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DiseaseINFOPACK

ESBL-producing *E.coli*

Oct 2007

CAT: VADIP004

Abstract

DiseaseINFOPACK: *ESBL-producing E.coli*

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REPORT ABSTRACT:

Although mostly a harmless commensal bacterium, *Escherichia coli (E.coli)* is frequently a human pathogen. For example, certain forms of extraintestinal *E.coli*, known as ExPEC, cause urinary tract infections (UTIs) which occur in the community and/or hospital settings. In rare cases ExPEC can also cause bloodstream infections which lead to sepsis and even death. Since the 1980s, hospital *E.coli* has become multidrug resistant through the production of extended-spectrum beta-lactamase enzymes (ESBLs). The CTX-M types of the enzyme have the ability to hydrolyse many antibiotics limiting current treatment options. This **DiseaseINFOPACK** report is an expert review of the current literature providing the reader with a full easy-to-read overview of ESBL-producing *E.coli*. The report covers epidemiology, outbreak case studies along with an assessment of current treatment options and future dynamics.

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Authors Note

This DiseaseINFOPACK focuses on ESBL-producing *Escherichia coli* (E.coli) in terms of extraintestinal diseases (ExPEC). Throughout the document there may be references to other forms of E.coli which cause intestinal diseases The reader is referred to a different DiseaseINFOPACK for more information on this particular aspect of E.coli pathogenesis

Bibliography

1. Donnenberg MS. *Escherichia coli:* virulence mechanisms of a versatile pathogen (2002). San Diego, California: Academic Press
2. Herzer PJ., et al. Phylogenetic distribution of branched RNA-linked multicopy single-stranded DNA among natural isolates of *Escherichia coli*. (1990). J Bacteriol. 172:6175-81
3. Knothe H., et al. Transferable resistance to cefotaxime, cefotoxitin, cefamandole and cefuroxime in clinical isolates of *Klebsiella pneumoniae* and *Serratia marcescans* (1983). Infection. 11:315-7
4. Wong-Beringer A., et al.. Therapeutic Challenges Associated with ESBL producing *E.coli* and *Klebsiella pneumoniae* (2001). Pharmacotherapy 21:583-592
5. Pitout JDD., et al. Antimicrobial resistance with a focus on β-lactam resistance in gram-negative bacilli (1997). Am J Med. 103:51-9
6. Health Protection Agency Report (2005) Investigations into multi-drug resistant ESBL-producing *E.coli* strains causing infections in England. Available at: http://www.hpa.org.uk/publications/2005/esbl_report_05/default.htm. Accessed: October 2007.
7. Paterson DL., et al.. Extended Spectrum β-lactamases: The European experience (2001). Curr Opin Infect Dis. 14: 697-701
8. Presentation by Graham Harvey. Extended spectrum beta-lactamase E.coli. Available at: http://www.webbertraining.com/files/library/docs/11.pdf. Accessed: October 2007
9. Wiener J. Multiple and antibiotic resistant *Klebsiella* and *Escherichia coli* in nursing homes (1999). JAMA. 281:563-4
10. Extended Spectrum Beta-Lactamases (ESBL) in bacteria associated with animals – Defra Position (March 2007). DEFRA. Accessed: October 2007.
11. Branger C., et al. Genetic Background of *Escherichia coli* and extended-spectrum beta-lactamase type (2005). Emerg Infect Dis. 11(1):54-61
12. Picard B., et al. The link between phylogeny and virulence in E.coli extraintestinal infection (1999). Infect Immun. 67:546-53
13. Johnson JR., et al. Phylogenetic background and virulence profiles of fluoroquinolone-resistant clinical isolates from the Netherlands (2002). J Infect Dis. 186:1852-6
14. Gupta K. Urinary Tract Infections (2005). Medscape (www.medscape.com). ACP medicine. WebMD Inc.
15. Stamm WE., et al. Natural History of recurrent urinary tract infection in young women (1991). Rev Infect Dis 13:77
16. Miller TE., et al. Host response in urinary tract infections (1974). Kidney International 5: 179-186
17. Weijer S., et al. Interleukin-18 facilitates the early antimicrobial host response to *Escherichia coli* peritonitis (2003). ASM 71:5488-5497
18. Cormican M., et al. ESBL production and fluoroquinolone resistance in pathogens associated with community-acquired urinary tract Infection (1998). Diagn Microbial Infect Dis 32: 217-19
19. Harris A., et al. Risk factors for colonization with ESBL-producing bacteria and intensive care unit admission (2007). Emer Inf Dis. 13: 1144-1149
20. Cormican M., et al. ESBL production and fluoroquinolone resistance in pathogens associated with community-acquired urinary tract Infection (1998). Diagn Microbial Infect Dis 32: 217-19
21. Harris A., et al. Risk factors for colonization with ESBL-producing bacteria and intensive care unit admission (2007). Emer Inf Dis. 13: 1144-1149
22. Centers for Disease Control and Prevention (CDC). Laboratory capacity to detect antimicrobial resistance, 1998. MMWR 2000;48:1167-71
23. M'Zali FH et al. Detection of ESBL in members of the family *Enterobacteriacae*: comparison of the Mast DD test, the double disc and the Etest (2000). Journal of Antimicro Chemother. 45, 881-5
24. Schoff WH. Pyelonephritis, Acute (2007). www.emedicine.com. WebMD. Accessed October 2007
25. Livermore D. Tigecycline. What is it, and where should it be used? (2005). J Antimicrob. Chemother. 58:1312-1314
26. Einhorn AE. Extended-Spectrum Beta-Lactamases: Frequency, Risk Factors and Outcomes (2002). Pharmacotherapy. 22:14-20

Bibliography (cont..)

27. National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1992 through June 2004, Issued October 2004. A report from the NNIS System, US DHHS, 2004
28. Winokur P., et al. Characterisation of strains from Europe, North and Latin America and Western Pacific that express an ESBL: Report from the SENTRY antimicrobial surveillance program (1997-1999). Presented at 40th ICAAC. Toronto, Canada, September 17-20,2000
29. Doi Y., et al. Community acquired Extended-Spectrum β-lactamase Producers, United States (2007). Emer Inf Dis. 13: 1121-1123
30. Jones RN., et al. Prevalence of important pathogens and antimicrobial activity of parenteral drugs at numerous medical centers in the United States (1994). Diagn Microbiol Infect Dis. 19-203-15
31. Jones RN., et al.. Antimicrobial activity and spectrum investigation of eight broad spectrum β-lactam drugs: a 1997 surveillance trial in 102 Medical centers in the United States (1998). Diagn Microbial Infect Dis. 30:215-28
32. Jones RN., et al. Bacterial pathogens isolated from patients with bloodstream infection: frequencies of occurrence and antimicrobial susceptibility Patterns from the SENTRY antimicrobial surveillance program, 1997 (1998). Antimicrob Agents Chemother. 42:1762-70
33. Reynolds R., et al. Rising ESBL production and Ciprofloxacin Resistance In Invasive *Enterobacteriacae* in the UK and Ireland (2005). Poster Presented at the 45th ICAAC Conference, Washington DC 2005

About VacZine Analytics:

VacZine Analytics is a brand new research consultancy based in the United Kingdom. Its aim is to provide high quality-disease and commercial analysis to those working within or in collaboration with the vaccine industry.

With our product lines:

- DiseaseINFOPACK
- OpportunitySCAN
- MarketVIEW
- ExpertREACT
- VaccineSTATS

Our key focus is helping clients to build the case for developing new vaccines.

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