ANALYSIS OF THE CONJUGATED DRUG-DELIVERY POLYMER, POLYGLUTAMATE-DOXORUBICIN BY THE LATEST ADVANCED MULTI-DETECTOR GPC SYSTEMS

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In pharmaceutical research, correctly targeting the delivery location and release profile of drugs is a critical challenge and a great many avenues of research are being explored to overcome the challenges of drug delivery. Polymers are playing an increasing role in drug delivery applications as targeted controlled-release mechanisms. One potential solution is to conjugate chemotherapy drugs such as Doxorubicin (Dox) with a delivery polymer such as polyglutamate (PG). Preferential uptake of PG-Dox conjugates by cancer cells and local degradation and drug release could more effectively target cancer cells over healthy cells[1].

Gel-permeation chromatography (GPC) is the most widely used tool for the measurement of molecular weight and molecular weight distribution of natural and synthetic polymers. Historically, the elution volume of an unknown sample was compared with that of known standards to estimate molecular weight and distribution. However, this so-called 'conventional calibration' will not give accurate molecular weights for conjugated polymers like PG-Dox.

In this paper, we analysed PG, Dox, and two PG-Dox conjugates. Drug loading levels were accurately assessed and molecular weight and structural changes were also analysed using static light scattering and a viscosity detector. In combination, these data overcome the limitations of conventional measurements to measure accurate molecular weight, structural changes and drug loading. Regular use of multi-detector GPC measurements could support development and testing of these drug delivery candidates accelerating research in this area.

[1] Xu *et al.* An injectable nanoparticle generator enhances delivery of cancer therapeutics. **Nature Biotechnology** 34**,** 414-418 (2016)