

Transforming Cancer Care: Liquid Biopsy Revolutionizes Osteosarcoma Detection and Monitoring

Dumnoensun Pruksakorn^{1*}

¹ Center of Multidisciplinary Technology for Advanced Medicine (CMUTEAM),
Faculty of Medicine, Chiang Mai University

***Corresponding author:** dumnoensun.p@cmu.ac.th, dumnoensun@hotmail.com

Abstract

Over the past 10 years, efforts have been made to develop biomarkers to enhance the effectiveness of cancer care and treatment by analyzing biomolecules and cancer cells through "liquid biopsy," which involves the analysis of samples of body fluids. Due to the non-invasive nature and the repeatability of the sampling procedure, liquid biopsy has emerged as a promising tool for monitoring cancer during treatment. Current cancer mutation analysis relies solely on DNA and/or RNA analysis of tissue samples collected at specific times. However, cancer cells undergo continuous evolution. Tracking changes in cancer cells over time through liquid biopsy enables a comprehensive understanding of cancer cell dynamics throughout treatment. A diverse array of liquid biopsy analysis is currently being implemented in clinical settings. These analyses serve as either a complementary sample to tissue biopsy or, in cases where tumor tissue samples are unavailable, genetic profiling may be exclusively conducted using blood samples. Additionally, many ongoing clinical trials utilize liquid biopsy tests to monitor the response rate of treatments. Our group focuses on developing pipelines for cell-free DNA (cfDNA) analysis, particularly focusing on the size distribution of cfDNA, cfDNA-based actionable mutation identification, and other non-genetic characteristics of cfDNA that contribute to molecular subtype classification and the identification of the tissue of origin of cfDNA. We have identified an association between cfDNA size distribution and clinical outcomes in patients, including prognosis and metastasis. We found that the length of cfDNA in the blood of cancer patients is shorter compared to that in healthy individuals. In-silico analysis revealed that 150-bp cfDNA fragments carry somatic mutations highly concordant with those observed in parental tissues, particularly in copy number variation in bone cancer. These pipelines will undergo further development to enhance early cancer detection, identify actionable targets, monitor disease progression, and detect minimal residual disease.

CURRICULUM VITAE



Name:	Dumnoensun Pruksakorn
Academic positions:	- Professor in Musculoskeletal Oncology Division, Department of Orthopedic Surgery, Faculty of Medicine, Chiang Mai University - Director of Center of Multidisciplinary Technology for Advance Medicine - Assistance dean for research affair, Faculty of Medicine - President of Bioinformatics Academic Association of Thailand (BAT)
Workplace:	Faculty of Medicine, Chiang Mai University
Address:	239, Huay Kaew Road, Meuang District, Chiang Mai 50200, Thailand
Email:	dumnoensun.p@cmu.ac.th, dumnoensun@hotmail.com
Expertise:	Orthopedic tumor surgery, Cancer, Omics, Drug discovery, Bioinformatics



Education and Training

1.	2000	Degree of Doctor of Medicine (Second Class Honors).
2.	2006	Certificate of Proficiency in Orthopedic Surgery, Thai Orthopedic Association, Medical Council, Thailand
3.	2008	Fellowship of Musculoskeletal Oncology Surgery, Munster University Hospital, Munster, Germany.
4.	2010	Philosophy of Doctor in “Apply Biological Science Program” at Chulabhorn Graduated Institute, Bangkok, Thailand.
5.	2011	Clinical fellowship of Musculoskeletal Oncology and Lower Limb Reconstruction, University of British Columbia, Canada



Selected Grants

2016-2018	Serine-theonine kinase receptor-associated protein (STRAP) for the progression of osteosarcoma (TRF)
2016-2019	Identification of classifying factors of osteosarcoma for group-specific treatments (NSTDA)
2019-2022	Mycophenolate mofetil (MMF) as a repurposed drug for the treatment of osteosarcoma (NSTDA)
2021-2024	Rare pediatric cancer group of Genomic Thailand (HSRI)
2022-2023	Researcher capability boost up for post-doctoral resource in genomics and bioinformatics for health discovery research (PMUB)
2023-2024	Researcher capability boost up for post-doctoral resource in genomics and bioinformatics for health discovery research (Phase II) (PMUB)
2023-2024	Hub of Talent in Thailand for Bioinformatics (NRCT)