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研究興趣

雖然病毒引起人類各種疾病，但我們卻仍無法清楚了解病毒如何藉由一個奈米級的簡單個體不斷地生存生長，並控制生物體的不同系統，持續對抗著各種藥物及治療的方法。本實驗室利用人類病毒以及噬菌體對這些問題做更深入的探討。

• 病毒與寄主之交互作用、基因體重組、序列變異之研究

本實驗室研究的一個方向是透過噬菌體探究病毒顆粒如何入侵寄主與生長，病毒的基因體怎麼發生重組，病毒基因體重組之機制，為何重組可幫助病毒生存，及病毒的基因所常見的各種突變，其突變產生的機轉。我們也探索病毒與寄主如何交互作用，病毒運用寄主細胞的蛋白質來助其進行何種功能，寄主蛋白能夠支持病毒生長的原因與物理化學特性。此外我們並研究噬菌體本身及其蛋白在醫藥與業界的應用。

• 酵素與抑制劑

本實驗室研究數種酵素，其中包括寄主本身及病毒的蛋白質。例如我們研究去氧核糖核酸聚合酵素的活性及DNA複製機制，參與氧化還原的酵素其功能及原理，serine蛋白酵素及其抑制劑設計，登革熱病毒的酵素活性機轉與致病。這些酵素或抑制劑的機轉，以及動力論，或者是這類蛋白質的設計，與商業或醫療之應用，都是此部份有興趣的研究內容。

• 細胞的生長機制與藥物應用

我們另一研究方向著重於探索氧化還原蛋白質對癌細胞的作用，以及自然界存在的氧化還原蛋白型式與經過變異後的蛋白如何影響人類PBMC生長與分化，其機制為何，並探討其在免疫藥物上的應用。

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Research Interests

Viruses infect humans and cause a variety of diseases. Yet we still do not clearly understand how a simple nanoparticle like viruses can continuously grow, control different human organ systems, and resist various drugs and therapeutic treatments. Our lab employs phages and human viruses to explore these questions for fundamental understanding and further applications.

• Virus and host interactions, genome recombination, and sequence mutation

There is a lack of understanding about the rapid growth, frequent recombination, and continual sequence mutation of viruses and phages. One of our research interests is to utilize phages to investigate how a virus invades the host, grows within the host cell, recombines the viral genome, and mutates the sequences of the viral genes. Viral recombination and gene mutations have hampered medical therapies. Our lab investigates the mechanisms of viral recombination and the benefits of the genomic recombination, as well as the mechanisms of various viral mutations. Phage growth is similar to animal viruses in that it often requires proteins from the host cell. Therefore, we further explore how phages exploit host proteins for accomplishing viral functions and the interactions between the viruses and hosts. We also look into these phages and proteins for medical, pharmaceutical, and industrial application purposes.

• Enzymes and inhibitors

We study a wide variety of enzyme topics, including proteins of viruses and the hosts. Some examples are the coordination of proteins and replication mechanism of DNA polymerases, the functions and physicochemical principles of oxidoreductive enzymes, the design of serine protease inhibitors, and the activity and pathogenesis of dengue viral enzymes. The activities, mechanisms, kinetics, design, and applications of these enzymes and inhibitors to industry and medicine are all of our interest.

• Cell growth and mechanism

Another focus is to investigate the effects of redox proteins on the growth and replication of cancer cells. We also study the propagation of human normal peripheral blood mononuclear cells (PBMC) under the influence of the wild-type and mutant oxidoreductive proteins, the molecular mechanism, and how this may apply to immune modulatory therapy.