

Combating species-specific antibiotics resistance?

Professor Dr Ada Yonath

Department of Structural Biology, Weizmann Institute, Rehovot 76100, Israel

Summary

The current global escalation in resistance to antibiotics is a serious threat, as it seems that the world is headed for a post-antibiotic era, in which common infections and minor injuries that have been treatable for decades could become fatal again. Ribosomes, the universal cellular machines that translate the genetic code into proteins, are paralyzed by many clinically useful antibiotics. The structures of ribosomes from non-pathogenic bacteria, used as models for genuine pathogens, illuminated the antibiotics binding modes, inhibitory actions, synergism pathways, the differentiation between patients vs. pathogens and mechanisms leading to bacterial resistance. However, as species specific diversity was detected in susceptibility to infectious diseases and in developing specific resistance mechanisms, our structural studies have been extended to ribosomes from genuine pathogens. The high resolution structures of ribosomal particles from multi-resistant pathogens and from eukaryotic parasites with several antibiotics, highlighted subtle, albeit highly significant structural elements that can account partially or fully for species specificity and may be exploited for improving known antibiotics and for the design of novel compounds.