敬請張貼

# 淡 江 大 學 統 計 學 系

## 學 術 演 講

講　題：Challenges and Opportunities in Statistics and Data Science for Cancer Research

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時　間：2023 年 12 月 21 日（星期四）下午 02：00 - 04：00

地　點：淡水校園守謙國際會議中心 HC 306、HC307 會議室

### 摘 要


The key concepts of precision medicine are prevention and treatment strategies that take individual molecular profile and clinical information into account. Single-cell next-generation sequencing technologies (NGS), liquid biopsy for circulating tumor DNA (ctDNA) analysis, microbiomics, radiomics, spatial omics, and other types of high-throughput assays have exploded in popularity in recent years, thanks to their ability to produce an enormous volume of data quickly and at relatively low cost. The emergence of these big data has advanced the goals of precision medicine; however, across the entire continuum of big data capture and utilization, many more mathematical and statistical challenges lie ahead—from analysis of high-throughput biomarkers to maximum exploitation of the electronic health record (EHR), to the ultimate goal of clinical guidance based on a patient’ s genome.

Because of these challenges, the statistics profession is in a period of disruptive change—change long-time coming, as John Tukey called for a reformation of academic statistics almost 60 years ago. He pointed to the existence of an as-yet unrecognized science in his book, The Future of Data Analysis. More than ten years ago, John Chambers, Bill Cleveland, and Leo Breiman independently urged academic

statistics to expand its boundaries beyond the classical domain of theoretical statistics. Cleveland even suggested the catchy name, "Data Science," for his envisioned field.

Now, today, the statistical community faces a crucial moment; if we do not participate in the data revolution, we will be marginalized; if we do not adapt our mindset, we will find ourselves relegated to a supporting role on the data science stage; if we do not educate our students on new concepts in statistics, we will be less and less successful in passing the statistical torch.

In this presentation, I will offer some perspectives on the changing landscape for applied mathematical and statistical science, including the concept of treating unstructured text as quantitative data; the need for statisticians to adjust their mindset around the explosive growth in information technology; machine learning; and the AI revolution. These areas present great opportunities for our profession to strengthen our role in the data science arena. I will finish up with my recent research about single cell RNA-seq data analysis which we developed a new method to identify dysregulated ligand-receptor interactions from single cell transcriptomics.