



GENOMICS AND BIOINFORMATICS



Principal Investigator

Professor Peiyong Jiang



Team Members

Meng Ni | Wenlei Peng | Ze Zhou | Olivia Tse



Research Progress Summary

Professor Peiyong Jiang and his team have made several important achievements in the year 2020. The team discovered a new class of cell-free DNA biological properties, namely plasma DNA jagged ends. They proved that a circulating cell-free DNA molecule usually carries single-stranded DNA at its ends, based on the team's newly-developed Jag-Seq technology. The jaggedness varied according

to plasma DNA fragment sizes and displayed the nucleosomal patterns. The jaggedness of both fetal DNA and tumoural DNA was shown to be higher than the background DNA, mainly of hematopoietic origin. It also revealed that plasma DNA jagged ends were associated with nucleases activities. They have also devoted efforts to developing new tools for analysing third-generation sequencing.



Research and Scholarship

Grants and Consultancy

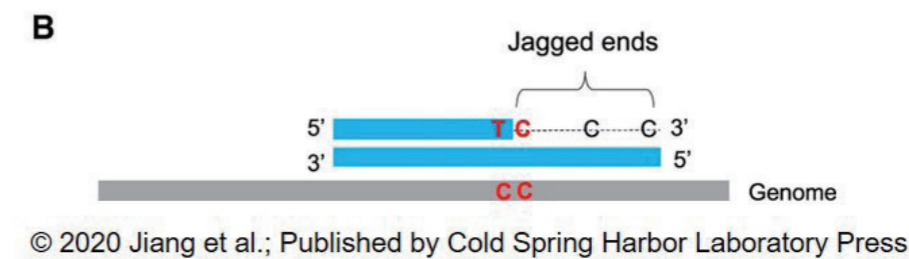
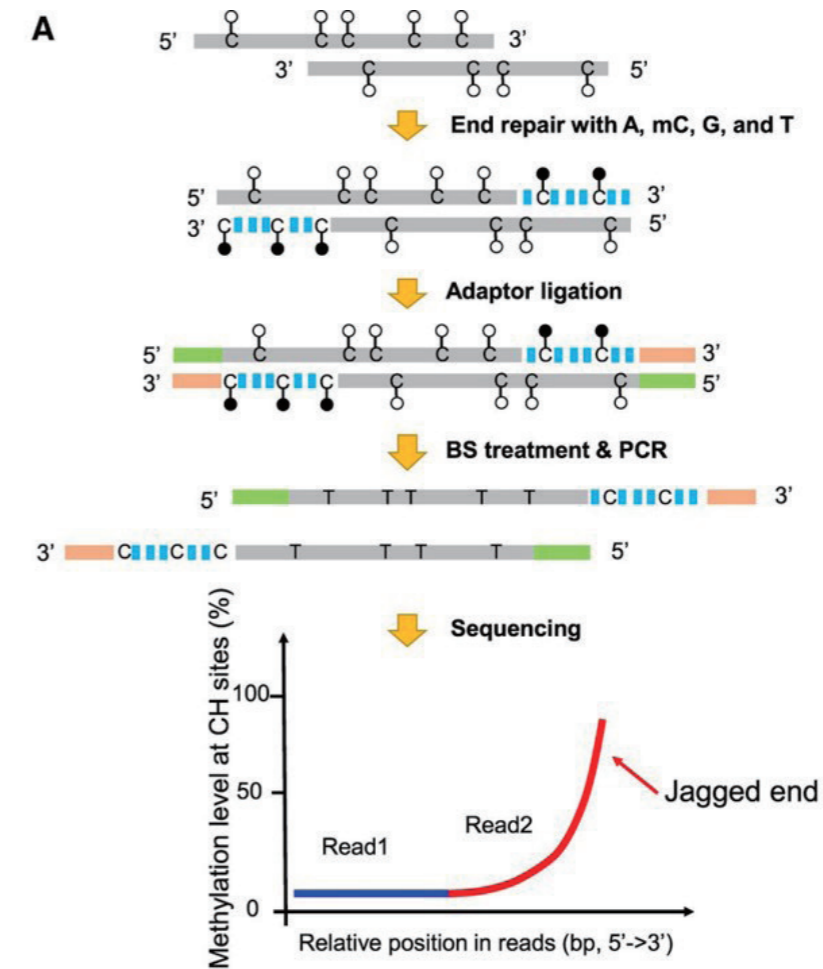
Name	Project Title	Funding Source	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	Amount (HK\$)
Peiyong Jiang	Centre for Novostics	Innovation and Technology Commission – Innovation and Technology Fund	01/05/2020	01/05/2025	483,000,000
	Plasma DNA as a Platform Technology for Cancer Detection	Research Grants Council – Theme-based Research Scheme	01/06/2016	31/05/2020	44,444,000
	Research into Circulating Fetal Nucleic Acids	Research Grants Council – Theme-based Research Scheme	01/01/2016	31/12/2020	37,286,000
	Regulation of Eosinophil/basophil-innate Lymphoid Type 2 Cells Axis by Fundamental Innate Immunity Inhibitor IL-37 in Atopic Dermatitis	Research Grants Council – General Research Fund	01/12/2018	30/11/2020	739,525

Publications

A. Journal Papers

1. Jiang P, Sun K, Peng W, Cheng SH, Ni M, Yeung PC, Heung MMS, Xie T, Shang H, Zhou Z, Chan RWY, Wong J, Wong VWS, Poon LC, Leung TY, Lam WKJ, Chan JYK, Chan HLY, Chan KCA, Chiu RWK, Lo YMD. Plasma DNA end-motif profiling as a fragmentomic marker in cancer, pregnancy, and transplantation. *Cancer Discovery*. 2020;10(5):664-673. doi:10.1158/2159-8290.CD-19-0622.

- Jiang P, Xie T, Ding SC, Zhou Z, Cheng SH, Chan RWY, Lee WS, Peng W, Wong J, Wong VWS, Chan HLY, Chan SL, Poon LCY, Leung TY, Chan KCA, Chiu RWK, Lo YMD. Detection and characterization of jagged ends of double-stranded DNA in plasma. *Genome Research*. 2020;30(8):1144-1153. doi:10.1101/gr.261396.120.
- Sin STK, Jiang P, Deng J, Ji L, Cheng SH, Dutta A, Leung TY, Chan KCA, Chiu RWK, Lo YMD. Identification and characterization of extrachromosomal circular DNA in maternal plasma. *Proceedings of the National Academy of Sciences of the United States of America*. 2020;117(3):1658-1665. doi:10.1073/pnas.1914949117.
- Lam WKJ, Ji L, Tse OYO, Cheng SH, Jiang P, Lee PHP, Lin SV, Hui EP, Ma BBY, Chan ATC, Chan KCA, Chiu RWK, Lo YMD. Sequencing analysis of plasma Epstein-Barr Virus DNA reveals Nasopharyngeal Carcinoma-associated single nucleotide variant profiles. *Clinical Chemistry*. 2020;66(4):598-605. doi:10.1093/clinchem/hvaa027.



Schematic illustration of plasma DNA jagged end detection using methylation levels at CH sites

Source: Jiang P, Xie T, Ding SC, Zhou Z, Cheng SH, Chan RWY, Lee WS, Peng W, Wong J, Wong VWS, Chan HLY, Chan SL, Poon LCY, Leung TY, Chan KCA, Chiu RWK, Lo YMD. Detection and characterization of jagged ends of double-stranded DNA in plasma. *Genome Research*. 2020;30(8):1144-1153. doi:10.1101/gr.261396.120.