FATTY ACID SYNTHASE AND THE LIPOGENIC PHENOTYPE IN WSSV-INFECTED SHRIMP

Han-Ching Wang[§]

*Institute of Biotechnology, College of Bioscience and Biotechnology, National Cheng
Kung University, Tainan, Taiwan*

ABSTRACT

Shrimp aquaculture is a global industry that incurs severe economic losses from several serious shrimp diseases. One of the most damaging diseases is white spot disease (WSD), which originally swept through the cultured shrimp industry with devastating effects in 1995. However, the change of host metabolism after WSSV infection is not well understood. In this talk, we review some studies about the metabolic changes in WSSV-infected shrimp. We recently used an approach based on human cancer systems biology to detect global metabolic changes induced by white spot syndrome virus (WSSV) at various stages of viral replication in white shrimp (*Litopenaeus vannamei*). Most interestingly, at the genome replication stage (12 hpi), WSSV induced metabolic rerouting (invertebrate Warburg effect). Furthermore, using a quantitative GC-MS-based lipidomic approach, we determined that lipogenesis of shrimp cells occurred during a late stage of WSSV replication. Fluctuations in lipid concentrations in WSSV-infected cells may be tightly coupled to WSSV-induced metabolic reprogramming and therefore, important to WSSV replication. When fatty acid synthase (FAS; the key enzyme involved in lipogenesis) was suppressed with a specific inhibitor (C75), the virus was unable to complete its replication cycle, even though replication of the WSSV genome was not affected. In addition, the PI3K-Akt-mTOR pathway was the key pathway to induce lipid biosynthesis. We concluded that WSSV-induced lipid synthesis was important to support viral morphogenesis.

KEYWORDS

Litopenaeus vannamei, white spot syndrome virus, Warburg effect, lipogenesis, viral morphogenesis

§Corresponding author. TEL: +886-6-2757575 ext 65603-810 FAX: +886-6-276-6505

E-mail: wanghc@mail.ncku.edu.tw