

## SOME ISSUES ON THE USE OF THE MEDICINAL PRODUCT DECACAN IN MEDICINE AND THE MECHANISM OF ACTION

**Mardonova Nigora Parda kizi**

Assistant teacher of the department of Maxillofacial Surgery, Samarkand State  
Medical University, Samarkand, Uzbekistan

**Abstract.** This article discusses the use of the medicinal product Decacan in medicine and the mechanism of action. Decacan accumulates in the cytoplasmic membrane (SPM) of the microbial cell and binds to the phosphatide groups of membrane lipids, disrupts the SPM of microorganisms, and has an antimicrobial and antifungal effect.

**Key words:** bactericidal effect, resistant, application, microtracheostomy, diphtheria.

**Annotatsiya.** Ushbu maqolada tibbiyotda Dekasan dori vositasining qo'llanilishi va ta'sir mexanizmi to'g'risida fikr yuritilgan. Dekasan mikrobu hujayrasining sitoplazmatik membranasida (SPM) to'planadi va membrana lipidlarining fosfatid guruhlar bilan birikadi, mikroorganizmlarning SPMni buzib, mikroblarga qarshi, zamburug'larga qarshi ta'sir ko'rsatadi.

**Kalit so'zlar:** bakteritsid ta'sir, rezistent, applikasiya, mikrotraxeostoma, difteriya.

**Аннотация.** В данной статье рассматривается применение препарата Декасан в медицине и механизм его действия. Декасан накапливается в цитоплазматической мембране (СПМ) микробной клетки и связывается с фосфатидными группами мембранных липидов, нарушая СПМ микроорганизмов и оказывая противомикробное и противогрибковое действие.

**Ключевые слова:** бактерицидный эффект, резистентный, применение, микротрахеостомия, дифтерия.

**Introduction.** Decacan (or decamethoxin) is an antiseptic and antimicrobial agent, usually used to treat upper respiratory tract infections such as rhinitis, pharyngitis, tracheitis and other inflammatory processes in the nasal and laryngeal areas. Decasan has a pronounced bactericidal effect on staphylococci, streptococci, diphtheria and pertussis bacillus and encapsulated bacteria, fungicidal effect on

yeasts, yeast-like fungi, pathogens of epidermophytosis, trichophytosis, microsporia, erythrasma, some types of mold fungi (aspergillus, penicillin), protisticidal effect on Trichomonas, Giardia, virucidal effect on viruses.

Decacan (active ingredient - decamethoxin) according to the ATC classification belongs to the group of antiseptic and disinfectant drugs. It has a wide range of antimicrobial, antifungal and antiviral action due to the ability to interact with the phosphate groups of lipids of the cytoplasmic membrane of microorganisms and thus disrupt its permeability and lead to cell destruction. Decamethoxin has been used in clinical practice since the 1970s and to this day with consistently high efficiency, has a wide range of indications for use.

**Main part.** An antimicrobial antifungal drug that concentrates on the cytoplasmic membrane (CPM) of a microbial cell and combines with phosphatide groups of membrane lipids, disrupting the permeability of the CPM of microorganisms. Decamethoxin has a pronounced bactericidal effect on staphylococci, streptococci, diphtheria and pseudomonas aeruginosa, capsular bacteria and a fungicidal effect on yeast, yeast-like fungi, causative agents of epidermophytosis, trichophytosis, microsporia, erythrasma, some types of mold fungi (aspergillus, penicillium), protisticidal effect on trichomonads, lamblia, and a virucidal effect. It is highly active against microorganisms resistant to antibiotics. The formation of forms resistant to decamethoxin with prolonged use occurs slowly and does not exceed the effective concentrations of the drug. Bacteriostatic (fungistatic) concentrations are similar to its bactericidal (fungicidal), virucidal, protisticidal concentrations. During treatment with the drug, the sensitivity of antibiotic-resistant microorganisms to antibiotics increases. The drug is practically not absorbed by mucous membranes, intact skin and wound surfaces.

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1 ml of solution contains 0.2 mg of Decasan, excipients: sodium chloride, water for injection, is a clear, colorless solution. It is an antiseptic and disinfectant ATX code: D08A, belongs to the group of structural agents

Treatment of pustular bacterial and fungal skin diseases, microbial eczema, purulent-inflammatory lesions of soft tissues (abscess, carbuncle, phlegmon, furuncle, infected wounds, panaritium); dental diseases (stomatitis, ulcerative-necrotic gingivitis, dystrophic-inflammatory form of periodontosis of I-II degree in the acute phase). Indicated for lung abscess, bronchiectasis, cystic hypoplasia of the lungs complicated by suppuration, chronic bronchitis in the acute phase, chronic tonsillitis, sore throat, carriage of staphylococci and diphtheria bacilli, ulcerative colitis, paraproctitis. In surgical infectious and inflammatory diseases of the abdominal cavity (peritonitis of various etiologies) and in pulmonology, Decacan is used to wash the abdominal and pleural cavity. In urology, the drug is used for urethritis (for instillation into the urethra), balanoposthitis (for baths), prostatitis (for microclysters), cystitis (for instillation into the bladder), for irrigation of the bladder in the postoperative period.

In gynecological practice, Decacan is used to treat candidiasis of the vaginal mucosa, inflammatory diseases of the external genitalia of microbial etiology, prenatal sanitation of the birth canal, and treatment of postpartum endometritis.

Decacan is used to disinfect the skin of the hands of medical personnel, rubber gloves when examining patients and performing medical manipulations, small-scale surgical interventions, pre-sterilization disinfection of medical instruments and diagnostic equipment made of metal, rubber, polymeric materials and glass.

Used for purulent and fungal lesions of the skin, purulent wounds, for washing and in the form of a primochka. For the treatment of proctitis and ulcerative colitis, a warm solution of the drug is administered in the form of an enema of 50-100 ml 2 times a day until the symptoms of acute inflammation disappear completely. In chronic paraproctitis, fistulas are washed with Decacan daily for 3-4 days. For washing the bladder in adults, Decacan solution is used in a dose of 500-600 ml, after previously diluting it with purified water in a ratio of 1:7 (the course of treatment consists of 7-20 washings). In case of damage to the oral mucosa, it is treated by applying 25-50 ml for 10-15 minutes or by rinsing (with 100-150 ml). Dystrophic inflammation of the I-II degree in the stage of exacerbation of periodontitis is treated by washing the pathological areas with a warm solution (50-70 ml) or applying it to the gums until the inflammation disappears.

Patients with candidal lesions of the oral mucosa, ulcerative-necrotic gingivitis are prescribed 4 times a day for rinsing the mouth (100-150 ml) for 5-10

days. Treatment of tonsillitis and chronic tonsillitis is carried out by washing the lacunae of the subpalatine tonsils (50-75 ml is used per wash). Sanitation of carriers of staphylococci and diphtheria bacillus is carried out by gargling, washing the lacunae, washing the nasopharynx, tonsils. The lacunae are washed 3-5 times a day. In lung abscess, bronchiectasis, cystic hypoplasia of the lungs complicated by suppuration, chronic bronchitis in the acute stage, Decacan endobronchial is administered as follows:

25-50 ml 1-2 times a day through a microtracheostomy, 5-10 ml 1 time a day through a transnasal catheter;

5-10 ml 1-2 times a day by ultrasonic inhalation;

washing the tracheobronchial tree in a volume of 100 ml.

**Analysis and results.** The duration of treatment is 2-4 weeks. In addition, for the treatment of microbial, fungal and trichomonad lesions of the vaginal mucosa, Decacan is used in the form of sprints (50-100 ml of the drug heated to 38 ° C 3 times a day). The birth canal is also sanitized once before childbirth in the same way. Treatment of postpartum endometritis is carried out by washing the uterine cavity with a warm drug (150-200 ml) 2 times a day. Disinfection of the skin of the hands and rubber gloves is carried out by applying 5-10 ml of the drug to the pre-washed surface to be disinfected, evenly distributing it over the entire surface for 5 minutes. Cleaned medical instruments, tubes and equipment are disinfected by immersing them in the solution for 30 minutes. Decamethoxin does not have toxic effects in the concentrations used in Decasan.

Long-term use of the drug Decasan does not cause any toxic reactions. Heating the drug to 38 °C before use increases the effectiveness of the effect. In inflammatory processes and skin exposure, the drug is diluted in a ratio of 1:1 or 1:2. Decasan is a substance with cationic surface tension activity, therefore it is incompatible with soap and other anionic compounds. Decasan increases the sensitivity of antibiotic-resistant microorganisms to antibiotics.

As a result of the studies, it was established that decamethoxin has a bactericidal effect on *Pseudomonas aeruginosa*, as well as *Escherichia coli* and *Micrococcus lysodeikticus*. Since decamethoxin is a surfactant, it changes the permeability of the pathogen membrane, leading to the destruction and death of the microorganism, which determines its bactericidal effect (Shchetina V.N. et al., 1990). The bacteriostatic effect is due to the following mechanisms: inactivation of

pathogen exotoxins (Kovalchuk V.P., 2002); decreased adhesion of pathogenic microorganisms (Zhorniyak O.I. et al., 2010). An in vitro study demonstrated the antifungal efficacy of decamethoxin against *Candida* fungi isolated from patients with chronic bowel diseases. It has also been established that drug resistance to decamethoxin develops very slowly and does not reach a high level (Palii G.K., Ivanova S.A., 1986).

A recent clinical study presents the experience of treating 17 patients with cholangitis of various origins using the antiseptic Decacan. The clinical efficacy of the drug in the complex therapy of cholangitis, confirmed by the results of a bacteriological study of bile, is noted (Aripova N.U., Magzumov I.Kh., 2014). The efficacy of Decacan in the treatment of cholangiogenic liver abscess is demonstrated in a clinical study. The results of treating 47 patients with cholangiogenic liver abscess are described. The study demonstrated the effectiveness of abscess cavity sanitation with Decacan (Nychytailo M.I. et al., 2005),

Decacan is proposed for use in the complex treatment of infected pancreatic necrosis and its complications (Nichitailo M.E., 2010), as well as in the treatment of acute abdominal infectious pathology of various origins (Fomin P.D. et al., 2009).

Another study presents the results of complex therapy of 37 patients operated on due to the development of acute abdominal surgical diseases. 22 patients received local therapy with 0.02% antiseptic solution of decamethoxin. A positive effect on the clinical course of diseases, a decrease in the incidence of purulent-septic complications, in particular in patients operated on for acute necrotic pancreatitis (Konovalov E.P., 2004) were noted. The experience of treating 91 patients with peritonitis of various origins using the antiseptic Decacan is presented. Significant clinical efficacy was noted in comparison with other antiseptics in the complex treatment of peritonitis (Nazirov F.N., 2014).

Based on the analysis of the research results, it was found that the use of a cationic antiseptic solution (including 0.02% decamethoxin solution) for sanitizing the abdominal cavity reduces microbial contamination during sanitization, and due to this, the frequency of postoperative complications in surgical peritonitis and the number of deaths are reduced (Boiko V.V. et al., 2012).

The effectiveness of Decacan in the treatment of purulent infections of the pararectal area was analyzed in 102 patients. According to the data obtained,

Decacan is an effective drug for local therapy of this pathology (Zakharash M.P., 2011).

Decamethoxin has also proven itself as an effective drug for preventing suppuration of postoperative wounds after excision of pararectal or coccygeal epithelial cysts (Klimenko A.N., Iukhimets A.D., 1982). One of the clinical studies examined the effectiveness of Decacan in the complex therapy of soft tissue necrosis, which resulted in sepsis. Sepsis is a severe generalized infection usually caused by pathogenic bacteria. It is often the cause of hospitalization and death. The experience gained as a result of the study contributed to a better understanding of the pathomechanisms of this condition, the development of therapy aimed at improving the general condition of patients, and also necessarily including local application of antibacterial and antiseptic agents in the purulent focus. The study included 192 patients (women - 103, men - 89). According to the classification of septic conditions (Chicago, 1991), patients were divided into 3 groups: Group 1 — with a local form of infection, Group 2 — with systemic inflammatory response syndrome (SIRS), which lasts up to 72 hours, Group 3 — with various forms of sepsis, in which SIRS lasts 72 hours or more. In patients whose wounds were treated with Decasan solution, a decrease in pain, tissue edema, early wound debridement and early appearance of granulation in the wound were noted. The algorithm for treating sepsis proposed by the authors includes a comprehensive approach to treating infection by early surgical intervention, intensive supportive therapy, etiotropic antibacterial therapy and local use of antiseptic therapy with Decasan solution.

As a result, it was concluded that Decacan can be recommended for disinfection of skin, mucous membranes and wounds in foci of infections caused by bacteria, fungi and protozoa (Fuss J., 2016). Decamethoxin can also be used to treat burn disease. In one of the clinical studies, the etiology of infectious complications in 71 patients with severe burns was established. It was found that the main pathogens of infection in patients with burn disease are *S. aureus* (35.9%), *A. baumannii* (25%), *P. aeruginosa* (12.82%), *P. mirabilis* (5.12%). The effective bactericidal activity of antiseptic solutions of Decacan, miramistin, chlorhexidine has been proven. In relation to staphylococcus, high antimicrobial properties of dressings, which include ions of decamethoxin, chlorhexidine, furagin, silver, have been noted. The clinical effectiveness of the use of materials impregnated with the

antimicrobial composition decamethoxin with carboxymethyl starch, oxyethyl cellulose and polyvinyl acetate, used for the prevention and treatment of infectious-purulent-inflammatory diseases, has been proven.

**Conclusion.** Decacan is an antiseptic indicated for use in a wide range of infectious and inflammatory diseases. Its efficacy and safety have been confirmed in clinical studies. The use of Decacan for local sanitation of the infection site reduces the need for antibiotics and increases the sensitivity of microorganisms to antibiotics when used in combination with Decacan. This drug has no toxic effect. The only contraindication for use is individual intolerance to decamethoxin. There are no restrictions on the use of Decacan during pregnancy and breastfeeding. As a surface-active cationic antiseptic, Decacan is incompatible with soap and other anionic surfactants.

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