MANUFACTURING STRATEGIES FOR SUSTAINABLE SUPPLY OF ULTRA-LOW COST VACCINES FOR GLOBAL HEALTH

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The ability for governments across the globe to protect infants from diseases caused by viruses such as polio, human papillomavirus and rotavirus through immunization is highly contingent on the development and manufacture of efficacious and cost-effective vaccines. Historically, vaccine manufacturers operate at large, and at times, overstretched capacities to benefit from economies of scale. However, this has led to expensive batch failures that have added to cost and interrupted supply.

This presentation describes a detailed economic analysis of multiple approaches for the manufacture of a *Pichia pastoris*-based vaccine with the aim of proposing strategies to produce a ultra-low cost vaccine against rotavirus with a target COG per dose of ¢15 for the finished drug product. This analysis was carried out using an advanced integrated decisional tool developed *in-house*. The case study assesses the cost-effectiveness of multiple manufacturing flowsheets combining different upstream and downstream techniques (e.g. fed-batch v perfusion, chromatography v crystallisation) as well as different facility designs (e.g. in-house v outsourced reagent production, fully integrated process v segregated process steps), across different geographic locations (Europe v India) and number of manufacturing sites. The key cost drivers across these scenarios were identified through a detailed sensitivity analysis. This allowed for process performance targets for sustainable supply of ultra-low cost rotavirus vaccines to be identified using an optimization algorithm.

The key output of this work is to break the economies of scale model and explore how advances in manufacturing can be integrated into decisional tools models to facilitate the guaranteed, uninterrupted supply for low cost vaccines for Global Health.