beta-LACTAM RESISTANCE Peptidoglycan biosynthesis Outer membrane Inner membrane — **(≥⊙**2 UDP-MurNAcβ-Lactamase pentapeptide K17850 Colistin °°O°-Polymyxin B (Cationic antimicrobial peptides) Inhibition of peptidoglycan biosynthesis Increase of muropeptides GlcNAc-anhMurNAc muropeptide 1,6-Anhydro-MurNAc-peptide DNA DAP-containing peptide fragment y-D-Glu-m-DAP β-Lactamase K02171 ĦO— DNA Penicillins Cephalosporins - oral agents K02547 K02546 K02545 DNA Cephalosporins - parenteral agents K18073 K18093 K18072 <u>DNA</u> _β-Lactam // K09476 Penicillin binding proteins K09475 K08720 K02545 K18094 K18129 Protein synthesis inhibitors K18149 K18095 DNA Loss or severe reduction of porins K12552 K18130 K18150 DNA K18131 K12555 Peptidoglycan biosynthesis K18131 K00687 DNA) K03585 K12556 K18135 DNA K18138 P9301_00431 K18139 K12553 DNA RND efflux pumps K18137 P9301_05441 DNA K18138.. K18145 K12340... K18143 K03585... K18146 K18144 K18147 Overexpression K18104 β-Lactamases K19095.. K18698.. K17838.. K17837.. Hydrolytic_degaradation Plasmid Conjugal transfer from __ β-Lactam-resistant bacterium 01501 5/11/15 (c) Kanehisa Laboratories