MOLECULAR DIAGNOSTICS
(Genetics of Disease Susceptibility)

Principal Investigator

Professor Nelson Tang

Team

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Research Progress Summary

Research Directions

1. Disease predisposition genes and variants: to identify prevalent genetic variants causing common diseases in Han Chinese;
2. Statistical genetics and computational statistical analysis of big genetic and biological datasets;
3. Functional analysis of such variants: to determine the functional consequence of these disease predisposition variants;
4. Analysis of variation of the transcriptome using latest technology of next generation sequencing.

Research into Genetics of Disease Susceptibility (GDS)

The mission of the GDS laboratory is to identify disease predisposition genes for common diseases in the locality. Predisposition to many common diseases (for example Alzheimer's disease, breast cancer and asthma) are due to alleles in multiple genes in addition to environmental risk factors. With the advances in sequencing and other technologies, the team acquires biological data in an unprecedented volume nowadays. The analysis and statistic method become limiting factor in handling such huge volume of data.

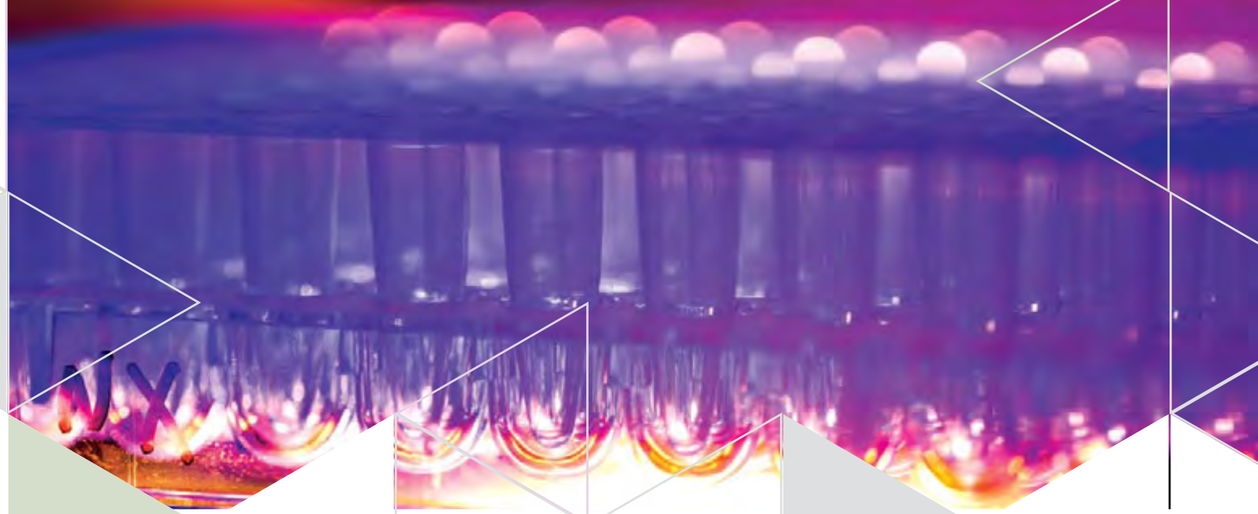
The research group is involved in development of various analysis methods and wet laboratory validation of the results generated from such analysis. The team also participates in international consortiums in studies of healthy aging (including bone and other phentoypes), breast cancer, and genetic susceptibility to tuberculosis.

Schematic diagrams of two alternate hypothetical models for molecular action of STR of different length.

Recognitions

Grants and Consultancy

Full Name of PI	Project Title	Funding Source	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	Amount (HK$)
Nelson Tang	Genetic Studies of Tuberculosis: In-depth Study of Recently GWAS Identified Loci in Chinese Patients	Food and Health Bureau - Health and Medical Research Fund	01/07/2015	30/06/2017	987,414
Nelson Tang	CUHK Jockey Club Institute of Ageing - Research Initiatives	CUHK Vice-Chancellor's One-off Discretionary Fund	01/01/2016	31/12/2019	200,000
Nelson Tang	Genetics of Idiopathic Scoliosis	CUHK Research Committee - Direct Grants	01/06/2016	31/05/2017	50,000
Nelson Tang (Co-I)	Relationship between Chronic Inflammation and Vitamin D Level to Prevalent and Incident Frailty in Older Adults	Food and Health Bureau - Health and Medical Research Fund	12/03/2015	11/03/2017	996,108
Nelson Tang (Co-I)	An Integrated Trans-omics Approach to Diabetic Cardio-renal Complications: From Novel Discoveries to Personalized Medicine (Project Coordinator: Professor Ronald Ma)	Research Grants Council - Theme-based Research Scheme	01/01/2014	31/12/2018	47,000,000
Nelson Tang (Co-I)	Anti-inflammatory Action of Carbon Monoxide via Interaction with Purinergic Receptor-mediated Cell Signaling Pathways in Human Bronchial Epithelia	Research Grants Council - General Research Fund	01/01/2014	31/12/2016	848,712
Nelson Tang (Co-I)	CUHK- CAS KIZ Joint Laboratory of Bioresources and Molecular Research in Common Diseases	CUHK Research Committee - One-off Funding for joint/lab and collaboration	01/07/2015	30/06/2017	1,000,000



Publications

A. Journal Papers

1. Chen HY, Ma SL, Huang W, Ji LD, Leung VH, Jiang HL, Yao XQ, Tang NL. The mechanism of transactivation regulation due to polymorphic short tandem repeats (STRs) using IGF1 promoter as a model. *Scientific Reports.* 2016; 6:38225.
2. Ma SL, Tang NL, Lam LC. Association of gene expression and methylation of UQCRC1 to the predisposition of Alzheimer's disease in a Chinese population. *Journal of Psychiatric Research.* 2016; 76:143-7.
3. Ji LD, Tang NL, Xu J. AGTR1 has undergone natural selection in Euro-Asian populations in relation to ambient temperature that predisposes Chinese populations to essential hypertension. *International Journal of Cardiology.* 2016; 209:278-80. (Correspondence)
4. Styrkarsdottir U, Thorleifsson G, Gudjonsson SA, Sigurdsson A, Center JR, Lee SH, Nguyen TV, Kwok TC, Lee JS, Ho SC, Woo J, Leung PC, Kim BJ, Rafnar T, Kiemeney LA, Ingvarsson T, Koh JM, Tang NL, Eisman JA, Christiansen C, Sigurdsson G, Thorsteinsdottir U, Stefansson K. Sequence variants in the PTCH1 gene associate with spine bone mineral density and osteoporotic fractures. *Nature Communications.* 2016; 7:10129.

B. Book Chapters

1. Woo J, Yu HY, Tang NL. Telomeres and physical activity. In: Marti A, Zalba G, ed. *Telomeres, Diet And Human Disease: Advances And Therapeutic Opportunities.* 1st ed. United Kingdom: CRC Press, Taylor & Francis Group; 2017.

C. Conference Papers

1. Chu SK, Xu SG, Xu F, Tang NL. Gene-gene Interaction Analysis by IAC (Interaction Analysis by Chi-Square) - A Novel Biological Constraint-based Interaction Analysis Framework. In: *The 9th International Joint Conference on Biomedical Engineering Systems and Technologies*; Rome, Italy; 2016 Feb 21-23.
2. Ma RC, Jiang GZ, Tam CH, Luk AO, Lee HM, Lim CK, Kong AS, FAN XD, Lok S, Chan TF, Yip KY, Tang NL, Tsui SK, Yu WC, Tomlinson B, Huang Y, Lan HY, Szeto CC, So WY, Chan JC, The TRANSCEND Consortium. Genome-wide Association Study Identifies Novel Loci Associated with Baseline Renal Function and the Rate of Decline in Renal Function Among Chinese Patients with Type 2 Diabetes. In: *American Diabetes Association's 76th Scientific Sessions*; New Orleans, USA; 2016 Jun 10-14.
3. Tang NL, Hu FY, Huang D, Wang XY. Splicing aberration in SLC25A13 gene with tissue specificity. In: *The 1st International Caparica Conference in Splicing*; Lisbon, Portugal; 2016 Sep 12-14.