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IN BRIEF

TECHNIQUES AND APPLICATIONS

Finding out how antimicrobials work

Identifying the mechanism of action of antimicrobials remains a challenge and is a major limitation for the drug discovery process. Here, Pogliano and colleagues test the ability of bacterial cytological profiling (BCP) to determine the mechanism of action of antimicrobials. BCP involves the treatment of bacterial cells with a compound and the subsequent analysis of morphological changes to identify the cellular pathway targeted. Using this technique, the authors could distinguish between inhibitory compounds that target different cellular pathways (for example, protein synthesis or DNA replication), as they generated distinct cytological profiles. Moreover, they used BCP to show that the antibacterial compound spirohexenolide A probably kills bacterial cells by disrupting the cytoplasmic membrane. Thus, BCP could be used to rapidly characterize the mechanism of action of antimicrobials and, in combination with other approaches, to determine the precise target in the pathway.

ORIGINAL RESEARCH PAPER Nonejuie, P. *et al.* Bacterial cytological profiling rapidly identifies the cellular pathways targeted by antibacterial molecules. *Proc. Natl Acad. Sci. USA* http://dx.doi.org/10.1073/pnas.1311066110 (2013)

FUNGAL PHYSIOLOGY

GlcNAc triggers a morphogenetic switch

Thermally dimorphic fungal pathogens grow in the soil in a multicellular, filamentous form and transition to a unicellular, pathogenic cell type within mammalian hosts. Temperature is the only known environmental trigger for this morphogenetic switch, but Gilmore *et al.* now show that the monosaccharide *N*-acetylglucosamine (GlcNAc), which is ubiquitous in the environment, is a robust inducer of the unicellular-to-multicellular transition in both *Histoplasma capsulatum* and *Blastomyces dermatitidis*. Transcriptional profiling revealed that GlcNAc-induced morphogenesis in *H. capsulatum* depends on the expression of two GlcNAc transporters, Ngt1 and Ngt2. Moreover, Ngt1 and Ngt2 were also important for the efficiency of this transition even in the absence of exogenous GlcNAc, which suggests that they function as sensors of endogenous GlcNAc to regulate morphogenesis in response to temperature.

ORIGINAL RESEARCH PAPER Gilmore, S. A. *et al.* *N*-acetylglucosamine (GlcNAc) triggers a rapid, temperature-responsive morphogenetic program in thermally dimorphic fungi. *PLoS Genet.* **9**, e1003799 (2013)

PUBLIC HEALTH

E. coli O157 cattle vaccine shows promise

Escherichia coli O157 is a major cause of gastrointestinal illness in humans, and consumption of contaminated food and water is one of the main transmission routes. Because cattle are the primary reservoirs of *E. coli* O157, vaccines for cattle have been developed but are rarely used owing to licensing issues and other factors. Matthews *et al.* used veterinary, human surveillance and molecular data to evaluate cross-species transmission dynamics and show that only rare super-shedding events (which involve high densities of the pathogen in excreted cattle faeces) are a serious threat to humans. Because the available vaccines reduce high-density shedding, the authors estimate that they could reduce human cases by nearly 85%, which is a huge improvement on the predicted 50% efficacy previously reported in vaccine trials that did not account for cross-species transmission dynamics.

ORIGINAL RESEARCH PAPER Matthews, L. *et al.* Predicting the public health benefit of vaccinating cattle against *Escherichia coli* O157. *Proc. Natl Acad. Sci. USA* http://dx.doi.org/10.1073/pnas.1304978110 (2013)

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