**Table 2. Reported cough cases after administration of some inhalation products in clinical studies**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Drug** | **Formulation** | **Dose** | **Regimen** | **Delivery platform** | **Subjects** | **Reported coughs** | **Reference** |
| Tobramycin | Powder  Solution | 112 mg (4 capsules)  300 mg in 5 mL saline | Twice daily  Twice daily | T-326 dry powder inhaler  PARI LC  PLUS® air jet nebuliser | Cystic fibrosis | * 48% (powder) * 31% (solution) * Higher cough incidents in all age groups receiving powder | ([Geller, Nasr, Piggott, He, Angyalosi & Higgins, 2014](#_ENREF_32); [Konstan et al., 2011](#_ENREF_47)) |
| Tobramycin | Powder  Solution | 112 mg (4 capsules)  300 mg in 5 mL saline | Twice daily  Twice daily | T-326 dry powder inhaler  PARI LC  PLUS® air jet nebuliser | Cystic fibrosis | * 20% (powder) * 0% (solution) * Increased cough incident with increased powder dose | ([Geller, Konstan, Smith, Noonberg & Conrad, 2007](#_ENREF_31)) |
| Tobramycin | Solution | 300 mg in 5 mL saline  Placebo (1.25 mg of quinine sulfate in saline) | Twice daily for 28 days | PARI LC PLUS® air jet nebuliser | Bronchiectasis | * 41% (tobramycin solution) * 24% (placebo) | ([Barker et al., 2000](#_ENREF_4)) |
| Tobramycin (radiolabelled) | Solution | 300 mg in 5 mL saline | Single dose | eFlow rapid or PARI LC PLUS® air jet nebuliser | Cystic fibrosis | * 50% (eFlow rapid) * 17% (PARI LC PLUS®) | ([Lenney, Edenborough, Kho & Kovarik, 2011](#_ENREF_54)) |
| Tobramycin | Solution | 300 mg in 5 mL saline | Twice daily, 14-day on/off cycle; three cycles | PARI LC PLUS® air jet nebuliser | Severe bronchiectasis | * 44% (27%: thought to be treatment-related) | ([Scheinberg & Shore, 2005](#_ENREF_75)) |
| Tobramycin | Solution | 300 mg in 5 mL saline  300 mg in 4 mL saline | Twice daily, 28-day on/off cycle; 1+6 cycles | PARI LC PLUS® air jet nebuliser | Cystic fibrosis | * 6.4% (300 mg/4mL) * 6.0% (300 mg/5 mL) | ([Mazurek et al., 2014](#_ENREF_57)) |
| Tobramycin | Solution | 300 mg in 5 mL saline | Phase 1: Twice daily for 14 days + once a day on day 15 using one type of nebuliser  Phase 2: Twice daily for 14 days + once a day on day 15 using other type of nebuliser | eFlow rapid or PARI LC PLUS® air jet nebuliser | Cystic fibrosis | * 12% (eFlow) * 0% (PARI LC PLUS) | ([Hubert et al., 2009](#_ENREF_38)) |
| Tobramycin,  Colistimethate sodium | Powder  Solution  Solution | 112 mg (4 x 28 mg capsules)  300 mg in 3 mL saline  1 or 2 million units | Group A  Phase 1: Tobramycin solution, twice daily for 28-day on/off  Phase 2: Tobramycin powder, twice daily for 28-day on/off  Group B  Phase 1: Colistin solution, twice daily for 56 days  Phase 2: Tobramycin powder, twice daily for 28-day on/off  Group C  Phase 1&2: Tobramycin powder, twice daily for 28-day on/off | T-326 dry powder inhaler or  patients’ personal nebuliser | Cystic fibrosis | * Group A: not reported * Group B: comparable * Group C: post-inhalation rates reduced from 55% during phase 1 down to 37% in phase 2) | ([Greenwood et al., 2017](#_ENREF_34)) |
| Tobramycin | Powder | 112 mg (4 x 28 mg capsules)  Placebo: 112 mg of excipients | Twice daily, 28-day on/off cycle; 3 cycles  Cycle 1: tobramycin powder or placebo  Cycles 2 & 3: open-label tobramycin powder | T-326 dry powder inhaler | Cystic fibrosis | Cycle 1,   * 13% (tobramycin powder) * 27% (placebo)   Cycles 2 or 3   * 26% (tobramycin powder) * 24% (placebo) | ([Konstan, Geller, Minic, Brockhaus, Zhang & Angyalosi, 2011](#_ENREF_48)) |
| Colistin | Powder  Solution | 25 mg  160 mg in 6 mL saline | A single dose at each visit | In-house built dry powder inhaler or Ventstream® jet nebuliser | Cystic fibrosis | * moderate to severe (powder) * No coughs reported (solution) | ([Le Brun et al., 2002b](#_ENREF_53)) |
| Colistin sulphometate  Colistin sulfate | Solution | 160 mg in 6 mL saline  100 mg in 6 mL saline  Both contained an equivalent amount of colistin (67 mg in 6 mL) | A single dose | Ventstream® jet nebuliser | Cystic fibrosis | * Severe cough (solistin sulfate) * No coughs reported (colistin sulphpometate) | ([Westerman, Le Brun, Touw, Frijlink & Heijerman, 2004](#_ENREF_85)) |
| Colistimethate sodium  Tobramycin | Powder  Solution | 125 mg  300 mg in 5 mL saline | Twice daily, 24 weeks  Twice daily, three 28-day courses | Turbospin dry powder inhaler or PARI LC PLUS® air jet nebuliser | Cystic fibrosis | * 75% (colistimethate sodium powder) * 43% (tobramycin solution) | ([Schuster, Haliburn, Doring & Goldman, 2013](#_ENREF_76)) |