

## 長海計畫提案構想書

議題/構想題目	Carbonized nanomaterials synthesized from sea-weed polysaccharides effectively inhibit metastasis in triple-negative breast cancer				
提案人	Dr. Chih-Ching Huang (黃志清)	單位	Bioscience and Biotechnology		
連絡電話	+886-2-2462-2192 #5517	Email	huangcing@ntou.edu.tw		
個人專長	<ol style="list-style-type: none"> <li>Expert in developing novel therapeutic carbon-based nanomaterials including carbon dots, carbonized nanogels, carbon nanoparticles, carbonized polymer dots, and photoluminescent quantum dots from natural compounds</li> <li>Synthesis, specific modification, and characterization of metal and metal oxide-based nanomaterials, and photoluminescent quantum dots.</li> <li>Expert in the design of multifunctional nanomaterials to specific bio-applications, their chemical characterization, biochemical analysis, <i>in vitro</i> and <i>in vivo</i> therapeutic evaluation, and toxicity analyses</li> <li>Expert in the application of multifunctional nanomaterials for biomedical applications including anti-cancer, anti-viral, anti-bacterial, anti-inflammatory, anti-oxidant, anti-coagulant, and biosensing applications.</li> </ol>				
預期合作對象	(醫院科別或專長領域). Department of Medical Research and Development Department of Oncology, Department of Chinese Medicine				
擬研究領域 (海大與長庚之議題請至少各選1項)	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">           海洋大學  <input type="checkbox"/> 項目 1：疾病預測之大數據分析研究  <input checked="" type="checkbox"/> 項目 2：癌症基礎研究  <input checked="" type="checkbox"/> 項目 3：生醫材料相關應用研究  <input type="checkbox"/> 項目 4：長照健康  <input type="checkbox"/> 其他：<u>Nanomedicine development and basic cancer research at NTOU.</u> </td> <td style="width: 50%; vertical-align: top;">           基隆長庚  <input checked="" type="checkbox"/> 精準醫療  <input type="checkbox"/> 世代醫學研究  <input type="checkbox"/> AI 智慧醫療  <input checked="" type="checkbox"/> 疾病預防與治療         </td> </tr> </table>			海洋大學 <input type="checkbox"/> 項目 1：疾病預測之大數據分析研究 <input checked="" type="checkbox"/> 項目 2：癌症基礎研究 <input checked="" type="checkbox"/> 項目 3：生醫材料相關應用研究 <input type="checkbox"/> 項目 4：長照健康 <input type="checkbox"/> 其他： <u>Nanomedicine development and basic cancer research at NTOU.</u>	基隆長庚 <input checked="" type="checkbox"/> 精準醫療 <input type="checkbox"/> 世代醫學研究 <input type="checkbox"/> AI 智慧醫療 <input checked="" type="checkbox"/> 疾病預防與治療
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議題重點描述 (此部分資料將另置於網頁公開)	<p>1. 計畫目的 (Purpose): Triple-negative breast cancer (TNBC) is a formidable subtype of breast cancer due to its aggressive characteristics and the absence of targeted therapeutic alternatives. Conventional therapeutic approaches, such as chemotherapy, frequently produce less-than-ideal results, and the medications currently accessible do not specifically target TNBC tumors and are linked to severe adverse effects. As part of the new generation of anti-cancer therapies, neutralizing antibodies and small molecule kinase inhibitors inhibit the uncontrolled activities of oncogenic proteins. However, they are still in the developing stages due to the costs associated with the drug development procedure, molecular heterogeneity of TNBC, limited targeting specificity, and limited efficacy in advanced stages. Although nanoparticle-based treatment for TNBC has attained great attention for both drug delivery and therapy, they are still far from producing a practically feasible therapeutic system due to safety concerns. Therefore, targeting metastasis as an effective way of treating TNBC has been gaining importance and gives scope for further improvement and reducing side effects associated with anti-cancer therapy. This proposal is aimed at developing carbon nanomaterial-based drugs from natural compounds to target metastasis without killing the cancer cells, thereby reducing their aggressiveness and side effects on normal cells. Compared to metal-based nanomaterials, carbon-based drugs are biodegradable and can be eliminated from the body easily.</p> <p>2. Objectives:</p> <ol style="list-style-type: none"> <li>Development of a novel carbon nanomaterial-based multifunctional therapeutic agents from sea-weed-derived polysaccharides</li> <li>Developing a novel approach for metastasis-targeted tumor therapy of TNBC using carbon nanomaterials, by targeting unexplored pathways</li> </ol>				

	<p>c) Investigate the mechanism of action of carbon nanomaterials on the inhibition of metastasis in TNBC</p> <p>d) Investigate the efficacy and biocompatibility profile of carbonized nanomaterials in animal models and pre-clinical models of TNBC</p> <p>e) Establish a foundation for translating this technology into clinical trials for TNBC patients</p> <p>3. 預期成果 (Expected Results): Our proposal involves the production of nanomaterials utilizing seaweed polysaccharides, with a specific emphasis on alginate, fucoidan, carrageenan, and agarose. These polysaccharides are biocompatible and have low toxicity levels. We intend to employ environmentally friendly processing procedures for carbonization of polysaccharides to produce therapeutic carbon nanoparticles, while maintaining and enhancing their natural bioactivity. By the end of this project, we will be able to</p> <p>a) Hypothesize the mechanism of action of carbon-based drugs on cancer therapy</p> <p>b) Find new targets for anti-metastasis activity</p> <p>c) Demonstrate <i>in vitro</i> and <i>in vivo</i> efficacy in anti-metastasis or anti-tumor effects, and biocompatibility as a pre-clinical model</p> <p>d) Creating a framework for future clinical translation and commercialization of this technology.</p> <p>e) Publish one paper in a reputed journal</p> <p>f) One Ph.D student and one research assistant can work on this chemistry and biology part of the projects</p> <p>g) Apply for a patent for the therapeutic carbon nanomaterial for anti-metastasis therapy for cancer</p> <p>3. 關鍵字 (Keywords): carbonized-nanomaterials, alginate, fucoidan, metastasis, breast tumor</p>		
<p>近 5 年 代表性著作</p>	<p>包含：主題/期刊名/發表年月等，最多 2 篇</p>		
<p>符合之 SDGs 項目</p>	<p><input checked="" type="checkbox"/> 項目 3：良好健康和福祉</p> <p><input type="checkbox"/> 項目 17：促進目標實現的夥伴關係</p> <p><input type="checkbox"/> 其他項目：_____</p> <table border="0" data-bbox="391 1444 1005 1646"> <tr> <td style="vertical-align: top;"> <p>SDG1 消除貧窮</p> <p>SDG2 消除飢餓</p> <p>SDG3 良好健康與福祉</p> <p>SDG4 優質教育</p> <p>SDG5 性別平等</p> <p>SDG6 清潔飲水和衛生設施</p> <p>SDG7 可負擔和清潔能源</p> <p>SDG8 優質工作和經濟成長</p> <p>SDG9 工業、創新和基礎設施</p> </td> <td style="vertical-align: top;"> <p>SDG10 縮小不平等</p> <p>SDG11 永續城市和社區</p> <p>SDG12 負責任的消費和生產</p> <p>SDG13 氣候行動</p> <p>SDG14 海洋生態系</p> <p>SDG15 陸域生態系</p> <p>SDG16 和平、正義與強大機構</p> <p>SDG17 促進目標實現的夥伴關係</p> </td> </tr> </table> <p>相關連結：</p> <p>1. <a href="#">聯合國 SDGs 簡介</a></p> <p>2. <a href="#">天下雜誌 SDGs 懶人包</a></p>	<p>SDG1 消除貧窮</p> <p>SDG2 消除飢餓</p> <p>SDG3 良好健康與福祉</p> <p>SDG4 優質教育</p> <p>SDG5 性別平等</p> <p>SDG6 清潔飲水和衛生設施</p> <p>SDG7 可負擔和清潔能源</p> <p>SDG8 優質工作和經濟成長</p> <p>SDG9 工業、創新和基礎設施</p>	<p>SDG10 縮小不平等</p> <p>SDG11 永續城市和社區</p> <p>SDG12 負責任的消費和生產</p> <p>SDG13 氣候行動</p> <p>SDG14 海洋生態系</p> <p>SDG15 陸域生態系</p> <p>SDG16 和平、正義與強大機構</p> <p>SDG17 促進目標實現的夥伴關係</p>
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構想書撰寫注意事項：

1. 構想書內容以2頁為限(不含注意事項)。
2. 長海計畫係由基隆長庚紀念醫院與本校合作計畫，更多資訊請至研發處學術發展組網頁 <https://research.ntou.edu.tw/p/412-1021-10720.php?Lang=zh-tw>。
3. 敬請將 (1)構想書及(2)個人簡歷 (PPT)電子檔 Email 至研發處企劃暨學術合作組鄧鈞澤先生 ([kamenpayu@email.ntou.edu.tw](mailto:kamenpayu@email.ntou.edu.tw)；分機 2281)收。