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Nanopurpurin-based photodynamic therapy destructs extracellular matrix against intractable tumor metastasis

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1 **Nanopurpurin-Based Photodynamic Therapy Destroys Extracellular Matrix**  
2 **against Intractable Tumor Metastasis**

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14 **Keywords:** Adhesion, extracellular matrix, biomechanical forces, photodynamic  
15 therapy, tumor metastasis

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17 **Abstract:** Nanomaterials-based photodynamic therapy (PDT) has been used to treat  
18 malignant cells. However, the intrinsic impact of nanomaterials-based PDT on  
19 mechanical properties of intractable tumor cells is not well understood. Herein, we  
20 demonstrated that the mechanical forces of Taxol-resistant tumor cells were decreased  
21 by nanopurpurin-based PDT destructing extracellular matrix (ECM), increasing  
22 therapy sensitivity and repressing tumor metastasis. Combining FIRMS and general  
23 confocal microscope, we observed that the disruption of ECM by photodynamic  
24 reaction of P18-nanoconfined liposome (**P18cL**) induced a decrease of adhesion  
25 force and biomechanical properties of Taxol-resistant cells through the attenuation of  
26 actomyosin-based contractility thereby inhibiting cell migration and metastasis *in vivo*.  
27 Moreover, the destroyed ECM by **P18cL** PDT increased the therapy sensitivity. A  
28 clearer understanding of the effect of nanopurpurin-based PDT on mechanical

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