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## Genomics initiative for surveillance of and research on antimicrobial resistance in clinical pathogens

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The Philippines is a hotspot for the emergence of antibiotic-resistant “superbugs” such as fluoroquinolone resistant *E. coli* and carbapenemase carrying *Klebsiella pneumoniae*. This paper reports on the use of next-generation sequencing and bioinformatics techniques for the genome wide analysis of genetic variation in fluoroquinolone resistant *E. coli*, carbapenem resistant *K. pneumoniae*, ESBL positive *K. pneumoniae* and a carbapenem resistant *Stenotrophomonas maltophilia*. These bacteria were isolated in 2013-2014 from clinical specimens of patients confined at St. Luke's Medical Center in Manila, Philippines. *De novo* assembly, primary structural and functional annotations, gene search and SNV analyses performed on pooled reads identified several resistance determinants. Plasmid-borne New Delhi  $\beta$ -lactamase genes, *bla**NDM-1* and *bla**NDM-7*, were found in *K. pneumoniae* as well as stop codon mutations in the *ompK35* and *ompK36* porin genes. SNVs in the genomes of susceptible and fluoroquinolone resistant *E. coli* were identified in scaffolds derived from pooled reads, which were then mapped against reference sequences of two susceptible and one fluoroquinolone resistant *E. coli*. *In silico* filtering of SNVs using a subtraction strategy selected for variants that may be associated with fluoroquinolone resistance in 23 genes involved in transport, respiratory chain, oxidative stress, iron metabolism and bacterial cell death. The functional association of these variants and putative pathways of fluoroquinolone resistance involving them were derived by mining gene annotations. This strategy of combining whole genome analyses with *in silico* identification of significant variants and searching gene ontologies for functional associations is useful to guide functional genomics studies on the development of antibiotic resistance in common clinical pathogens like *E. coli* and *K. pneumoniae*.

### Biography

Maria Luisa G Daroy is currently a Scientist at the Research and Biotechnology of St. Luke's Medical Center and Assistant Professor in the MS Molecular Medicine Program of the St. Luke's College of Medicine-WHQ Memorial. She has published more than 20 papers on dengue, Japanese encephalitis, chikungunya, eye infections, dementia, diabetes and coronary artery disease. She was the Chair of the Board of Examiners of the Philippine Academy for Microbiology from 2013-2015 and authored a book chapter on Philippine Microbiology Research. Her researches include dengue, chikungunya, diarrhea, CNS infections, pathogen genomics, antimicrobial resistance, plant antivirals, molecular diagnostics and genetics of CVD, thyroid cancer and dementia.

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