INHALATION OF ANTIBIOTICS IN CYSTIC FIBROSIS AND BRONCHIECTASIS

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A number of pulmonary diseases is characterised by chronic infections (grampositive and gramnegative bacteria, e.g. Pseudomonas aeruginosa) and consecutive progressive lung disease. Antibiotic treatment by inhaled medications is established in patients with cystic fibrosis (CF) and together with other therapies has resulted in an increase of life expectancy in these patients. Bronchiectasis, irrespective their underlying cause (e. g. postinfectious, chronic obstructive pulmonary disease (COPD) and hereditary) are also frequent causes of recurrent pulmonary infections and progressive lung failures. However, publications on inhaled antiinfective treatment of bronchiectasis are sparse. In addition, most publications on inhalation of antibiotics focus on tobramycin administered by nebulisers and there are few publications describing inhalative treatment with other formulations and inhalation devices. However, prerequisites in all are adequate delivery by inhalation devices resulting in sufficient pulmonary deposition and usability of the compound for inhalation (e. g. sufficient stability, bactericidal effect, MIC50 (minimally inhibitory concentration), local tolerability). We performed a literature review on studies on inhalation of antibiotics focusing on patients with cystic fibrosis and bronchiectasis and recent publications. The first studies on inhalation of antibiotics were published more than 30 years ago. Controlled studies in this field were performed in the USA about 20 years ago. Usually drugs approved for oral or intravenous administration were administered by different types of nebulisers and tobramycin was most frequently the drug of choice especially in cystic fibrosis patients. Accordingly, required doses, volumes and number of daily inhalations differ strongly. Recently, a tobramycin dry powder inhaler (DPI) has been introduced to the market. For colistin inhalation also liquid formulations are frequently used without formal approval. Recently, a dry powder colistin has been approved for CF. Administration of aztreonam solution by means of different nebulisers is also approved. Additionally, there are phase 2 and 3 studies on inhalation of levofloxacin (liquid), fosfomycin/tobramycin (liquid), amikacin (liposomes in fluid) and ciprofloxacin (aqueous liposomes, DPI). Other studies investigated e. g. gentamicin, doripenem, gallium compounds, lactoferrin, dry powder vancomycin, and antimicrobial peptides. In summary, inhalation of antibiotics is of increasing interest especially in patients with cystic fibrosis. However, other clinical indications are also subject of research. Inhalative administration is typically based on distinct combinations of drug and nebuliser. Some methods are based on powder aerosols and dry powder inhalers (DPI). Compared to older methods for inhalative drug administration recent methods (intelligent nebulizers and DPIs) are characterised by a number of advantages, e. g. shorter inhalation times and lower required drug doses resulting in an improved patient convenience and reduction of costs. We observe that modern methods for inhalation of antibiotics further improve treatment and outcome in patients with cystic fibrosis and bronchiectasis.