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War on terror cells: Novel sources of antimicrobials

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With the worsening trends of drug resistance, there is a need for newer and more powerful antimicrobial agents. The search for new compounds originating from natural resources is a promising research area. We hypothesized that animals living in polluted environments are potential source of novel antimicrobial molecules. Under polluted milieus, organisms such as cockroaches encounter different types of microbes, including superbugs. Such creatures survive the onslaught of superbugs and are able to ward off disease by producing antimicrobial substances. Here, we characterized antibacterial properties in extracts of various body organs of cockroaches (*Periplaneta americana*) and showed potent antibacterial activity in crude brain extract against methicillin-resistant *Staphylococcus aureus* and neuropathogenic *E. coli* K1. The size-exclusion spin columns revealed that the active compound(s) are less than 10 kDa in molecular mass. Using cytotoxicity

assays, it was observed that pre-treatment of bacteria with lysates inhibited bacteria-mediated host cell cytotoxicity. Using spectra obtained with LC-MS on Agilent 1290 infinity liquid chromatograph, coupled with an Agilent 6460 triple quadrupole mass spectrometer, tissues lysates were analyzed. Among hundreds of compounds, only a few homologous compounds were identified that contained isoquinoline group, chromene derivatives, thiazine groups, imidazoles, pyrrole containing analogs, sulfonamides, furanones, flavanones and known to possess broad-spectrum antimicrobial properties and possess anti-inflammatory, anti-tumour and analgesic properties. Further identification, characterization and functional studies using individual compounds can act as a breakthrough in developing novel therapeutics against various pathogens including superbugs.

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