Exploring the Anti-Cancer Potential of Anthocyanins via Autophagy Overactivation

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Exploring the Anti-Cancer Potential of Anthocyanins via Autophagy Overactivation

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Abstract:

Background: Anthocyanins are natural plant pigments that give fruits and vegetables their colors. They are well known for their health benefits, such as antioxidant, anti inflammatory and anticancer properties. In recent years there has been an increased interest in using natural plant products to treat diseases. One specific anthocyanin called Dracorhodin derived from the fruit of Daemonorops draco (also known as ‘dragons blood’) has shown anticancer effects. However the precise molecular mechanisms through which Dracorhodin Perchlorate (DP) a derivative of Dracorhodin exerts its antitumor activities are still not fully understood. In this study we aimed to investigate whether DP can induce autophagy—a process of cellular self digestion—in colorectal cancer cells. Methods: We employed an approach that involved techniques such as immunocytochemistry, western blotting and microscopy to explore how DP triggers cytotoxic autophagy, in colorectal cancer cells. Results: Our findings demonstrated that DP effectively suppressed the proliferation of cancer cells (SW620) by excessively activating autophagy. Further analysis revealed that DP achieved this by inhibiting the target of rapamycin (mTOR) signaling pathway and promoting the activation of transcription factor EB (TFEB) a key regulator of autophagy. Additionally DP enhanced lysosome function, an essential aspect of autophagic processes. We also observed that DP activated the calcium signaling pathway by mobilizing calcium stores and facilitating dephosphorylation of TFEB to further promote autophagy. Furthermore our investigation unveiled that DP led to caspase 3 degradation, an event associated with both autophagy and apoptosis. Conclusions: Based on our findings, DP exhibits anticancer properties by triggering a combination of autophagy and apoptosis. This means that DP induces autophagy through coordinated actions on mTOR TFEB and calcium signaling making it a promising drug, for cancer treatment.