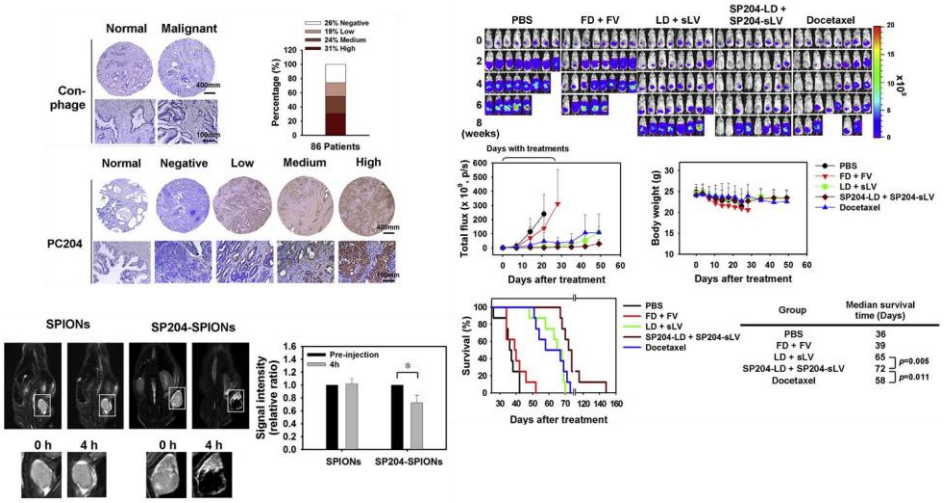
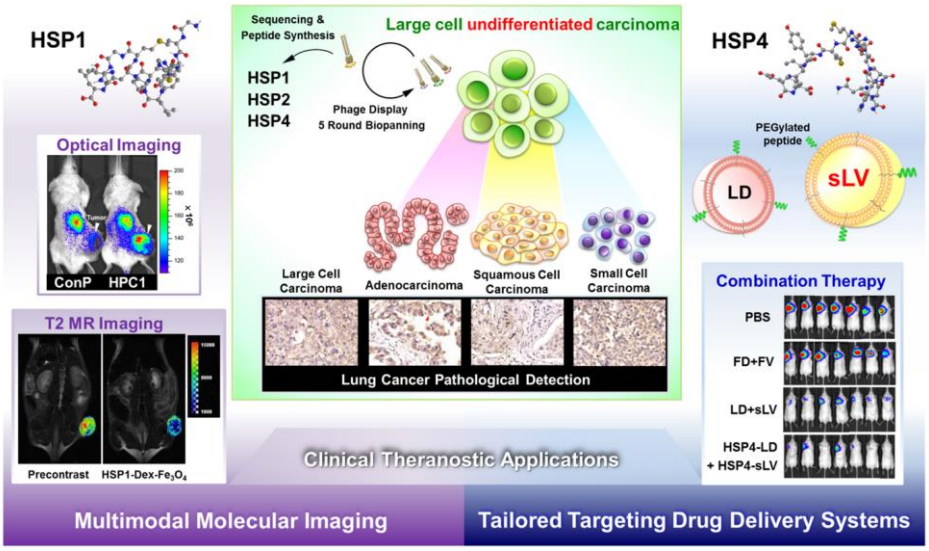
研發標靶藥物傳輸系統運用於癌症之影像分子及治療

主要領域　癌症治療

一. **前列腺癌的標的胜肽**/針對男性極為好發的前列腺癌，我們篩選出具專一性且能辨認前列腺癌細胞株及前列腺癌臨床檢體之胜肽。將胜肽接合在螢光物質量子粒或超順磁氧化鐵微粒上，發展成MRI活體造影，可精準測出腫瘤的位置。在小鼠的腫瘤異體移植及原位癌模式中，以帶有專一性胜肽之艾黴素或溫諾平的微脂體進行治療，能夠加強對癌症的治療效果，並且延長小鼠的存活時間。研究成果證明此專一性胜肽，對於前列腺癌治療及分子影像有極大的應用潛力。此成果已申請全球專利，並已獲證台灣(2018)及歐洲(2020)專利，且論文已發表於著名的生物材料期刊(Biomaterials 2016)。



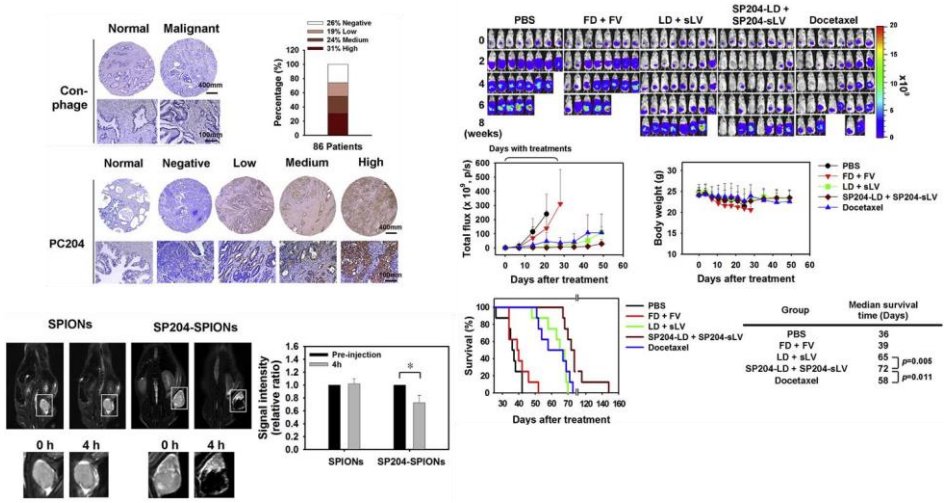
二. **肺癌的標記胜肽**/肺癌位居全世界癌症死亡率之首。我們篩選出三條標的胜肽(HSP1、HSP2和HSP4)對於肺癌細胞有高度的專一性與親和力，且不會與正常細胞結合。在非小細胞肺癌的動物模式中，發現HSP1、HSP2和HSP4接合的標靶微脂體具有顯著療效。在細胞株及肺癌病人組織切片的免疫染色發現這三條胜肽可以辨識非小細胞肺癌(包括：肺腺癌、鱗狀細胞癌和大細胞癌) 及小細胞肺癌。因此，這三條胜肽可用於不同亞型 (subtype) 的肺癌病人做出最佳的治療策略，亦可發展成活體造影或組織病理學上的偵檢試劑，極具臨床潛力。此部分成果已申請全球專利，且論文已發表於重要的癌症治療及診斷期刊 (Theranostics 2017)。



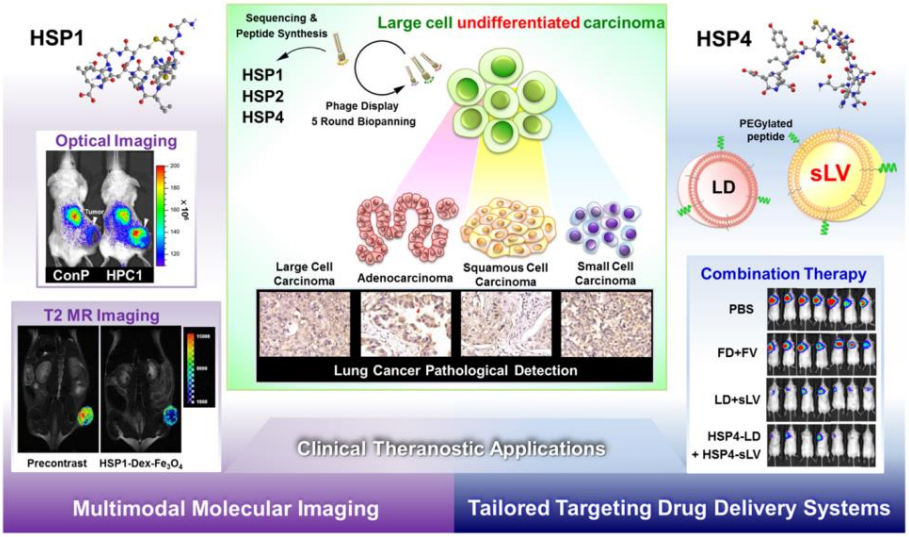
Development of Targeted Drug Delivery Systems for Cancer Molecular Imaging and Therapy

Research Area Cancer Treatment

1. **Cancer targeting peptides for use in the diagnosis and treatment of prostate cancer**/ Specific peptides targeting prostate cancer cells and surgical specimens from prostate cancer patients were successfully identified. The conjugation of targeting peptide to imaging agents results in more precise delivery to tumor sites. Furthermore, administration of liposomal doxorubicin and vinorelbine conjugated with targeting peptides was found to markedly increase the inhibition of human prostate tumor growth in mouse xenograft and orthotopic models. These results indicate that targeting peptide, SP204, has significant potential for targeted therapy and molecular imaging in prostate cancer (Biomaterials 2016). The global patent has been filed.



2. **Three lung cancer specific peptide ligands for targeted drug delivery, imaging and diagnosis**/ Lung cancer is the leading cause of cancer-related death worldwide. Three targeting phages (HPC1, HPC2, and HPC4) and their respective displayed peptides (HSP1, HSP2, and HSP4) were able to bind to both SCLC and NSCLC cell lines, as well as clinical specimens, but not to normal pneumonic tissues. Liposomal doxorubicin conjugated to HSP1, HSP2, or HSP4 had significantly greater therapeutic efficacy than non-targeting liposomal drugs in NSCLC (H460 and H1993) animal. *In vivo* optical imaging of phage homing and magnetic resonance imaging of peptide-SPIONs revealed that HSP1 was the most favorable probe for multimodal molecular imaging of lung cancer (Theranostics 2017). Our study overcame a major challenge of accurately delivering drugs to tumor sites by combining liposomal drugs with ligands that were discovered by phage display to design a next-generation of targeted drug delivery systems for cancer molecular imaging and therapy. The global patent has been filed.



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