

# An Pilot Study of Developing An Assessment Function for Prognosis Prediction of Neuroendocrine System Cancer by using Wax Physisorption Kinetics coupled with Fourier Transform Infrared Spectroscopic Imaging

Pei-Yu Huang (黃佩瑜)<sup>1</sup>, Yi-Ting Chen (陳怡庭)<sup>2</sup>, Ching-Iue Chen (陳慶曰)<sup>1</sup>,  
Chee-Yin Chai (蔡志仁)<sup>\*2,3</sup>, Yao-Chang Lee (李耀昌)<sup>\*1,4</sup>  
<sup>\*</sup>yclee@nsrrc.org.tw

<sup>1</sup> Life Science Group, National Synchrotron Radiation Research Center, Hsinchu 30076, Taiwan

<sup>2</sup> Graduate Institute of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung 80708, Taiwan

<sup>3</sup>Department of Pathology, Faculty of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung 80708, Taiwan

<sup>4</sup>Department of Optics and Photonics, National Central University, Chung-Li 32001, Taiwan

<sup>\*</sup>cychai@kmu.edu.tw; <sup>\*</sup>yclee@nsrrc.org.tw

## Abstract

Establishing a methodology using wax physisorption kinetics coupled with Fourier transform infrared (WPK-FTIR) spectroscopic imaging for prognosis prediction based on the profile of altered glycans structure of glycoprotein of neuroendocrine tumors (NETs). Proper prognosis prediction always expected for grade 1 NET patients after tumor excision; however, rapid progressing multiple metastases was happened for those patients with grade 3 neuroendocrine carcinoma (NEC) even after aggressive treatment. Profiling glycans alteration of glycoprotein using WPK-FTIR imaging would provide the nascent profile of glycans structure of mechanisms of NETs, which is still remain unclear, and reducing the diagnosis variability among inter-observers. Previous studies showed that aberrant protein glycosylation is suggested strongly relating with carcinogenesis<sup>[1-3]</sup>; furthermore, aberrant glycans structure of glycoprotein were proved during the course of cancerization caused by neo-synthesis and incomplete synthesis<sup>[4]</sup>. Herein a proper prognosis prediction for those patients with neuroendocrine tumors could be making by using WPK-FTIR imaging based on variant carbon number (CN) n-alkane residue ratio, correlated with altered glycans structure of NET and NEC tumors. Based on the preliminary results, we proposed an assessment function by linear combining the IR absorption ratio of variant CN n-alkanes residue for making prognosis prediction for those patients with NEC and NET tumors.

**Keywords:** Wax-physisorption-kinetics-based FTIR imaging, neuroendocrine tumor

## Reference:

- [1]. L.-F. Chiu, P.-Y. Huang, W.-F. Chiang, T.-Y. Wong, S.-H. Lin, Y.-C. Lee\*, D.-B. Shieh\*, Anal. Bioanal. Chem. 405, 1995(2013)
- [2]. Morris M.-H. Hsu, P.-Y. Huang, Y.-C. Lee, Y.-C. Fang, Michael W. Y. Chan, and C.-I. Lee, Int. J. Mol. Sci.15(10), 17963–17973(2014).
- [3] C.-H. Lee, C.-Y. Hsu, P.-Y. Huang, C.-I. Chen, Y.-C. Lee, H.-S. Yu, Int. J. Mol. Sci. 17, 427(2016)
- [4]. R. Kannagi, J. Yin, K. Miyazaki, M. Izawa, Biochim. Biophys. Acta. 1780(3), 525(2008)