



## Symposium 15.1

### The Global Expansion of ESBLs

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Extended-spectrum beta-lactamases (ESBLs) have become global invaders of virtually all hospitals where serious infections are treated. Because of the widespread distribution of these enzymes, the usage of broad spectrum cephalosporins such as cefotaxime and ceftazidime has become more restricted, and fewer options are available to treat infections caused by Gram-negative pathogens.

ESBLs are plasmid-encoded enzymes that belong to a limited number of beta-lactamase families, with various members appearing in geographically distinct clusters. Initially, the TEM and SHV families of ESBLs predominated in Europe and the United States beginning in the mid- to late-1980s, with occasional reports of ESBLs from the OXA beta-lactamase family a few years later. However, as the newly-described CTX-M family of beta-lactamases emerged in the mid-1990s in Germany and South America, these enzymes began to displace the “traditional” ESBLs from many geographic areas. Today the CTX-M family of enzymes has become the dominant ESBL in most of the world, and TEM ESBLs are now rarely, or never, reported from many countries. For some unexplained reason, however, the SHV and TEM families remain the major ESBLs in the United States, with little reporting of CTX-M enzymes.

Epidemiological surveys of ESBL production demonstrate higher levels of these enzymes in *Klebsiella* spp. in contrast to *E. coli*. These enzymes have also appeared in almost all other Enterobacteriaceae, but at lower prevalence. Detection of these enzymes in all the Enterobacteriaceae, and reporting of cephalosporin susceptibilities in these organisms, remains a controversial topic, especially in pathogens other than the klebsiellae and *E. coli*. Pharmacodynamic properties and epidemiological considerations are often at odds with each other, as clinical microbiology laboratories struggle to determine how low level cephalosporin resistance should be reported in hospitals that may harbor clonal outbreaks of ESBL-producing bacteria.