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Relative contribution of three main virulence factors in Pseudomonas aeruginosa pneumonia:

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Titre	Relative contribution of three main virulence factors in Pseudomonas aeruginosa pneumonia:
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Auteur	Le Berre, Rozenn [1], Nguyen, Sophie [2], Nowak, Emmanuel [3], Kipnis, Eric [4], Pierre, Maud [5], Quenee, Lauriane [6], Ader, Florence [7], Lancel, Steve [8], Courcol, René [9], Guery, Benoît-P. [10], Faure, Karine [11], Pyopneumagen Group, [12]
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Résumé en anglais	Objective: The pathogenesis and the outcome of Pseudomonas aeruginosa ventilator-acquired pneumonia depend on the virulence factors displayed by the bacteria as well as the host response. Thus, quorum sensing, lipopolysaccharide, and type 3 secretion system have each individually been shown to be important virulence systems in laboratory reference strains. However, the relative contribution of these three factors to the in vivo pathogenicity of clinically relevant strains has never been studied. We analyzed the virulence of 56 nonclonal Pseudomonas aeruginosa strains isolated from critically ill patients with ventilator-acquired pneumonia. To avoid the variation of human immune response, we used a murine model of pneumonia. The aim was to determine which virulence factor was the most important.Setting: Research laboratory of a university. Subjects: Male adult BALB/c mice. Interventions: In vitro, the phenotype of each strain was established as to the expression of quorum sensing-regulated factors (elastase and pyocyanin), type 3 secretion system exotoxin secretion (Exotoxin U, S and/or T, or “nonsecreting”), and lipopolysaccharide O-antigen serotype. Strain pathogenicity was evaluated in vivo in a mouse model of acute pneumonia through lung injury assessment by measuring alveolar–capillary barrier permeability to proteins, lung wet/dry weight ratio, and bacterial dissemination. Associations were then sought between virulence system phenotypes and levels of lung injury. Measurements and Main Results: In univariate analysis, elastase production, O11 serotype, and type 3 secretion system exotoxin secretion were associated with increased lung injury and exotoxin U was linked to an increase risk of bacteremia. In multivariate analysis, we observed that type 3 secretion system exotoxin secretion and to a lesser degree elastase production were associated with increased lung injury. Conclusion: In a murine model of pneumonia, our data suggest that type 3 secretion system and elastase are the most important virulence factors in clinically relevant P. aeruginosa strains.
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Liens

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