the oropharyngeal cavity (e.g. gingivitis, stomatitis and pharyngitis), including those resulting from conservative or extractive dental therapy. **Posology and method of administration.** Pour 15 ml of Tantum Verde mouthwash into the measuring cup, 2-3 times per day, using it either at full concentration or diluted. If diluted, add 15 ml of water to the graduated cup. Do not exceed the recommended dosage. **Contraindications.** Hypersensitivity to benzydamine or to any of the excipient. **PHARMACOLOGICAL PROPERTIES. Pharmacodynamic properties.** Pharmacotherapeutic group: Stomatologic drugs: other agents for local oral treatment, ATC code: A01AD02. Clinical studies demonstrate that benzydamine is effective in relieving suffering from localised irritation of the mouth and pharynx. In addition, benzydamine possesses a moderate local anaesthetic effect. **Pharmacokinetic properties. Absorption.** Absorption through the oropharyngeal mucosa is demonstrated by the presence of measurable quantities of benzydamine in human plasma. These levels are insufficient to produce systemic effects. **Distribution.** When applied locally, benzydamine has been shown to accumulate in inflamed tissues where it reaches effective concentrations because of its capacity to penetrate the epithelial lining.

**Information about medicines. Information for health care professionals for use in professional activities.**

1. Інструкція для медичного застосування лікарського засобу Тантум Верде®, розчин для ротової порожнини, РПН № UA/3920/01/01, затверджено Наказом Міністерства охорони здоров'я України № 636 від 01.10.2015.

2. <http://www.angelini-pharma.com/wps/wcm/connect/com/home/Angelini+Pharma+in+the+world/>

3. Тимофеев А.А. и др. "Особенности гигиены полости рта для профилактики воспалительных осложнений при переломах нижней челюсти". Современная стоматология 2015;1(75):52-8.

4, 4.5. Tymofiejew O.O. et al "Prevention of inflammatory complications upon surgeries in maxillofacial region". J Diagn Treat Oral Maxillofac Pathol. 2017;1:105-12.

Clinical and CT images are courtesy of: Ievgen Fesenko (Department of Oral & Maxillofacial Surgery, PHEI "Kyiv Medical University", Kyiv, Ukraine), Oleg Mastakov ("SCIEDECE—Scientific Center of Dentistry & Ultrasound Surgery" Kyiv, Ukraine)



04119, Kiev, Melnikova str. 83D, of. 404.

Tel.: (044) 538-01-26

Fax: (044) 538-01-27



# About the Journal

JANUARY 2024 • VOLUME 8 • ISSUE 1  
www.dtjournal.org

## Official Title

*Journal of Diagnostics and Treatment of Oral and Maxillofacial Pathology*

## Official Title in Ukrainian

Журнал діагностики та лікування оральної і щелепно-лицевої патології

## Standard Abbreviation: ISO 4

*J. Diagn. Treat. Oral Maxillofac. Pathol.*

## Acronym

JDTOMP

## International Standard Serial Number (ISSN)

ISSN 2522-1965 (online)

## Aims & Scope

This is a monthly open access and peer-reviewed oral and maxillofacial surgeons. The journal is focused on trauma, microvascular and jaw reconstructive surgery, dental implants, salivary gland tumors/diseases, TMJ lesions, virtual surgical planning, implementation of ultrasonography into the practice of oral and maxillofacial surgeons.

## Editorial Board (EB) Composition

- EB shows significant geographic diversity representing 34 opinion leaders from 14 countries: Brazil, Canada, Colombia, Greece, Hong Kong (SAR, China), India, Israel, Italy, Slovak Republic, Spain, Ukraine, United Arab Emirates, United Kingdom, and United States.
- The majority of the EB Members have a discernible publication history in Scopus, Web of Science, and journals with a high impact factor.
- The publication records of all EB members are consistent with the stated scope and published content of the journal.
- The journal has several full-time professional editors.
- Gender distribution of the editors: 11.76% women (4 persons), 88.24% men (30 persons), 0% non-binary/other, and 0% prefer not to disclose.

## Frequency

12 issues a year (from January 2020)

## Publication History

2017: 4 issues a year  
2018: 4 issues a year  
2019: 10 issues a year  
From 2020: 12 issues a year

## Publishing Model

The *Journal of Diagnostics and Treatment of Oral and Maxillofacial Pathology* is a fully online-only open access and peer-reviewed publication.

## Types of Peer Review

The journal employs “double blind” and open reviewing.

## Article Publishing Charge (APC)

The APC in this journal is 500 Euro (\$550 USD) and 250 Euro (\$275 USD)(excluding taxes) depending on the article’s type. Details at website: [www.dtjournal.org](http://www.dtjournal.org).

## Types of Articles Currently Published by the Journal

Editorials/Guest Editorials/Post Scriptum Editorials, Images, Case Reports/Case Series, Original Articles, Review Articles, Discussions, Paper Scans (*synonyms*: Review of Articles, Literature Scan), Book Scans (*synonym*: Book Reviews), Letters to the Editor (*synonym*: Letters), and Viewpoints.

## State Registration in Ministry of Justice of Ukraine

Registration: Jul 28, 2016 (Certificate: KB № 22251-12151 P)  
Re-registration: May 21, 2019 (Certificate: KB № 23999-13839 ПП)  
Re-registration: Aug 10, 2021 (Certificate: KB № 24951-14891 ПП).

## Journal is Included in

Encyclopedia of Modern Ukraine, Google Scholar, National Repository of Academic Texts, Register of Scientific Publications of Ukraine (also known as Ukrainian Scientific Periodicals or Register of Scientific Professional Publications of Ukraine), ResearchGate, Scilit, and Vernadsky National Library of Ukraine

## Co-Founders

1. Shupyk National Healthcare University of Ukraine (formerly known as Shupyk National Medical Academy of Postgraduate Education).
2. Private Higher Educational Establishment “Kyiv Medical University.”
3. OMF Publishing, Limited Liability Company.

## Publisher

OMF Publishing, LLC is an academic publishing company.  
Address: 13-A Simferopolska Street, office 121, Kyiv 02096, Ukraine.  
E-mail: [office@omfpublishing.com](mailto:office@omfpublishing.com).  
Website: [www.omfpublishing.com](http://www.omfpublishing.com).

## Crossref Membership

OMF Publishing, LLC is a member of Publishers International Linking Association, Inc. which doing business as a Crossref. OMF Publishing’s active membership: From February 2017 to present.

## Digital Object Identifier (DOI) of the Journal

10.23999/j.dtomp

## Official Journal of the Association

Ukrainian Association for Maxillofacial and Oral Surgeons

## Ukrainian Association for Maxillofacial and Oral Surgeons (UAMOS)

Address: 4-A Profesora Pivvysotskoho Street, Kyiv 01103, Ukraine.  
Tel., fax: +38 044 528 35 17.  
Website: [www.uamos.org](http://www.uamos.org).

© 2024 OMF PUBLISHING, LLC



# Editorial Board

JANUARY 2024 • VOLUME 8 • ISSUE 1  
www.djournal.org

## Editor in Chief

**Oleksii O. Tymofieiev, ScD**  
Kyiv, Ukraine

## Deputy Editor in Chief

**Rui P. Fernandes, MD, DMD, FACS, FRCS(Ed)**  
Jacksonville, Florida, United States

## Section Editors

### Bone Augmentation Techniques

**Nardy Casap, MD, DMD**  
Jerusalem, Israel

### Business

**Ivan V. Nagorniak, MSc, PhD**  
Kyiv, Ukraine

### Craniofacial Deformities

**Sunil Richardson, MDS**  
Nagercoil, Tamil Nadu, India

### Facial Feminization Surgery

**Kyle Keojampa, MD, FACS**  
Los Angeles, California, United States

### Facial Plastic Surgery

**Tirbod Fattahi, MD, DDS, FACS**  
Jacksonville, Florida, United States

### Head & Neck Oncologic Surgery

**Todd C. Hanna, MD, DDS, FACS**  
New York, New York, United States

### Head & Neck Radiology

**Anil T. Ahuja, MBBS, MD, FRCR, FHKCR, FHKAM**  
Hong Kong, SAR, China

### Images

**Camilo Mosquera, DDS**  
Galveston, Texas, United States

### Orthognathic Surgery

**Mario Brinhole**  
São Paulo, São Paulo, Brazil

### Robotic Surgery

**Salam O. Salman, MD, DDS, FACS**  
Jacksonville, Florida, United States

### TMJ Lesions/Disorders

**Belmiro C. Vasconcelos, DDS, PhD**  
Recife, Pernambuco, Brazil

### Trauma

**Paul Coulthard, BDS, MDS, PhD, MFGDP(UK), FDSRCS(Eng), FDSRCS(OS), FDSRCPS(Glas), FFDTRCS(Ed), FDSRCS(Ed), FCGDent**  
London, United Kingdom

## Editorial Board Members

**Oleh M. Antonyshyn, MD, FRCS(C)**  
Toronto, Ontario, Canada

**Anthony M. Bunnell, MD, DMD, FACS**  
Jacksonville, Florida, United States

**Yurii V. Chepurnyi, ScD**  
Kyiv, Ukraine

**Nur A. Hatab, DMD, PhD**  
Ras Al Khaimah, United Arab Emirates

**Vladyslav P. Iefymenko, PhD**  
Kyiv, Ukraine

**Michael T. Kase, DMD**  
Birmingham, Alabama, United States

**Andrey V. Kopchak, ScD**  
Kyiv, Ukraine

**John M. Le, MD, DDS**  
Birmingham, Alabama, United States

**Olindo Massarelli, MD, PhD, FEBOMFS**  
Sassari, Italy

**Anastasiya Quimby, DDS, MD**  
Fort Lauderdale, Florida, United States

**Daniel Robles Cantero, DDS, MSc, PhD**  
Madrid, Spain

**Nataliia O. Savychuk, ScD**  
Kyiv, Ukraine

**Peter Stanko, MD, PhD**  
Bratislava, Slovak Republic

**Rostyslav M. Stupnytskyi, ScD**  
Kyiv, Ukraine

**Olexander O. Tymofieiev, ScD**  
Kyiv, Ukraine

**Natalia O. Ushko, ScD**  
Kyiv, Ukraine

**Andrew Yampolsky, DDS, MD**  
Philadelphia, Pennsylvania, United States

## Web & Social Media Editor

**João L. Monteiro, DDS, PhD**  
Boston, Massachusetts, United States

## Director, Journal Development Department

**Evangelos G. Kilipiris, DMD**  
Bratislava, Slovak Republic

## Resident Ambassador

**John M. Le, MD, DDS**  
Birmingham, Alabama, United States

## Managing Editor

**Ievgen I. Fesenko, PhD**  
Kyiv, Ukraine



# TANTUM VERDE®

INFORMATION LEAFLET  
for the medicinal product

### **Composition:**

*active substance:* **benzydamine hydrochloride;**

100 mL of solution contain benzydamine hydrochloride 0.15 g;

*excipients:* ethanol 96%, glycerol, methyl parahydroxybenzoate (E 218), flavor (menthol), saccharin, sodium hydrocarbonate, Polysorbate 20, Quinoline Yellow (E 104), Patent Blue V (E 131), purified water.

**Dosage form.** Oromucosal solution.

*Basic physical and chemical properties:* a clear green liquid with a typical mint flavor.

**Pharmacotherapeutic group.** Dental preparations. Other agents for local oral treatment.

ATC code: A01A D02.

### **Pharmacological properties.**

#### *Pharmacodynamics.*

Benzydamine is a non-steroidal anti-inflammatory drug (NSAID) with analgesic and antiexudative properties.

Clinical studies have shown that benzydamine is effective in the relief of symptoms accompanying localized irritation conditions of the oral cavity and pharynx. Moreover, benzydamine has anti-inflammatory and local analgesic properties, and also exerts a local anesthetic effect on the oral mucosa.

#### *Pharmacokinetics.*

Absorption through the oral and pharyngeal mucosa has been proven by the presence of measurable quantities of benzydamine in human plasma. However, they are insufficient to produce any systemic pharmacological effect. The excretion occurs mainly in urine, mostly as inactive metabolites or conjugated compounds.

When applied locally, benzydamine has been shown to cumulate in inflamed tissues in an effective concentration

due to its ability to permeate through the mucous membrane.

### **Clinical particulars.**

#### **Indications.**

Symptomatic treatment of oropharyngeal irritation and inflammation; to relieve pain caused by gingivitis, stomatitis, pharyngitis; in dentistry after tooth extraction or as a preventive measure.

#### **Contraindications.**

Hypersensitivity to the active substance or to any other ingredients of the product.

#### **Interaction with other medicinal products and other types of interaction.**

No drug interaction studies have been performed.

#### **Warnings and precautions.**

If sensitivity develops with long-term use, the treatment should be discontinued and a doctor should be consulted to get appropriate treatment.

In some patients, buccal/pharyngeal ulceration may be caused by severe pathological processes. Therefore, the patients, whose symptoms worsen or do not improve within 3 days or who appear feverish or develop other symptoms, should seek advice of a physician or a dentist, as appropriate.

Benzydamine is not recommended for use in patients hypersensitive to acetylsalicylic acid or other non-steroidal anti-inflammatory drugs (NSAIDs).

The product can trigger bronchospasm in patients suffering from or with a history of asthma. Such patients should be warned of this.

For athletes: the use of medicinal products containing ethyl alcohol might result in positive antidoping tests considering the limits established by some sports federations.

#### *Use during pregnancy or breast-feeding*

No adequate data are currently available on the use of benzydamine in pregnant and breastfeeding women. Excretion of the product into breast milk has not been studied. The findings of animal studies are insufficient to make any conclusions about the effects of this product during pregnancy and lactation.

The potential risk for humans is unknown.

TANTUM VERDE should not be used during pregnancy or breast-feeding.

#### *Effects on reaction time when driving or using machines*

When used in recommended doses, the product does not produce any effect on the ability to drive and operate machinery.

#### **Method of administration and doses.**

Pour 15 mL of TANTUM VERDE solution from the bottle into the measuring cup and gargle with undiluted or diluted product (15 mL of the measured solution can be diluted with 15 mL of water). Gargle 2 or 3 times daily. Do not exceed the recommended dose.

#### *Children.*

The product should not be used in children under 12 years due to a possibility of ingestion of the solution when gargling.

#### **Overdosage.**

No overdose has been reported with benzydamine when used locally. However, it is known that benzydamine, when ingested in high doses (hundreds times higher than those possible with this dosage form), especially in children, can cause agitation, convulsions, tremor, nausea, increased sweating, ataxia, and vomiting. Such acute overdose requires immediate gastric lavage, treatment of fluid/salt imbalance, symptomatic treatment, and adequate hydration.

#### **Adverse reactions.**

Within each frequency group, the undesirable effects are presented in order of their decreasing seriousness.

Adverse reactions are classified according to their frequency: very common ( $\geq 1/10$ ); common ( $\geq 1/100$  to  $<1/10$ ); uncommon ( $\geq 1/1,000$  to  $<1/100$ ); rare ( $\geq 1/10,000$  to  $<1/1,000$ ); very rare ( $<1/10,000$ ); frequency unknown (cannot be estimated from the available data).

*Gastrointestinal disorders:* rare – burning mouth, dry mouth; *unknown* – oral hypesthesia, nausea, vomiting, tongue edema and discoloration, dysgeusia.

*Immune system disorders:* rare – hypersensitivity reaction, *unknown* – anaphylactic reaction.

*Respiratory, thoracic and mediastinal disorders:* very rare – laryngospasm; *unknown* – bronchospasm.

*Skin and subcutaneous tissue disorders:* uncommon – photosensitivity; very rare – angioedema; *unknown* – rash, pruritus, urticaria.

*Nervous system disorders:* *unknown* – dizziness, headache.

TANTUM VERDE contains methyl parahydroxybenzoate, which can cause allergic reactions (including delayed-type reactions).

**Shelf life.** 4 years.

#### **Storage conditions.**

Do not store above 25°C. Keep out of reach of children.

#### **Packaging.**

120 mL of solution in a bottle with a measuring cup; 1 bottle per cardboard box.

#### **Dispensing category.**

Over-the-counter medicinal product.

#### **Manufacturer.**

Aziende Chimiche Riunite Angelini Francesco A.C.R.A.F. S.p.A., Italy.

Location of the manufacturer and its business address.  
Via Vecchia del Pinocchio, 22 – 60100 Ancona (AN), Italy.

#### **Date of the last revision of the text.**

September 26, 2018.

Information leaflet is

**APPROVED** by

Order of the

**Ministry of Health of Ukraine**


No. 636 dated 01.10.2015

**Registration Certificate**

No. UA/3920/01/01

# State Registration

JANUARY 2024 • VOLUME 8 • ISSUE 1  
www.djournal.org



**Міністерство юстиції України**  
**СВІДОЦТВО**  
**про державну реєстрацію**  
**друкованого засобу масової інформації**

Серія КВ № 24951-14891 ПР

«Журнал діагностики та лікування оральної і щелепно-лицевої патології»  
(назва видання державною мовою)  
«Journal of Diagnostics and Treatment of Oral and Maxillofacial Pathology»  
(назва видання іншою мовою (мовами))

Вид видання журнал  
(газета, журнал, бюлетень, збірник, альманах, календар, дайджест)

Статус видання вітчизняне  
(вітчизняне, спільне)

Мова (мови) видання змішаними мовами: українська, англійська

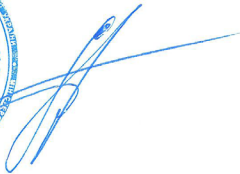
Вид видання за цільовим призначенням наукове, науково-виробниче  
(громадсько-політичне, наукове, навчальне, інформаційне, рекламне (понад 40 відсотків обсягу одного номера – реклама), еротичне тощо)

Обсяг, періодичність 23,1 ум. друк. арк., формат А4 (210x297мм), 1 раз на місяць


Сфера розповсюдження та категорія читачів загальнодержавна, зарубіжна  
лікарі-стоматологи-хірурги; лікарі ультразвукової діагностики, лікарі-рентгенологи, лікарі-патологоанатоми, студенти, лікарі-інтерни, слухачі, аспіранти, докторанти, наукові, науково-педагогічні та педагогічні працівники закладів вищої освіти та наукових установ

Засновник (співзасновники) «ОМФ ПАБЛІШІНГ» (код за ЄДРПОУ 40493077)  
Национальний університет охорони здоров'я України імені П.Л. Шупика (код за ЄДРПОУ 01896702), Приватний вищий навчальний заклад «Київський медичний університет» (код за ЄДРПОУ 16478809), Товариство з обмеженою відповідальністю «ОМФ ПАБЛІШІНГ» (код за ЄДРПОУ 40493077)

Програмні цілі (основні принципи) лікування в хірургічній стоматології та щелепно-лицевій  
або тематична спрямованість хірургії

Перший заступник Міністра  **Євгеній ГОРОВЕЦЬ**

10.08.2021  
(дата реєстрації)



**FIGURE.** Certificate of State Re-Registration of the Print Mass Media (journal) in the Ministry of Justice of Ukraine as of 2021. The *Journal* was registered for the first time in 2016 under the title *Diagnostics and Treatment of Oral and Maxillofacial Pathology*. The next re-registration took place in 2019.

# Content

of the Volume 8 • Issue 1 • January 2024

A1 **Publisher & Editorial Office Information**

A2 **Editorial Board**

A5 **State Registration**

A6 **Content, Courtesy, & Erratum**

## ORIGINAL RESEARCH

- 1 **Study of Changes in the State of Local and General Nonspecific Resistance of the Organism in Patients with Odontogenic Maxillary Sinusitis at Galvanic Pathology in the Oral Cavity**  
Oleksii O. Tymofeiev & Andrii M. Cherednichenko



## COURTESY

The *Journal*'s cover images are courtesy Olindo Massarelli, MD, PhD, FEBOMFS.

The images were taken from this article: Massarelli O, Meloni SM. The “beveled one-and-a-half-barrel” fibula transplant with virtual surgical planning and CT-guided implant surgery for prosthetic rehabilitation in posterior mandible defects: a pictorial essay. *J Diagn Treat Oral Maxillofac Pathol* 2022;6(3):39–59.

<https://doi.org/10.23999/j.dtopm.2022.3.3>





## ORIGINAL RESEARCH

# Study of Changes in the State of Local and General Nonspecific Resistance of the Organism in Patients with Odontogenic Maxillary Sinusitis at Galvanic Pathology in the Oral Cavity

Oleksii O. Tymofieiev<sup>a,\*</sup> & Andrii M. Cherednichenko<sup>b</sup>

## ABSTRACT

**Purpose:** To determine the state of local and general nonspecific resistance of the organism in the dynamics of surgical treatment of patients with odontogenic maxillary sinusitis in the presence of galvanic pathology in the oral cavity and to clarify the causes of development of postoperative inflammatory complications.

**Methods:** We examined 56 patients with odontogenic maxillary sinusitis in the dynamics of surgical treatment (sparing highmorotomy) in the presence of fixed metal dentures in the oral cavity. The age of the patients ranged from 29 to 58 years.

**Results:** In patients with odontogenic maxillary sinusitis with the presence of oral cavity galvanosis (atypical and typical forms), i.e. in the subjects of the II observation group, gingivitis was detected in almost 100% of cases, which were located in the area of fixed metal dental prostheses. The most pronounced inflammatory phenomena in the oral cavity were in subjects with stamped-soldered metal constructions, as well as in patients with chromium-cobalt (chromium-nickel) metal inclusions or in persons with defects in the metal-protective coating with titanium nitride (areas of damage and abrasion of titanium nitride metal-protective coating).

**Conclusions:** On the basis of the conducted examination of patients with odontogenic maxillary sinusitis in the presence of galvanic pathology in the oral cavity, it was found that in some forms of this pathology, i.e. galvanosis, there is a decrease in local and general nonspecific resistance of the body, which in turn leads to the development of inflammatory complications in the maxillary soft tissues (in 100%) and in the bone wound of the jaw, i.e. osteomyelitis (in 34.6%).

<sup>a</sup> Doctor of Medical Sciences, Professor, Honored Science and Technology Worker of Ukraine, Head of the Maxillofacial Surgery Department, Shupyk National Healthcare University of Ukraine, Kyiv, Ukraine.

<sup>b</sup> PhD Researcher, Maxillofacial Surgery Department, Shupyk National Healthcare University of Ukraine, Kyiv, Ukraine.

\* **Correspondence:** Department of Maxillofacial Surgery of Shupyk National Healthcare University of Ukraine based on Kyiv City Clinical Hospital No. 12 Communal Non-profit Enterprise, 4A Profesora Pidvysotskoho Street, Kyiv 01103, Ukraine.  
E-mail: [tymofeev@gmail.com](mailto:tymofeev@gmail.com) (Oleksii Tymofieiev)  
ORCID: <https://orcid.org/0000-0002-3191-6025>

**Support:** no grants received.

**Author Contribution:** The authors confirm their contribution to the paper as follows: study conception, design, and approval of the final version of the manuscript: both authors.

**Conflict of Interests:** The author has no conflicts of interest to disclose.

**Study design:** Original research.

**Please cite this article as:** Tymofieiev OO, Cherednichenko AM. Study of changes in the state of local and general nonspecific resistance of the organism in patients with odontogenic maxillary sinusitis at galvanic pathology in the oral cavity. J Diagn Treat Oral Maxillofac Pathol 2024;8(1):1–9.

Paper received 23 December 2023

Accepted 17 January 2024

Available online 31 January 2024

<https://doi.org/10.23999/j.dtmp.2024.1.1>

© 2024 OMF Publishing LLC. This is an open access article under the CC BY license (<https://creativecommons.org/licenses/by-nc/4.0/>).

## KEY WORDS

Odontogenic maxillary sinusitis, maxillary sinus, galvanic pathology, galvanism, galvanosis, local nonspecific resistance, general nonspecific resistance, metal inclusions

## INTRODUCTION

In recent years, we have noted that the number of patients with odontogenic maxillary sinusitis with galvanic pathology in the oral cavity has increased significantly; the severity of the clinical course of this disease, the number of recurrences and postoperative inflammatory complications has worsened.

It is noted that many of these patients have metal inclusions (fixed dentures, pins, inlays, etc.) of dissimilar metals in their mouths, which were installed many years ago. It is known that all these dissimilar metals and alloys in the human oral cavity cause the appearance of galvanic currents that leads to the development of galvanic pathology. And this, in turn, leads not only to an aggressive course of other somatic diseases in this person, but also to changes in nonspecific and specific resistance of the body, as well as the development of early and late postoperative inflammatory complications that are carried out in a patient with such galvanic pathology.

Therefore, the problem of decreasing local and general nonspecific resistance of the organism in patients with odontogenic maxillary sinusitis in the presence of galvanic pathology in the oral cavity is a difficult task in the treatment and for the prevention of inflammatory complications.

Thus, the treatment of patients with odontogenic maxillary sinusitis in the presence of galvanic pathology in the oral cavity is one of the most difficult and urgent problems in maxillofacial surgery. It is known that galvanic pathology is most often found in middle-aged people, i.e. in the most able-bodied age group of the population. Therefore, effective treatment of this pathology has not only economic but a social aspect as well.

The purpose of this study is to determine the state of local and general nonspecific resistance of the organism in the dynamics of surgical treatment of patients with odontogenic maxillary sinusitis in the presence of galvanic pathology in the oral cavity and to clarify the causes that cause

the development of postoperative inflammatory complications [1–7].

## MATERIALS AND METHODS

We examined 56 patients with odontogenic maxillary sinusitis in the dynamics of surgical treatment (sparing highmorotomy) in the presence of fixed metal dentures in the oral cavity. The age of the patients ranged from 29 to 58 years. Depending on the presence or absence of plating pathology in their mouths, the subjects with odontogenic maxillary sinusitis were divided into two observation groups. The first observation group included subjects with galvanism (compensated and decompensated), and the second group included subjects with galvanosis (atypical and typical forms). Since the cause of odontogenic maxillary sinusitis was a tooth (chronic periodontitis, granuloma, radicular cyst, etc.), the removal of the etiologic factor that caused the maxillary sinusitis was performed simultaneously with the highmorotomy performed.

Thus, all patients with odontogenic maxillary sinusitis, depending on their concomitant galvanic pathology, were divided into two studied groups of observation: group I - 30 patients with the presence of galvanism in the oral cavity (compensated and decompensated forms); group II - 26 patients with the presence of galvanosis in the oral cavity (atypical and typical forms). The control group consisted of 28 practically healthy people of the same age as the examined patients.

Samples for the examination of local and general nonspecific resistance of the organism were taken when patients were hospitalized, on the 3-4th day of surgical treatment, as well as when patients were discharged from the hospital. The control group consisted of 28 practically healthy people (without concomitant diseases) of the same age.

To study the local nonspecific resistance of the organism, we determined the functional activity of neutrophils that emigrated into the oral cavity through the cheek mucosa. The material was

selected in accordance with the method proposed by V.D. Dyshlov. To detect alkaline phosphatase in neutrophilic leukocytes we used the most common method of its determination - the method of azo-combination (modified by M.G. Shubich, 1980). The number of emigrated leukocytes and the activity of alkaline phosphatase in them were determined in the prints obtained from the cheek mucosa on the side of odontogenic maxillary sinusitis.

The Kaplow L.S. method was used for objective assessment of cytochemical reaction to alkaline phosphatase. Depending on the enzymatic activity of neutrophils according to their degree of dye staining, they were divided into 5 types: zero (unstained), the first (with weak cytoplasm staining), the second (with moderate cytoplasm staining), the third (with strong cytoplasm staining) and the fourth (with very strong cytoplasm staining and dye diffusion into the nucleus area). 100 neutrophils were counted in the smear and the number of cells belonging to each type was determined. This number was multiplied by the type number and the product was summarized. The sum was expressed in conventional units.

To determine the state of general nonspecific resistance of the organism we studied phagocytic activity of peripheral blood leukocytes according to the method of V.F. Chernushenko and L.S. Kogosova (1978).

To detect the presence of inflammation of the alveolar mucosa, Schiller-Pisarev's test was performed. The mucous membrane of the alveolar processes was treated with Lugol's solution. The intensity of staining was evaluated in points: 1 point – no staining, 2 points – weak staining, 3 points – intense staining. The average value for the upper and lower jaw parameters was calculated.

To objectivize the Schiller-Pisarev test was expressed in numbers (points).

#### Estimation of Svrakov's iodine number values:

- weakly expressed inflammation process – up to 2.3 points.
- moderately pronounced inflammation process – 2.67-5.0 points.
- intense inflammation process – 5.33-8.0 points.

Contact thermometry was carried out with an electrothermometer TPM-1, which has point thermocouples (sensors) with a measuring range

from 16 to 42°C. The accuracy of registration is 0.2°C. By touching the end section of this sensor to the surface of the mucous membrane of the alveolar process, we determined the temperature in the examined area, i.e. we performed contact thermometry. The time of contact of the sensor with the oral mucosa was 20 seconds, the intervals between repeated examinations were from 2 to 5 seconds. Touching with the sensor was done with approximately the same pressure force. Local temperature was measured three times, and the arithmetic mean was calculated. The temperature was measured on the investigated and healthy side. The basis of contact thermometry is not the measurement of absolute temperatures above the pathologic focus, but the detection of temperature differences in symmetric areas ( $\Delta T$ ). The thermoasymmetry ( $\Delta T$ ) on symmetrical areas, detected in practically healthy people of the same age and sex, served as a control.

All numerical data obtained during the survey were processed by mathematical method with calculation of Student's criterion. The indicators were considered reliable at  $p < 0.05$ .

## RESULTS AND DISCUSSION

The results of examination of patients with odontogenic maxillary sinusitis in the first observation group showed that local nonspecific resistance of the organism in the subjects changed in the dynamics of the treatment as follows (Table 1). At hospitalization of the subjects the number of neutrophils that emigrated through the mucous membrane of the neck unreliably increased in comparison with healthy people up to  $20.0 \pm 4.7$  ( $p > 0.05$ ), that was also noted with the activity of alkaline phosphatase in them, which was  $44.2 \pm 2.2$  units ( $p > 0.05$ ). In 3-4 days after the operation (sparing highmorotomy) the number of neutrophils that emigrated through the cheek mucosa significantly increased compared to healthy people to  $33.7 \pm 0.9$  units ( $p < 0.01$ ), and the activity of alkaline phosphatase in them amounted to  $72.9 \pm 6.9$  units ( $p < 0.001$ ). At the discharge of the patients of the I study group from the hospital, the number of neutrophils that emigrated through the cheek mucosa decreased and already corresponded to the norm –  $17.9 \pm 0.5$  units ( $p > 0.05$ ), which was also noted in relation to the activity of alkaline phosphatase in them –  $40.3 \pm 1.9$  units ( $p > 0.05$ ).

**TABLE 1.** Cytologic and Cytochemical Indices in the Prints Taken from the Cheek Mucosa of Patients with Odontogenic Maxillary Sinusitis of the First Observation Group in the Dynamics of the Conducted Treatment.

Groups Under Study	Number of Persons	Examination Period	Number of Neutrophils (per 100 cells) that Emigrated Through the Cheek Mucosa	Activity of Alkaline Phosphatase in Neutrophils that Emigrated Through the Mucosa Cheek (in Units)
			M ± m	M ± m
I observation group	30	Hospitalization	20.0 ± 4.7 p > 0.05	44.2 ± 2.2 p > 0.05
		Day 3 to 4	33.7 ± 0.9 p < 0.001 p <sub>1</sub> < 0.001	72.7 ± 6.9 p < 0.001 p <sub>1</sub> < 0.001
		Extract	17.9 ± 0.5 p > 0.05 p <sub>1</sub> < 0.001	40.3 ± 1.9 p > 0.05 p <sub>1</sub> < 0.001
Control group (healthy people)	28		16.6 ± 1.4	40.9 ± 2.2

Note: p – reliability of differences compared to the control group (healthy people), p<sub>1</sub> – reliability of differences compared to the previous period of examination.

Thus, based on the analysis of the previously conducted examination and the obtained indicators, we concluded that in patients with odontogenic maxillary sinusitis in the presence of galvanism in the oral cavity (compensated and decompensated forms) local nonspecific resistance of the organism at the discharge of patients from the hospital is within normal limits. The increase in the number of neutrophils emigrated through the cheek mucosa, as well as the activity of alkaline phosphatase in them in the dynamics of the surgical treatment (on the 3-4 day) shows the body's response to the surgical intervention (strain of local immunity). At discharge of the patients of the first observation group from the hospital, normalization of local immunity was observed.

The results of examination of patients with odontogenic maxillary sinusitis with the presence of galvanosis (atypical and typical forms) in the oral cavity, i.e. II observation group are presented in [Table 2](#). It was found that in the first days of hospitalization of patients of the II observation group the number of neutrophils that emigrated through the mucous membrane of the neck was unreliably increased compared to healthy people and amounted to  $24.4 \pm 3.6$  ( $p > 0.05$ ) and the activity of alkaline phosphatase in them was also significantly increased to  $64.4 \pm 5.0$  units ( $p < 0.001$ ). In 3-4 days after the operation the number of neutrophils, which emigrated through the cheek mucosa, significantly increased in comparison with healthy people and the previous period of examination and amounted to  $47.9 \pm 3.3$  units ( $p < 0.001$ ), and the activity of alkaline phosphatase

in them was equal to  $86.3 \pm 11.2$  units ( $p < 0.001$ ). At discharge of patients with odontogenic maxillary sinusitis of the II observation group from the hospital the number of neutrophils that emigrated through the cheek mucosa remained at reliably high figures and amounted to  $45.7 \pm 5.6$  units ( $p < 0.001$ ), which was also noted in relation to the activity of alkaline phosphatase in them –  $77.4 \pm 9.9$  units ( $p < 0.001$ ).

Based on the analysis of the data of the obtained laboratory parameters, which are presented in [Table 2](#), we came to the conclusion that in patients with odontogenic maxillary sinusitis in the presence of galvanosis in the oral cavity (atypical and typical forms), i.e. in group II of observation during the surgical treatment the local nonspecific resistance of the organism decreased, which was noted in the increase of the number of neutrophils that emigrated through the cheek mucosa and a high activity of alkaline phosphatase in them on the 3-4 day of the examination. At discharge of the subjects from the hospital these indices did not normalize (remained elevated) and significantly differed from the norm, indicating a significant decrease in local immunity in these subjects. The presence of an increased number of neutrophils emigrating through the cheek mucosa, as well as increased activity of alkaline phosphatase in them at discharge from the hospital indicated not only a decrease in the factors of local nonspecific resistance of the organism in this group of subjects, but also the presence of early inflammatory complications in the maxillary soft tissues around the postoperative wound in most of them.



**TABLE 2.** Cytologic and Cytochemical Indices in the Prints Taken from the Cheek Mucosa of Patients of the II Observation Group in the Dynamics of the Conducted Treatment.

Groups Under Study	Number of Persons	Examination Period	Number of Neutrophils (per 100 cells) that Emigrated through the Cheek Mucosa	Activity of Alkaline Phosphatase in Neutrophils that Emigrated Through the Mucosa Cheek (in units)
			M ± m	M ± m
II observation group	26	Hospitalization	24.4 ± 3.6 p > 0.05	64.4 ± 5.0 p < 0.001
		Day 3 to 4	47.9 ± 3.3 p < 0.001 p <sub>1</sub> < 0.001	86.3 ± 11.2 p < 0.001 p <sub>1</sub> < 0.001
		Extract	45.7 ± 5.6 p < 0.001 p <sub>1</sub> > 0.05	77.4 ± 9.9 p < 0.001 p <sub>1</sub> > 0.05
Control group (healthy people)	28		16.8 ± 1.4	40.9 ± 2.2

Note: p – reliability of differences compared to the control group (healthy people), p<sub>1</sub> – reliability of differences compared to the previous period of examination.

The indices of general nonspecific resistance of the organism in patients with odontogenic maxillary sinusitis in I and II observation groups were studied (Table 3). The indices of phagocytic activity of peripheral blood neutrophils in the subjects of the I observation group (in the presence of galvanism in the oral cavity) during hospitalization did not change significantly in comparison with healthy people and were as follows: 72.9 ± 3.0 % and 6.3 ± 0.5 (p > 0.05), at discharge: 73.7 ± 1.8 % and 6.5 ± 0.4 (p > 0.05). Indicators of phagocytic activity of

peripheral blood neutrophils in the subjects of the II observation group (with the presence of galvanosis in the oral cavity) at hospitalization significantly and reliably decreased in comparison with healthy people (control group) and were as follows: 57.0 ± 3.3% (p < 0.001) and 5.4 ± 0.3 (p < 0.02). At discharge of patients of the II observation group from the hospital the indices of phagocytic activity of leukocytes significantly remained reduced and were: 58.2 ± 3.2% (p < 0.001) and 5.6 ± 0.3 (p < 0.05).

**TABLE 3.** Dynamics of Changes in Phagocytic Activity of Peripheral Blood Leukocytes in Subjects of I and II Observation Groups.

Groups Under Study	Number of Persons	Examination Period	Indicators of Phagocytic Activity of Peripheral Blood Leukocytes	
			Percentage of Phagocytosis	Phagocytic Number
			M ± m	M ± m
Subjects of group I	30	Hospitalization	72.9 ± 3.0 p > 0.05	6.3 ± 0.5 p > 0.05
		Extract	73.7 ± 18 p > 0.05	6.5 ± 0.4 p > 0.05
Subjects of group II	26	Hospitalization	57.0 ± 3.3 p < 0.001	5.4 ± 0.3 p < 0.02
		Extract	58.2 ± 3.2 p < 0.001	5.6 ± 0.3 p < 0.05
Healthy people	28		74.5 ± 1.6	6.4 ± 0.

Note: p - reliability of differences compared to healthy people.

To detect inflammatory changes in the peri-mandibular soft tissues of the alveolar processes in the dynamics of treatment, we performed Schiller-Pisarev's test. Svrakov iodine number at hospitalization of maxillary sinusitis patients of the I observation group (patients with galvanism) was  $4.4 \pm 0.7$  points (moderately expressed process of inflammation), and in the II group (patients with galvanism) –  $7.5 \pm 0.6$  points (intensive process of inflammation). On the 3-4 day after the operation in the I group the index decreased and was equal to  $3.6 \pm 0.4$  points (moderately expressed process of inflammation), and in the II group it remained at high figures and amounted to  $6.5 \pm 0.3$  points (intensive process of inflammation). On the 3rd - 4th day after the operation in the I observation group the index was as follows  $2.4 \pm 0.7$  points (weakly expressed process of inflammation), and in the II group it remained on high figures and made  $5.9 \pm 0.8$  points (intensive process of inflammation). On the 7th-9th day of the conducted treatment in the I observation group (patients with galvanism) the index of Schiller-Pisarev's test was  $2.1 \pm 0.6$  points (weakly expressed process of inflammation), and in the II group (patients with galvanosis) it was equal to  $5.2 \pm$

0.5 points (intensive process of inflammation).

The indicators of thermoasymmetry of the jaw alveolar mucosa in the area of the postoperative bone wound and the opposite side in the I and II observation groups are presented in Table 4. When the subjects of the I observation group were hospitalized, the thermoasymmetry was significantly increased and amounted to  $1.6 \pm 0.1^\circ\text{C}$  ( $p < 0.001$ ), which was also noted in the patients of the II group –  $1.7 \pm 0.2^\circ\text{C}$  ( $p < 0.001$ ). In 3-4 days of the conducted treatment thermoasymmetry in the patients of the I group of observation remained significantly increased and amounted to  $1.2 \pm 0.2^\circ\text{C}$  ( $p < 0.001$ ), which was also noted in the patients of the II group –  $1.5 \pm 0.1^\circ\text{C}$  ( $p < 0.01$ ). In 5-6 days after the operation thermoasymmetry in the patients of the I observation group remained significantly increased and amounted to  $0.9 \pm 0.1^\circ\text{C}$  ( $p < 0.01$ ), and in the patients of the II group –  $1.3 \pm 0.2^\circ\text{C}$  ( $p < 0.001$ ). In 7-9 days after the operation the thermoasymmetry in patients of the I group of observation normalized and amounted to  $0.6 \pm 0.2^\circ\text{C}$  ( $p > 0.05$ ), and in patients of the II group of observation remained significantly increased –  $1.0 \pm 0.2^\circ\text{C}$  ( $p < 0.01$ ).

**TABLE 4.** Indices of Thermoasymmetry of the Mucous Membrane of the Alveolar Process.

Group Under Study	Number of Persons	Examination Day	$\Delta T$ - Thermoasymmetry (in $^\circ\text{C}$ )	
			$M \pm m$	$p$
Subjects of group I	26	Hospitalization	$1.6 \pm 0.1$	$< 0.001$
		Day 3 to 4	$1.2 \pm 0.2$	$< 0.001$
		Day 5 to 6	$0.9 \pm 0.1$	$< 0.01$
		Day 7 to 9	$0.6 \pm 0.2$	$> 0.05$
Subjects of group II	24	Hospitalization	$1.7 \pm 0.2$	$< 0.001$
		Day 3 to 4	$1.5 \pm 0.1$	$< 0.001$
		Day 5 to 6	$1.3 \pm 0.2$	$< 0.001$
		Day 7 to 9	$1.0 \pm 0.2$	$< 0.01$
Healthy people	28		$0.5 \pm 0.1$	

Note:  $p$  - reliability of differences compared to healthy people.

Thus, summarizing the conducted examinations of patients with odontogenic maxillary sinusitis with the presence of galvanism in the oral cavity (compensated and decompensated forms), i.e. in the subjects of the I observation group, we found only gingivitis (in 63.3%) among inflammatory complications, which, in our opinion, were the result of the presence of galvanic pathology – galvanism

in the oral cavity. We did not detect any other complications in the area of peri-mandibular soft tissues of postoperative wounds in this observation group.

In patients with odontogenic maxillary sinusitis with the presence of oral cavity galvanosis (atypical and typical forms), i.e. in the subjects of the II observation group, gingivitis was detected in

almost 100% of cases, which were located in the area of fixed metal dental prostheses. The most pronounced inflammatory phenomena in the oral cavity were in subjects with stamped-soldered metal constructions, as well as in patients with chromium-cobalt (chromium-nickel) metal inclusions or in persons with defects in the metal-protective coating with titanium nitride (areas of damage and abrasion of titanium nitride metal-protective coating with).

In the same observation group, all the operated patients (100%) were found to have such a complication as the presence of inflammatory infiltrate of soft tissues in the area of the postoperative wound. At repeated visits of these patients to the clinic (in 10-15 days) inflammatory infiltration of peri-mandibular tissues slightly decreased but remained in 22 patients (84.6%). In 3-4 weeks after the performed surgery, osteomyelitis process of the maxillary bone developed in 9 patients (34.6%).

Based on our examination, we proved that the use of this laboratory test such as determination of the number of neutrophils emigrated from the oral cavity through the cheek mucosa and the activity of alkaline phosphatase in them is a prognostic test. It was also proved that the use of such an examination method as thermoasymmetry of the mucous membranes of the alveolar process in the dynamics of the postoperative period can also be a prognostic test, which indicates the development of the inflammatory process in the peri-maxillary soft tissues after the operation performed.

### CONCLUSIONS

On the basis of the conducted examination of patients with odontogenic maxillary sinusitis in the

presence of galvanic pathology in the oral cavity, it was found that in some forms of this pathology, i.e. galvanosis, there is a decrease in local and general nonspecific resistance of the body, which in turn leads to the development of inflammatory complications in the maxillary soft tissues (in 100%) and in the bone wound of the jaw, i.e. osteomyelitis (in 34.6%).

### REFERENCES (7)

1. Tymofieiev OO. Maxillofacial surgery (Ukrainian). 3rd ed. Kyiv: Medicine, All-Ukrainian Specialized Publishing House; **2022**.
2. Tymofieiev OO. Manual of maxillofacial and dental surgery (Russian). 5th ed. Kyiv: Chervona Ruta-Turs; **2012**:319–32.
3. Tymofieiev OO, Pavlenko OO, Tymofieiev OO. Galvanic pathology in stomatology (Ukrainian). Kyiv: TOV Stal publishing house LLC; **2014**.
4. Butenko ZA, Gluzman DF, Zak KP, et al. Cytochemistry and electron microscopy of blood cells and hematopoietic organs. Kyiv: Naukova Dumka; **1973**.
5. Chernushenko EF, Kogosova LS. Immunological studies in the clinic. Kyiv: Zdorovia; **1978**.
6. Tymofieiev OO, Cherednichenko AM. Potentiometric examination of patients with chronic odontogenic maxillary sinusitis in the presence of galvanic pathology. *J Diagn Treat Oral Maxillofac Pathol* **2023**;7(10):120–131.  
<https://doi.org/10.23999/j.dtomp.2023.10.2>
7. Tymofieiev OO, Tymofieiev OO, Ushko NO, Yarifa MO. Question of the etiology of malignant neoplasms. *J Diagn Treat Oral Maxillofac Pathol* **2017**;1(3–4):175–82.  
<https://doi.org/10.23999/j.dtomp.2017.3-4.11>



ОРИГІНАЛЬНЕ ДОСЛІДЖЕННЯ

UKRAINIAN LANGUAGE

## Вивчення змін стану місцевої та загальної неспецифічної резистентності організму у хворих на одонтогенний верхньощелепний синусит при гальванічній патології в порожнині рота

Олексій Тимофєєв<sup>a,\*</sup> та Андрій Чередніченко<sup>b</sup>

### АНОТАЦІЯ

**Мета.** Визначити стан місцевої та загальної неспецифічної резистентності організму в динаміці хірургічного лікування хворих на одонтогенний гайморит за наявності гальванічної патології в ротовій порожнині та з'ясувати причини, що зумовлюють розвиток післяопераційних запальних ускладнень.

**Матеріали і методи.** Обстежено 56 хворих на одонтогенний гайморит в динаміці оперативного лікування (щадна гайморотомія) за наявності в порожнині рота незнімних металевих зубних протезів. Вік хворих коливався від 29 до 58 років.

**Результати.** У хворих на одонтогенний гайморит з наявністю гальванозу ротової порожнини (атипова та типова форми), тобто у обстежених II групи спостереження, майже у 100% випадків виявляли гінгівіти, які локалізувалися в ділянці фіксованих металевих зубних протезів. Найбільш виражені запальні явища в порожнині рота були у обстежених зі штамповано-паяними металевими конструкціями, а також у хворих з хромокобальтовими (хромонікелевими) металевими включеннями або в осіб з дефектами металозахисного покриття нітриду титану (зони пошкодження та стирання металозахисного покриття нітриду титану).

**Висновки.** На підставі проведеного обстеження хворих на одонтогенний верхньощелепний гайморит за наявності гальванічної патології в ротовій порожнині встановлено, що при деяких формах цієї патології, тобто гальванозах, спостерігається зниження місцевої та загальної неспецифічної резистентності організму, що в свою чергу призводить до розвитку запальних ускладнень у м'яких тканинах верхньої щелепи (у 100%) та в кістковій рані щелепи, тобто остеомієліту (у 34,6%).

<sup>a</sup> Тимофєєв Олексій Олександрович – д. мед. н., професор, заслужений діяч науки і техніки України, завідувач кафедри щелепно-лицевої хірургії Національного університету охорони здоров'я України імені П. Л. Шупика.

<sup>b</sup> Чередніченко Андрій Миколайович – аспірант кафедри щелепно-лицевої хірургії Національного університету охорони здоров'я України імені П. Л. Шупика.

\* **Кореспонденція:** Department of Maxillofacial Surgery of Shupyk National Healthcare University of Ukraine based on Kyiv City Clinical Hospital No. 12 Communal Non-profit Enterprise, 4A Profesora Pidvysotskoho Street, Kyiv 01103, Ukraine.  
E-mail: [tymofeev@gmail.com](mailto:tymofeev@gmail.com) (Oleksii Tymofieiev)  
ORCID: <https://orcid.org/0000-0002-3191-6025>

**Підтримка.** Гранти не отримано.

**Внесок авторів.** Авторі підтверджують свій внесок у статтю наступним чином: створення концепції дослідження, формуванню дизайну і затвердження остаточної версії рукопису – Олексій Тимофєєв та Андрій Чередніченко.

**Конфлікт інтересів.** Авторі не мають конфлікту інтересів, який слід розкривати.

**Дизайн дослідження:** оригінальне дослідження.

**Для цитування:** Tymofieiev OO, Cherednichenko AM. Study of changes in the state of local and general nonspecific resistance of the organism in patients with odontogenic maxillary sinusitis at galvanic pathology in the oral cavity. J Diagn Treat Oral Maxillofac Pathol 2024;8(1):1–9.

Манускрипт отриманий 23 грудня 2023  
Прийнятий до публікації 17 січня 2024  
Стаття доступна онлайн 31 січня 2024

<https://doi.org/10.23999/j.dtmp.2024.1.1>

© 2024 ТОВ «ОМФ ПАБЛІШІНГ». Це стаття відкритого доступу під ліцензією CC BY (<https://creativecommons.org/licenses/by-nc/4.0/>).



**КЛЮЧОВІ СЛОВА**

Одонтогенний гайморит, верхньощелепна пазуха, гальванічна патологія, гальванізм, гальваноз, місцева неспецифічна резистентність, загальна неспецифічна резистентність, металеві вclusions

# U-Impl<sup>®</sup>

SWITZERLAND



№ R3M 804 252 B2

Сертифікат відповідності  
технічного регламенту  
щодо медичних виробів



Switzerland Aarbergerstrasse 107A, CH-2502  
Biel, Phone/Fax +41 323230188  
info@u-impl.com  
www.u-impl.com