

Are You Up To Date?

ارائه از:

پروانه مدیرامانی

کتابخانه مرکزی دانشگاه علوم پزشکی مشهد

What are your next steps?

Let's look at an "evidence-based clinical resource"



Doctors Have Clinical Questions

Unanswered clinical questions impact patient management decisions

Approximately 2 out of 3 clinical encounters generate a question

Physicians have approximately 11 clinical questions a day

60%
of questions go
unanswered

Answering all clinical questions could change

5 to 8

patient management decisions each day

What is UpToDate ?

An electronic evidence-based clinical decision support tool designed by expert physicians for clinicians to:

Answer your clinical questions

Increase your clinical knowledge

Improve patient care

What is UpToDate?

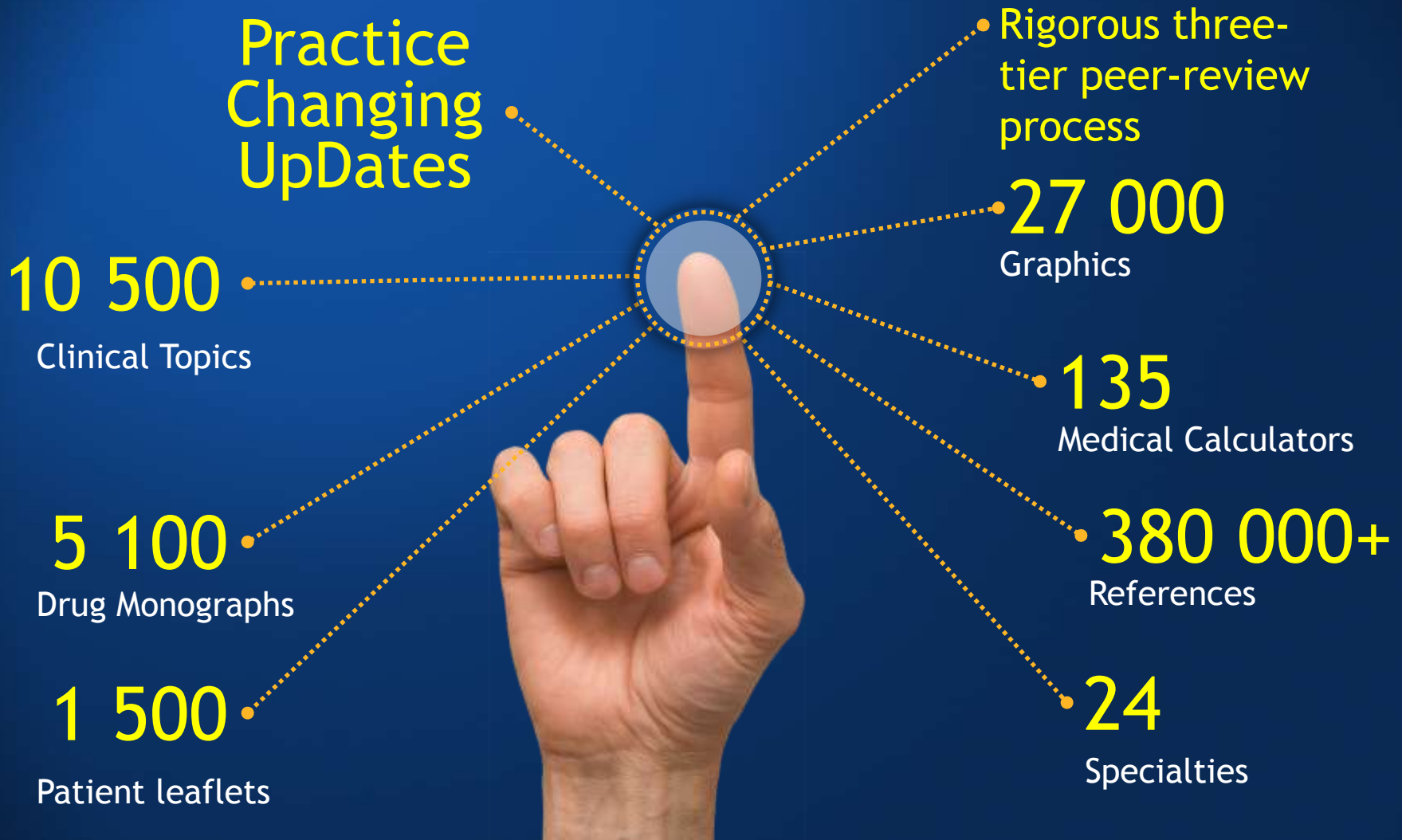
UpToDate®

<http://www.uptodate.com/contents/search>

UpToDate is part of Wolters Kluwer Health



The trusted way to practice medicine



was launched in 1992 by Dr. Burton D. Rose along with Dr. Joseph Rush out of Rose's home.

They started with Nephrology.

Now 23 specialities

includes a collection of medical and patient information,
access to [Lexi-comp](#) drug monographs and drug-to-drug, drug-to-herb and herb-to-herb interactions information,
A number of medical calculators,



Our Editorial Board

Three tiers of the peer review process to ensure accurate unbiased information

Authors

- Clinically active
- World-renown physician topic experts
- Have an academic affiliation

Sub Editors & Deputy Editors

- Clinically active
- Specialty experts & trained in EBM
- More than 50 in-house editors

Peer Reviewers

- Clinically active
- Specialists in their field
- Anonymous to the author

Specialties covered in UpToDate

Adult and Pediatric
Emergency Medicine

Adult and Primary
Care Medicine

Allergy and
Immunology

Anesthesiology

Cardiovascular
Medicine

Dermatology

Endocrinology and
Diabetes

Family Medicine

Gastroenterology and
Hepatology

General Surgery

Geriatrics

Hematology

Hospital Medicine

Infectious Diseases

Nephrology and
Hypertension

Neurology

Obstetrics,
Gynecology and
Women's Health

Oncology

Palliative Care

Pediatrics

Psychiatry

Pulmonary, Critical
Care and Sleep
Medicine

Rheumatology

Conducting a Search



New Search: Search in [another language](#)

cyst| X All Topics

- All Topics
- Adult
- Pediatric
- Patient
- Graphics

- cystic fibrosis
- cystitis
- cystocele
- cysticercosis
- cyst
- cystic hygroma
- cystic fibrosis children**
- cystoscopy
- cystinosis
- cystinuria

Conducting a search

UpToDate® cystic fibrosis children All Topics

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New Search Patient Info What's New Calculators CME 281.0 My Account Log Out

Search Results for "cystic fibrosis children"

- All Topics
- Adult
- Pediatric
- Patient
- Graphics

- Cystic fibrosis: Clinical manifestations and diagnosis
- Cystic fibrosis: Overview of the treatment of lung disease
- Cystic fibrosis: Overview of gastrointestinal disease
- Cystic fibrosis: Antibiotic therapy for lung disease**
- Cystic fibrosis: Nutritional issues
- Cystic fibrosis: Prenatal genetic screening
- Cystic fibrosis: Investigational therapies
- Cystic fibrosis: Genetics and pathogenesis
- Management of bronchiectasis in children without cystic fibrosis
- Cystic fibrosis: Clinical manifestations of pulmonary disease
- Patient information: Cystic fibrosis (The Basics)
- Evaluation of weight loss in infants over six months of age, children, and adolescents
- Overview of rectal prolapse in children
- Overview of pulmonary function testing in children
- Overview of aerobic exercise testing in children and adolescents
- Clostridium difficile infection in children: Approach to diagnosis
- Overview of nontuberculous mycobacterial pulmonary infections in children
- Evaluation of weight loss in infants six months of age and younger
- Overview of the causes of chronic diarrhea in children
- Etiology and diagnosis of heart failure in infants and children
- Causes of chronic pancreatitis in children and adolescents

Topic Outline

- INTRODUCTION
- PATHOGENS
 - Pseudomonas aeruginosa
 - Staphylococcus aureus
 - Methicillin-resistant Staphylococcus aureus
 - Burkholderia cepacia complex
 - Other pathogens
- CONSEQUENCES OF CF LUNG INFECTION
- TREATMENT OF ACUTE PULMONARY EXACERBATIONS
- ANTIBIOTIC SELECTION
 - General considerations
 - Susceptibility testing strategies
 - In vitro antibiotic susceptibility testing
 - Testing bacteria grown as biofilms
 - Antibiotic synergy testing
 - Number and choice of antibiotics
 - Route of antibiotic administration**
 - Oral
 - Inhaled
 - Intravenous
 - Dosing
 - Aminoglycosides
 - Once daily
 - Conventional
 - Monitoring
 - Colistin
 - Vancomycin
 - Ciprofloxacin
 - Sulfonamides

10,000 Topics - presented in the same format

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Back to Search Results

Cystic fibrosis: Antibiotic therapy for lung disease

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TOPIC OUTLINE

- SUMMARY & RECOMMENDATIONS
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Cystic fibrosis: Antibiotic therapy for lung disease

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Disclosures

All topics are updated as new evidence becomes available and our [peer review process](#) is complete. Literature review current through: Jan 2014. | This topic last updated: Sep 18, 2013.

INTRODUCTION

Cystic fibrosis (CF) is a multisystem disorder caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene, located on chromosome 7 [1]. (See "[Cystic fibrosis: Genetics and pathogenesis](#)".)

Pulmonary disease remains the leading cause of morbidity and mortality in patients with CF [2-5]. One of the major drivers of CF lung disease is infection [6,7]. The approach to treating infection in CF is multifaceted, involving antibiotics, chest physiotherapy, inhaled medications to promote secretion clearance, and anti-inflammatory agents. Undoubtedly, improved use of antibiotics is responsible for a substantial portion of the increased survival that has occurred in patients with CF ([figure 1](#)) [4,6].

The use of antibiotics to treat CF lung disease will be reviewed here. Treatments other than antibiotics for CF lung disease and the diagnosis, clinical manifestations, and investigational therapies for CF are discussed separately. (See "[Cystic fibrosis: Overview of the treatment of lung disease](#)" and "[Cystic fibrosis: Clinical manifestations and diagnosis](#)" and "[Cystic fibrosis: Clinical manifestations of pulmonary disease](#)" and "[Cystic fibrosis: Investigational therapies](#)".)

PATHOGENS

Chronic bacterial infection within the airways occurs in most patients with cystic fibrosis (CF) ([table 1](#)); the prevalence of each bacterial type varies with the age of the patient ([figure 2](#)).

Pseudomonas aeruginosa

For reasons that are poorly understood, the CF airway is particularly susceptible to Pseudomonas aeruginosa (P. aeruginosa), with infection occurring as early as the first year of life. The prevalence of Pseudomonas aeruginosa (P. aeruginosa) increases as patients age, such that more than 73 percent of adults are chronically infected [8]. With prolonged infection, P. aeruginosa converts to a mucoid phenotype by the production of alginate. This mucoid phenotype is seen infrequently in populations without CF but is manifested by over 66 percent of patients with CF. (See "[Epidemiology, microbiology, and pathogenesis of Pseudomonas aeruginosa infection](#)".)

Chronic infection with P. aeruginosa is associated with accelerated loss of pulmonary function and decreased survival [9,10].

Topic Feedback

Quick links to get you to the information you need

Graded recommendations

UpToDate® cystic fibrosis children All Topics

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Cystic fibrosis: Antibiotic therapy for lung disease

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 - Oral
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 - Aminoglycosides
 - Once daily
 - Conventional

SUMMARY AND RECOMMENDATIONS

- Cystic fibrosis (CF) lung disease is characterized by persistent infections. *Pseudomonas aeruginosa* (*P. aeruginosa*) are the most prevalent pathogens.
- The clinical course is frequently complicated by acute pulmonary exacerbations that impair lung function. Exacerbations are treated with antibiotics, given either empirically or based on the sensitivities of the infecting bacteria (table 2). Current practice is to culture respiratory secretions, and two antibiotics for *P. aeruginosa* are recommended: piperacillin-tazobactam, ticarcillin-clavulanate, ceftazidime, imipenem, meropenem, or aztreonam. For one of the following: azithromycin, amikacin, or a fluoroquinolone (eg, ciprofloxacin), depending on antibiotic susceptibility test results. (See 'Antibiotic selection' above.)
- The pharmacokinetics of many antibiotics differs in patients with CF as compared with normal individuals. Patients with CF generally require larger and/or more frequent dosing for penicillins, cephalosporins, sulfonamides, and fluoroquinolones. Starting doses of aminoglycosides should also be larger than those recommended for individuals without CF, but dosing must be adjusted based on pharmacokinetic analysis of serum levels because of considerable interindividual variation in clearance rates. (See 'Dosing' above.)
- In the absence of an acute pulmonary exacerbation, we generally suggest not administering chronic or intermittent systemic antibiotics to patients with CF (Grade 2C), EXCEPT for the following:
 - We recommend the chronic use of azithromycin for patients 6 years and older who have clinical evidence of airway inflammation such as chronic cough or any reduction in forced expiratory volume at one minute (FEV1), regardless of the patient's *P. aeruginosa* infection status (Grade 1B). To avoid induction of antibiotic resistance, azithromycin should not be given to patients infected with nontuberculous mycobacteria. (See 'Chronic oral antibiotics' above and "Cystic fibrosis: Overview of the treatment of lung disease", section on 'Macrolide antibiotics'.)
 - For patients older than six years with persistent *P. aeruginosa* infection and moderate or severe lung disease, we recommend chronic treatment with inhaled tobramycin (Grade 1A). We also suggest this treatment for patients with mild lung disease and persistent *P. aeruginosa* infection (Grade 2B). Inhaled aztreonam lysine is a reasonable alternative. Either inhaled tobramycin or aztreonam lysine are given for one month, on alternate months. (See 'Inhaled antibiotics' above.)
- We suggest not scheduling elective hospitalizations for antibiotics and intensified chest physiotherapy ("clean out") (Grade 2C). (See 'Hospitalizations' above.)

Based on the body of evidence, and the expertise of the leading specialty experts we make graded recommendations on the next course of action



- We recommend the chronic use of [azithromycin](#) for patients 6 years and older who have clinical evidence of airway inflammation such as chronic cough or any reduction in forced expiratory volume at one minute (FEV1), regardless of the patient's P. aeruginosa infection status ([Grade 1B](#)). To avoid induction of antibiotic resistance, azithromycin should not be given to patients infected with nontuberculous mycobacteria. (See '[Chronic oral antibiotics](#)' above and "[Cystic fibrosis: Overview of the treatment of lung disease](#)", section on '[Macrolide antibiotics](#)'.)
- For patients older than six years with persistent P. aeruginosa infection and moderate or severe lung disease, we recommend chronic treatment with inhaled [tobramycin](#) ([Grade 1A](#)). We also suggest this treatment for patients with mild lung disease and persistent P. aeruginosa infection ([Grade 2B](#)). Inhaled [aztreonam](#) lysine is a reasonable alternative. Either inhaled tobramycin or aztreonam lysine are given for one month, on alternate months. (See '[Inhaled antibiotics](#)' above.)

Evidence-based



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Grade 1A recommendation

A Grade 1A recommendation is a strong recommendation, and applies to most patients in most circumstances without reservation. Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.

Explanation:

A Grade 1 recommendation is a strong recommendation. It means that we believe that if you follow the recommendation, you will be doing more good than harm for most, if not all of your patients.

Grade A means that the best estimates of the critical benefits and risks come from consistent data from well-performed, randomized, controlled trials or overwhelming data of some other form (eg, well-executed observational studies with very large treatment effects). Further research is unlikely to have an impact on our confidence in the estimates of benefit and risk.

Recommendation grades

1. Strong recommendation: Benefits clearly outweigh the risks and burdens (or vice versa) for most, if not all, patients
2. Weak recommendation: Benefits and risks closely balanced and/or uncertain

Evidence grades

- A. High-quality evidence: Consistent evidence from randomized trials, or overwhelming evidence of some other form
- B. Moderate-quality evidence: Evidence from randomized trials with important limitations, or very strong evidence of some other form
- C. Low-quality evidence: Evidence from observational studies, unsystematic clinical observations, or from randomized trials with serious flaws

For a complete description of our use of the GRADE system, please see the UpToDate editorial policy which can be found at www.uptodate.com/home/editorial-policy.

Grading Recommendations in UpToDate: Balancing risks and benefits

- Strong recommendations (Grade 1)
 - For a strong recommendation, write, "We recommend."
 - A strong recommendation means that benefits clearly outweigh risks and burdens or vice versa
- Weak recommendations (Grade 2)
 - For a weak recommendation, write, "We suggest."
 - A weak recommendation means that benefits, risks, and burdens are closely balanced or uncertain

Grading Table in UpToDate

Grade of Recommendation	Clarity of risk/benefit	Quality of supporting evidence	Implications
1A. Strong recommendation. High quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	Consistent evidence from well performed randomized, controlled trials or overwhelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk.	Strong recommendation, can apply to most patients in most circumstances without reservation
1B. Strong recommendation. Moderate quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	Evidence from randomized, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other form. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate.	Strong recommendation, likely to apply to most patients
1C. Strong recommendation.	Benefits appear to outweigh risk and burdens, or vice versa	Evidence from observational studies, unsystematic clinical experience, or from randomized, controlled trials with serious flaws. Any	Relatively strong recommendation; might change when higher quality evidence becomes

Grading Table.....

<p>2A. Weak recommendation. High quality evidence</p>	<p>Benefits closely balanced with risks and burdens</p>	<p>Consistent evidence from well performed randomized, controlled trials or overwhelming evidence of some other form. Further research is unlikely to change our confidence in the estimate of benefit and risk.</p>	<p>Weak recommendation, best action may differ depending on circumstances or patients or societal values</p>
<p>2B. Weak recommendation. Moderate quality evidence</p>	<p>Benefits closely balanced with risks and burdens, some uncertainty in the estimates of benefits, risks and burdens</p>	<p>Evidence from randomized, controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other form. Further research (if performed) is likely to have an impact on our confidence in the estimate of benefit and risk and may change the estimate.</p>	<p>Weak recommendation, alternative approaches likely to be better for some patients under some circumstances</p>
<p>2C. Weak recommendation. Low quality evidence</p>	<p>Uncertainty in the estimates of benefits, risks, and burdens; benefits may be closely balanced with risks and burdens</p>	<p>Evidence from observational studies, unsystematic clinical experience, or from randomized, controlled trials with serious flaws. Any estimate of effect is uncertain.</p>	<p>Very weak recommendation; other alternatives may be equally reasonable.</p>

Lexicomp[®]

- We recommend the chronic use of [azithromycin](#) for patients 6 years and older who have clinical evidence of airway inflammation such as chronic cough or any reduction in forced expiratory volume at one minute (FEV1), regardless of the patient's P. aeruginosa infection status ([Grade 1B](#)). To avoid induction of antibiotic resistance, azithromycin should not be given to patients infected with nontuberculous mycobacteria. (See '[Chronic oral antibiotics](#)' above and "[Cystic fibrosis: Overview of the treatment of lung disease](#)", section on '[Macrolide antibiotics](#)'.)
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Over 5100 unique drug entities with Lexicomp

The screenshot displays the UpToDate website interface. At the top, the search bar contains "cystic fibrosis children". The navigation menu includes "New Search", "Patient Info", "What's New", "Calculators", "CME 281.5", and "My Account". The main title is "Tobramycin (systemic therapy and oral inhalation): Drug information". The left sidebar shows a "TOPIC OUTLINE" with various categories, and "Drug Interactions" is highlighted. The main content area is titled "Drug Interactions" and includes a note: "(For additional information: [Launch Lexi-Interact™ Drug Interactions Program](#)) Lexicomp®". Below this, a list of drug interactions is provided, each with a brief description and a risk level. A green callout box in the bottom right corner states: "Full prescription guidance available + a drug interaction program".

TOPIC OUTLINE

- ALERT: U.S. Boxed Warning
- Brand Names: U.S.
- Brand Names: Canada
- Pharmacologic Category
- Dosing: Adult
- Dosing: Pediatric
- Dosing: Geriatric
- Dosing: Renal Impairment
- Dosing: Hepatic Impairment
- Dosing: Obesity
- Dosage Forms: U.S.
- Dosage Forms: Canada
- Generic Equivalent Available: U.S.
- Administration
- Compatibility
- Use
- Medication Safety Issues
- Adverse Reactions Significant
- Contraindications
- Warnings/Precautions
- Metabolism/Transport Effects
- Drug Interactions**
- Pregnancy Risk Factor
- Pregnancy Implications
- Lactation
- Breast-Feeding Considerations
- Dietary Considerations
- Dosing: U.S.

Drug Interactions

(For additional information: [Launch Lexi-Interact™ Drug Interactions Program](#)) Lexicomp®

- AbobotulinumtoxinA: Aminoglycosides may enhance the neuromuscular-blocking effect of AbobotulinumtoxinA. *Risk C: Monitor therapy*
- Amphotericin B: May enhance the nephrotoxic effect of Aminoglycosides. *Risk C: Monitor therapy*
- BCG: Antibiotics may diminish the therapeutic effect of BCG. *Risk X: Avoid combination*
- Bisphosphonate Derivatives: Aminoglycosides may enhance the hypocalcemic effect of Bisphosphonate Derivatives. *Risk C: Monitor therapy*
- Capreomycin: May enhance the neuromuscular-blocking effect of Aminoglycosides. *Risk C: Monitor therapy*
- CARBOplatin: Aminoglycosides may enhance the ototoxic effect of CARBOplatin. Especially with higher doses of carboplatin. *Risk C: Monitor therapy*
- Cephalosporins (2nd Generation): May enhance the nephrotoxic effect of Aminoglycosides. *Risk C: Monitor therapy*
- Cephalosporins (3rd Generation): May enhance the nephrotoxic effect of Aminoglycosides. *Risk C: Monitor therapy*
- Cephalosporins (4th Generation): May enhance the nephrotoxic effect of Aminoglycosides. *Risk C: Monitor therapy*
- CISplatin: May enhance the nephrotoxic effect of Aminoglycosides. *Risk C: Monitor therapy*
- Colistimethate: Aminoglycosides may enhance the nephrotoxic effect of Colistimethate. Aminoglycosides may enhance the neuromuscular-blocking effect of Colistimethate. *Risk D: Consider therapy modification*
- CycloSPORINE (Systemic): Aminoglycosides may enhance the nephrotoxic effect of CycloSPORINE (Systemic). *Risk C: Monitor therapy*
- Gallium Nitrate: Aminoglycosides may enhance the nephrotoxic effect of Gallium Nitrate. *Risk C: Monitor therapy*
- Loop Diuretics: May enhance the adverse/toxic effect of Aminoglycosides. *Risk C: Monitor therapy*
- Neuromuscular-Blocking Agents: Aminoglycosides may enhance the neuromuscular-blocking effect of Neuromuscular-Blocking Agents. *Risk C: Monitor therapy*
- Nonsteroidal Anti-Inflammatory Agents: May decrease the excretion of Aminoglycosides. *Risk C: Monitor therapy*
- OnabotulinumtoxinA: Aminoglycosides may enhance the neuromuscular-blocking effect of OnabotulinumtoxinA. *Risk C: Monitor therapy*

Full prescription guidance available + a drug interaction program

Check for

Lexicomp® Lexi-Interact™

Lookup

Enter item name to lookup.



Analyze

New List

[Tobramycin \(Systemic, Oral Inhalation\)](#)

[Typhoid Vaccine](#)

[Vitamin A](#)

•Display complete list of interactions for an individual item by clicking item name.

•Add another item(s) [Lookup] to Analyze for potential interactions between items in the list.

•Remove item from the list by clicking the check mark next to the item name.

Risk Rating	Action	Description
A	<i>No Known Interaction</i>	Data have not demonstrated either pharmacodynamic or pharmacokinetic interactions between the specified agents
B	<i>No Action Needed</i>	Data demonstrate that the specified agents may interact with each other, but there is little to no evidence of clinical concern resulting from their concomitant use.
C	<i>Monitor Therapy</i>	Data demonstrate that the specified agents may interact with each other in a clinically significant manner. The benefits of concomitant use of these two medications usually outweigh the risks. An appropriate monitoring plan should be implemented to identify potential negative effects. Dosage adjustments of one or both agents may be needed in a minority of patients.
D	<i>Consider Therapy Modification</i>	Data demonstrate that the two medications may interact with each other in a clinically significant manner. A patient-specific assessment must be conducted to determine whether the benefits of concomitant therapy outweigh the risks. Specific actions must be taken in order to realize the benefits and/or minimize the toxicity resulting from concomitant use of the agents. These actions may include aggressive monitoring, empiric dosage changes, choosing alternative agents.
X	<i>Avoid Combination</i>	Data demonstrate that the specified agents may interact with each other in a clinically significant manner. The risks associated with concomitant use of these agents usually outweigh the benefits. These agents are generally considered contraindicated.

is

dependent judgment of the
most current product information),

Review a full list of interacting properties

Lexicomp® Lexi-Interact™

Lookup

Enter item name to lookup.

Analyze New List

[Tobramycin \(Systemic, Oral Inhalation\)](#)

[Typhoid Vaccine](#)

[Vitamin A](#)

•Display complete list of interactions for an individual item by clicking item name.

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•Remove item from the list by clicking the check mark next to the item name.

Customize Analysis

Only interactions
View interaction

Tobramycin (Systemic, Oral Inhalation)
[D] [Typhoid Vaccine](#)
Typhoid Vaccine
[D] [Tobramycin](#)
Vitamin A
No interaction

Date February 17, 2014

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Lexi-Comp Online™ Interaction Analysis

Lexi-Comp Online™ Interaction Monograph

Title Typhoid Vaccine / Antibiotics

Dependencies:
• **Route** (oral): Only typhoid vaccine

Risk Rating D: Considered

Summary Antibiotics may decrease the effectiveness of typhoid vaccine.
Severity Major **Reliability** High

Patient Management View systemic antibacterial agents.

Antibiotics Interacting
Cefaclor; Cefadroxil; Ceftazidime; Ceftriaxone; Cefuroxime; Cefuroxime (Systemic); Clarithromycin; Demeclocycline; Dicloxacillin; Acid (Systemic); Gemifloxacin; Lincomycin; Lomefloxacin; Mupirocin; Nafcillin; Nalidixic acid; Penicillin G Benzathine; Penicillin G Potassium; Spiramycin; Streptomycin; Telithromycin; Tetracycline; Acid; Aluminum Acetate; (Topical); Dapsone (Topical); Acid (Topical); Gatifloxacin; MetroNIDAZOLE (Topical); Sulfadiazine; Sulfacetamide

Discussion The prescription of antibiotics to individuals who are being vaccinated with oral typhoid vaccine should be avoided because of concern regarding the possible effect on the live bacterial strain used in the vaccine.

Footnotes
1. Prescribing information for Typhoid Vaccine, *Lancet*, 1990, 336:631-2. [PubMed 1975401]
2. <http://www.cdc.gov/vaccines/imz/id/pubs/typhoid.htm>, August 16, 2010.

Only interactions at or above the selected **risk rating** will be displayed. [A:] View interaction detail by clicking on link.

Lexi-Comp Online™ Interaction Lookup

Tobramycin (Systemic, Oral Inhalation)

Interacting Categories

- [C] [AbobotulinumtoxinA](#)
- [C] [Amphotericin B](#)
- [B] [Antifungal Agents \(Azole Derivatives, Systemic\)](#)
- [X] [BCG](#)
- [C] [Bisphosphonate Derivatives](#)
- [C] [Capreomycin](#)
- [C] [CARBOplatin](#)
- [C] [Cephalosporins \(2nd Generation\)](#)
- [C] [Cephalosporins \(3rd Generation\)](#)
- [C] [Cephalosporins \(4th Generation\)](#)
- [C] [Cisplatin](#)
- [B] [Clindamycin \(Systemic\)](#)
- [D] [Colistimethate](#)
- [C] [CycloSPORINE \(Systemic\)](#)
- [B] [Fluconazole](#)
- [X] [Gallium Nitrate](#)
- [C] [Loop Diuretics](#)
- [C] [Magnesium Salts](#)
- [C] [Neuromuscular-Blocking Agents](#)
- [C] [Nonsteroidal Anti-Inflammatory Agents](#)
- [C] [OnabotulinumtoxinA](#)
- [D] [Penicillins](#)
- [C] [RimabotulinumtoxinB](#)
- [D] [Sodium Picosulfate](#)
- [C] [Tenofovir](#)
- [D] [Typhoid Vaccine](#)
- [C] [Vancomycin](#)

Date February 17, 2014

3. Wolfe MS, "Precautions with Oral Live Typhoid (Ty 21a) Vaccine," *Lancet*, 1990, 336:631-2. [PubMed 1975401]

Our Editorial Team

The image shows a screenshot of the UpToDate website. At the top, there is a search bar with the text 'cystic fibrosis children' and a search icon. Below the search bar, there are navigation links for 'New Search', 'Patient Info', 'What's New', 'Calculators', 'CME 281.5', and 'My Account'. On the right side, there are links for 'Languages', 'About Us', 'Contact Us', and 'Help'. A 'Log Out' button is also visible.

The main content area displays the topic 'Cystic fibrosis: Antibiotic therapy for lung disease'. On the left, there is a 'TOPIC OUTLINE' with a 'SUMMARY & RECOMMENDATIONS' button. The main text area shows the beginning of the article, including the author's name, 'Disclosures', and the start of the 'INTRODUCTION' section.

Overlaid on the right side of the article is a callout box titled 'Cystic fibrosis: Antibiotic therapy for lung disease' which lists the following roles and names:

- Author:** Richard H Simon, MD, Professor of Medicine, University of Michigan Health Sciences Center
- Section Editor:** George B Mallory, MD, Section Editor — Pediatric Pulmonology, Associate Professor of Pediatrics, Baylor College of Medicine
- Deputy Editor:** Alison G Hoppin, MD, Deputy Editor — Pediatrics, Harvard Medical School
- Peer Reviewer:** Reviewers are not identified on topic reviews to preserve anonymity. Peer reviewers for this specialty.

At the bottom of the callout box, there is a 'Contributor disclosure' section.

A green callout box in the bottom left corner of the screenshot contains the text: 'Find out who wrote this information, and their background at the top of each topic'.

How uptodate is UpToDate?

The screenshot shows the UpToDate website interface. At the top, there is a search bar with the text 'cystic fibrosis children' and a search icon. Navigation links include 'Languages', 'About Us', 'Contact Us', and 'Help'. Below the search bar, there are tabs for 'New Search', 'Patient Info', 'What's New', 'Calculators', 'CME 281.5', and 'My Account'. A 'Log Out' button is visible in the top right corner. A 'Back to Search Results' button is located below the search bar. The main content area displays the title 'Cystic fibrosis: Antibiotic therapy for lung disease' and a yellow box containing the author (Richard H Simon, MD), section editor (George B Mallory, MD), and deputy editor (Alison G Hoppin, MD). Below this, there is a 'Disclosures' section with a paragraph stating that topics are updated as new evidence becomes available and that the peer review process is complete. The 'INTRODUCTION' section follows, describing cystic fibrosis (CF) as a multisystem disorder caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene. The 'PATHOGENS' section discusses chronic bacterial infection within the airways, noting that the prevalence of each bacterial type varies with the age of the patient. The 'Pseudomonas aeruginosa' section describes its susceptibility in the CF airway and its prevalence, which increases with age. A 'Feedback' button is visible in the bottom right corner.

UpToDate® cystic fibrosis children All Topics

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Cystic fibrosis: Antibiotic therapy for lung disease Find Patient Print Email

TOPIC OUTLINE

SUMMARY & RECOMMENDATIONS

INTRODUCTION

PATHOGENS

- Pseudomonas aeruginosa
- Staphylococcus aureus
- Methicillin-resistant Staphylococcus aureus
- Burkholderia cepacia complex
- Other pathogens

CONSEQUENCES OF CF LUNG INFECTION

TREATMENT OF ACUTE PULMONARY EXACERBATIONS

ANTIBIOTIC SELECTION

- General considerations
- Susceptibility testing strategies
 - In vitro antibiotic susceptibility testing
 - Testing bacteria grown as biofilms
 - Antibiotic synergy testing
- Number and choice of antibiotics
- Route of antibiotic administration
 - Oral
 - Inhaled
 - Intravenous
- Dosing
 - Aminoglycosides

Cystic fibrosis: Antibiotic therapy for lung disease

Author Richard H Simon, MD Section Editor George B Mallory, MD Deputy Editor Alison G Hoppin, MD

Disclosures

All topics are updated as new evidence becomes available and our [peer review process](#) is complete. Literature review current through: Jan 2014. | This topic last updated: Sep 18, 2013.

INTRODUCTION — Cystic fibrosis (CF) is a multisystem disorder caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene, located on chromosome 7 [1]. (See "[Cystic fibrosis: Genetics and pathogenesis](#)".)

Pulmonary disease remains the leading cause of morbidity and mortality in patients with CF [2-5]. One of the major drivers of CF lung disease is infection [6,7]. The approach to treating infection in CF is multifaceted, involving antibiotics, chest physiotherapy, inhaled medications to promote secretion clearance, and anti-inflammatory agents. Undoubtedly, improved use of antibiotics is responsible for a substantial portion of the increased survival that has occurred in patients with CF ([figure 1](#)) [4,6].

The use of antibiotics to treat CF lung disease will be reviewed here. Treatments other than antibiotics for CF lung disease and the diagnosis, clinical manifestations, and investigational therapies for CF are discussed separately. (See "[Cystic fibrosis: Overview of the treatment of lung disease](#)" and "[Cystic fibrosis: Clinical manifestations and diagnosis](#)" and "[Cystic fibrosis: Clinical manifestations of pulmonary disease](#)" and "[Cystic fibrosis: Investigational therapies](#)".)

PATHOGENS — Chronic bacterial infection within the airways occurs in most patients with cystic fibrosis (CF) ([table 1](#)); the prevalence of each bacterial type varies with the age of the patient ([figure 2](#)).

Pseudomonas aeruginosa — For reasons that are poorly understood, the CF airway is particularly susceptible to Pseudomonas aeruginosa (P. aeruginosa), with infection occurring as early as the first year of life. The prevalence of Pseudomonas aeruginosa (P. aeruginosa) increases as patients age, such that more than 73 percent of adults are chronically infected [8]. With prolonged infection, P. aeruginosa converts to a mucoid phenotype by the production of alginate. This mucoid phenotype is seen infrequently in populations without CF but is manifested by over 66 percent of the P. aeruginosa isolated from patients with CF. (See "[Epidemiology, microbiology, and pathogenesis of Pseudomonas aeruginosa infection](#)".)

Feedback

Fully referenced and transparent

The screenshot displays the UpToDate website interface. At the top, the search bar contains the text 'cystic fibrosis children'. Below the search bar, there are navigation links for 'New Search', 'Patient Info', 'What's New', 'Calculators', 'CME 281.5', and 'My Account'. The main content area is titled 'Medline® Abstracts for References 4,6 of 'Cystic fibrosis: Antibiotic therapy for lung disease''. The abstract is for the article 'Update on cystic fibrosis epidemiology' by Goss CH and Rosenfeld M, published in 'Curr Opin Pulm Med' in 2004. The abstract text is partially visible, discussing the clinical spectrum of cystic fibrosis (CF) and the impact of recent research on survival and outcomes. A green callout box in the bottom left corner of the screenshot contains the text 'Access 380,000+ Medline abstracts'. The website footer includes 'Wolters Kluwer Health' and 'University of Washington School of Medicine, Children's Hospital, Seattle, WA 98125, USA'.

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Written in plain language.

Best for a general overview

Answer the 4 or 5 most important questions

Beyond the Basics

5 - 10 pages long

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Better for readers who are comfortable with some technical medical terms.



IMPORTANT - All leaflets are written by the same editorial experts

Patient Education

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Print or email the information to your patient

The screenshot shows a web browser displaying a patient education article on UpToDate. The browser's address bar shows 'UpToDate' and the search term 'cystic fibrosis'. The page title is 'Patient information: Cystic fibrosis (The Basics)'. The article text includes a definition of cystic fibrosis, its causes, symptoms, and common signs. A sidebar on the right contains sections for 'GRAPHICS IN THIS TOPIC' and 'MORE ON THIS TOPIC' with various related article links.

Patient information: Cystic fibrosis (The Basics)
Written by the doctors and editors at UpToDate

What is cystic fibrosis? — Cystic fibrosis is a disease that some children are born with. It causes thick mucus and other fluids to build up and clog different parts of the body, including the lungs, pancreas, liver, and intestine (figure 1).

The thick mucus in the lungs causes people with cystic fibrosis to get frequent lung infections. Over time, these infections damage the lungs. The thick fluids in the pancreas and liver keep the intestine from absorbing certain nutrients from food. This affects a child's growth and causes abnormal bowel movements.

Cystic fibrosis is caused by an abnormal gene. To get the disease, people need to get the abnormal gene from both their mother and father. If people get the abnormal gene from only 1 parent, they will not have cystic fibrosis. But they will have a chance of passing on the abnormal gene to their children.

Cystic fibrosis is a life-long condition. As of now, doctors can't cure the disease, but they can use different treatments to help with symptoms.

People with cystic fibrosis don't live as long as people without the disease. But better treatments are helping people with cystic fibrosis live longer. To help manage your child's disease for as long as possible, it's important to work closely with his or her doctor.

What are the symptoms of cystic fibrosis? — People can have different symptoms at different times. Most people start having symptoms as a baby or young child. A few people start having symptoms as teens or adults. A person's symptoms usually get worse over time.

Common symptoms of cystic fibrosis include:

- Not growing or gaining weight normally
- A long-lasting cough – The cough usually brings up mucus (it sounds "wet"). Some people cough up blood.
- Trouble breathing or breathing that sounds like whistling (wheezing)
- Frequent infections of the lungs or sinuses – The sinuses are hollow areas in the bones of the face.
- Skin that tastes salty (for example, you might taste salt when you kiss your child)
- Belly pain, diarrhea, or constipation (trouble having bowel movements)

GRAPHICS IN THIS TOPIC View All
[Organs most affected by cystic fibrosis](#)

MORE ON THIS TOPIC

- Patient information: Brand versus generic medicines (The Basics)
- Patient information: bronchiectasis in children (The Basics)
- Patient information: Coughing up blood (The Basics)
- Patient information: Inhalers (The Basics)
- Patient information: Lung transplant (The Basics)
- Patient information: pneumonia in adults (The Basics)
- Patient information: Poor weight gain in babies and children (The Basics)
- Patient information: Reducing the costs of medicines (The Basics)
- Patient information: Vaccines for babies and children age 0 to 6 years (The Basics)
- Patient information: Vaccines for children age 7 to 18 years (The Basics)

Patient Education

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Patient



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Patient Information

- The Basics
- Beyond the Basics

What's New

Calculators

Authors and Editors

Contents: Patient Information

UpToDate offers different levels of patient education materials to meet the varying information needs of your patients.

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"The Basics" are short (1 to 3 page) articles written in plain language. They answer the 4 or 5 most important questions a person might have about a medical problem. These articles are best for people who want a general overview.

[View all The Basics](#)

Beyond the Basics

"Beyond the Basics" articles are 5 to 10 pages long and more detailed than "The Basics". These articles are best for readers who want a lot of detailed information and who are comfortable with some technical medical terms.

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Women's health issues

Check out what is new in your specialty

The screenshot displays the UpToDate website interface. At the top, the UpToDate logo is on the left, and navigation links for 'Languages', 'About Us', 'Contact Us', and 'Help' are on the right. Below the logo is a search bar with a 'Patient' dropdown and a magnifying glass icon. A secondary navigation bar contains links for 'New Search', 'Patient Info', 'What's New', 'Calculators', 'CME 282.0', and 'My Account'. The main content area is titled 'What's new in pulmonary and critical care medicine' and includes a 'Print' button. On the left side of the main content, there is a 'TOPIC OUTLINE' sidebar with expandable sections for 'ASTHMA', 'COPD', and 'CRITICAL CARE'. The 'ASTHMA' section is currently expanded, showing a list of updates. The main content area features a 'What's New' section with 'Authors' (Helen Hollingsworth, MD, April F Eichler, MD, MPH, Geraldine Finlay, MD), 'Disclosures', and a paragraph stating that topics are updated as new evidence becomes available. It also includes a 'Literature review current through: Jan 2014. | This topic last updated: Jan 14, 2014.' and a paragraph explaining that the following represent additions to UpToDate from the past six months. Below this is a sub-section for 'ASTHMA' with the title 'Highly selective COX-2 inhibitors in aspirin-exacerbated respiratory disease (January 2014)'. The text describes how patients with aspirin-exacerbated respiratory disease (AERD) often have severe hypersensitivity reactions to NSAIDs, and a new meta-analysis of placebo-controlled blinded trials involving 400 patients with AERD found that highly selective COX-2 inhibitors (celecoxib, rofecoxib) or relatively selective ones (meloxicam, nabumetone, nimesulide) were safe, with no reactions to the highly selective agents. The analysis supports the safety of highly selective COX-2 inhibitors in patients with AERD. A 'Topic Feedback' button is visible on the right side of the main content area.

What's new in pulmonary and critical care medicine

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TOPIC OUTLINE

ASTHMA

- Highly selective COX-2 inhibitors in aspirin-exacerbated respiratory disease (January 2014)
- Anti-IgE (omalizumab) therapy improves asthma control in occupational asthma (August 2013)
- Predicting asthma response to anti-IgE therapy (omalizumab) (August 2013)

COPD

- Combination therapy with umeclidinium and vilanterol for COPD (January 2014)
- Reassuring data about the tiotropium soft mist inhaler (October 2013)

CRITICAL CARE

- Score to predict neurologic status following in-hospital cardiopulmonary resuscitation (January 2014)
- Futile therapy in the ICU (November 2013)
- Statins in patients with ventilator-associated pneumonia (October 2013)
- Crystalloids versus colloids for hypovolemic shock (October 2013)
- Beta blockade as a therapy in septic shock (October 2013)
- Universal contact precautions in the intensive care unit (October 2013)
- FDA approval of telavancin for HAP and VAP (October 2013)

What's new in pulmonary and critical care medicine

Authors
Helen Hollingsworth, MD
April F Eichler, MD, MPH
Geraldine Finlay, MD

Disclosures

All topics are updated as new evidence becomes available and our [peer review process](#) is complete.
Literature review current through: Jan 2014. | This topic last updated: Jan 14, 2014.

The following represent additions to UpToDate from the past six months that were considered by the editors and authors to be of particular interest. The most recent What's New entries are at the top of each subsection.

ASTHMA

Highly selective COX-2 inhibitors in aspirin-exacerbated respiratory disease (January 2014)

Patients with aspirin-exacerbated respiratory disease (AERD) often have severe hypersensitivity reactions to nonsteroidal antiinflammatory drugs (NSAIDs), which are directly related to inhibition of the enzyme COX-1. Although highly selective COX-2 inhibitors are theoretically safe, observational studies described patients who appeared to react to these agents. In a new meta-analysis of placebo-controlled blinded trials, over 400 patients with AERD were challenged with highly selective (celecoxib, rofecoxib) or relatively selective (ie, meloxicam, nabumetone, nimesulide) COX-2 inhibitors [1]. Whereas 1 in 13 patients had reactions to the relatively selective agents, there were no reactions to the highly selective agents. This analysis supports the safety of highly selective COX-2 inhibitors in patients with AERD. (See "[NSAIDs \(including aspirin\): Allergic and pseudoallergic reactions](#)", section on 'Highly selective COX-2 inhibitors'.)

What's New

Number of the most important updates and share them with you via updates by clicking on the specialty you are interested in below. You may also use the search screen after you have logged in to UpToDate.

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Pediatrics
Psychiatry
Radiology
Respiratory care internal medicine

Topic Feedback

- What's new in psychiatry
- What's new in pulmonary and critical care medicine
- What's new in rheumatology

Calculators

Calculator: Peak Expiratory Flow Prediction

$$PEF_{\text{Female}} = e^{((0.376 \cdot \ln(\text{Age})) - (0.012 \cdot \text{Age}) - (58.8/\text{Height}) + 5.63)}$$

$$PEF_{\text{Male}} = e^{((0.544 \cdot \ln(\text{Age})) - (0.0151 \cdot \text{Age}) - (74.7/\text{Height}) + 5.48)}$$

Input:

Height cm
 Age yr

Results:

PEF Female L/min
 PEF Male L/min

References

- Nunn AJ, Gregg I. New regression equations for predicting peak expiratory flow in adults. *BMJ*. 1989 Apr 22;298(6680):1068-70.
- Radeos MS, Camargo CA. Predicted peak expiratory flow: differences across formulae in the literature. *Am J Emerg Med*. 2004 Nov;22(7):516-21.

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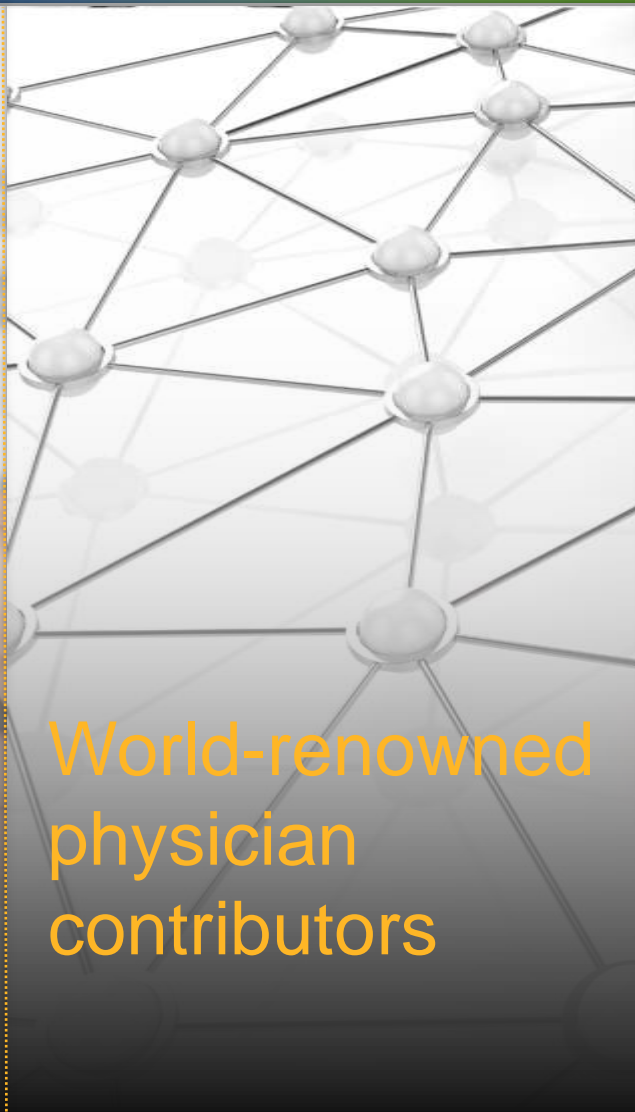
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