Nanomedicines to Enable Innovative Cancer Medicines

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Bringing new medicines to treat patients remains a considerable challenge. Attrition rates within the Pharmaceutical Industry are high and many of the easily “druggable” targets have been already been prosecuted and had limited effect in many cancers to date. Lack of therapeutic index remains one of the biggest reasons for failure in the Industry and particularly in Oncology where combination dosing is often needed to try to move treatments to cure rather that just slowing down the disease. In addition, it is now thought that approximately 70% of disease targets cannot be prosecuted by traditional small molecule medicinal chemistry or antibodies and thus many new modalities are being investigated which has led to a significant diversification of many Companies’ portfolios. The difference between these new modalities and previous drugs is that drug delivery rather than chemistry is required to ensure they reach their intracellular targets.

This talk will illustrate where nanomedicines can be used to enable new cancer medicines in two different areas. Firstly, through improving the therapeutic index of two small molecule drugs using two different nanomedicine approaches : an aurora kinase inhibitor in BIND Therapeutics polymeric nanoparticle (Accurin™) and the potent cytotoxic SN38, an active metabolite of the topoisomerase inhibitor, irinotecan, attached to a G5 –L-lysine stealth dendrimer . The critical design features of these delivery systems to ensure optimal therapeutic index benefit will be discussed, together with important factors required for successful clinical exploitation. Secondly, some of the delivery challenges of getting the various modalities that interfere with protein production into the correct place within cells will be illustrated. Some potential nanomedicine solutions to exploit these modalities as new medicines will be explored and the requirements for greater understanding for succesful nanomedicine design in this area will be discussed