Precision Medicine: Personalized diseases prevention and screening

精準醫療：疾病的個人預防與篩檢

Chun-Ying Wu

吳俊穎

Taichung Veterans General Hospital; Faculty of Medicine and Graduate Institute of Clinical Medicine
台中榮民總醫院 及 國立陽明大學醫學系及臨床醫學研究所

Precision medicine is the approach to provide personalized healthcare, with medical decisions, practices, or products tailored to be the individual patient. Precision medicine suggests selecting appropriate and optimal diagnoses and therapies based on the context of each patient's characteristics.

Big data research has made precision medicine not only feasible to diagnose and treat disease individually, but also possible to identify high-risk populations and prevent diseases occurrence thereafter. In this talk, we will use our previous big data research experience based on Taiwan's National Health Insurance Research Database (NHIRD) as examples to introduce the feasibility of big data approach in precision medicine. Based on NHIRD, we found several methods to prevent digestive cancers based on patients' characteristics. We found early *Helicobacter pylori* eradication and regular use of non-steroidal anti-inflammatory drugs (NSAIDs) associated with reduced risk of gastric cancer. We reported that antiviral therapy was effective as a 2nd chemoprevention agent to reduce hepatocellular carcinoma (HCC) risk in patients with hepatitis B. Antiviral therapy and NSAIDs were also an effective 3rd chemopreventive method to reduce HCC recurrence in patients with HBV and HCV-related HCC after liver resection or radiofrequency ablation (RFA). In addition, we found regular ultrasonography and higher RFA operator volume significantly associated with HCC mortality.

Big data approach can also be used for personalized risk prediction and finding the molecular signaling pathways to inhibit carcinogenesis. For patients with peptic ulcer diseases, we used NHIRD to construct a nomogram to predict each individual patient's risk score and categorized patients' risk in the following 2 years. We also used NHIRD to find the usefulness of metformin and statins to treat HCC and explored the related signaling pathways with *in vitro* and *in vivo* studies. Currently, we are conducting a nationwide multicenter randomized clinical trial to confirm the chemopreventive effect of statins in HCC.

In conclusion, big data approach can be used to conduct novel clinical studies, to assess effectiveness in real world, to make health policies, and to achieve precision medicine.