of the regulatory strategies and clinical development that led to their approval in this market. A systematic review until May 31st, 2021 was carried out. A total of 10 RPs were approved for 12 indications, 6 of the products being cell therapies and 4 of them being gene therapies. Six of the therapies obtained an orphan designation and 2 obtained a Sakigake designation. The mean (SD) time required from submitting the marketing authorisation (MA) application to approval was 14.72 (10.63) months, and 10.5 (2.51) months for those products with a Priority Review designation. Three out of 11 (27.27%) analysed indications received a conditional and time-limited approval. Thirteen main clinical trials (CT) were conducted to support the MA for those products specifically developed in Japan (n = 7). Of these studies, all except one were small, uncontrolled and single arm. Eleven (84.62%) used intermediate variables to evaluate the primary efficacy. A total of 4 (30.79%) were Phase III or Phase II/III, while 9 (69.23%) were Phase I/II or II. Finally, the median (IQR 25-75) number of patients enrolled was 10 (5-16). RP regulations in Japan allow adaptive licensing and constitute shortcut through the clinical development to the approval. Evidence shows that RPs have been mainly approved so far based on inconclusive efficacy and limited safety, prioritising the unmet medical needs of the target diseases, and therefore, the early access for patients.

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The small heat shock protein *Al*IbpA from mycoplasma *Acholeplasma laidlawii* prevents the formation of amyloid structures

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Heat shock proteins (HSPs) inhibit the aggregation of a wide range of target proteins. Interaction of HSPs with aggregating proteins that precipitate in amorphous or fibrillar form, is associated with various neurodegenerative diseases, the transfer of prions, drug resistance and biofilm formation.

In this study, we investigated the ability of the small heat shock protein *Al*IbpA from phytopathogenic mycoplasma *Acholeplasma laidlawii* to influence the process of biofilm formation and formation of amyloid structures.

For these purposes, we used *Escherichia coli* BL21 HSP deletion strains (Δ*Ec*IbpA, Δ*Ec*IbpB, Δ*Ec*DnaK and Δ*Ec*ClpB) and overexpression of *Al*IbpA with deletions of putative functional terminal motifs (*Al*IbpAΔN12, *Al*IbpAΔC14, *Al*IbpAΔN12C14). Biofilm staining with crystal violet showed that the deletion of any HSP leads *E. coli* cells to form dense biofilms. To assess the formation of amyloids, *E. coli* strains were grown on a medium with Thioflavin S and Congo red dyes. Removal of one of the physiological HSPs in *E. coli* leads to enhanced formation of amyloid structures, which was also confirmed by cross-sectional microscopy of the colonies. An increased level of amyloids was observed during overexpression of *Al*IbpAΔN12 in Δ*Ec*IbpA and *Al*IbpAΔC14 in Δ*Ec*IbpB cells, respectively. Amyloids were also detected during overexpression of *Al*IbpAΔN12C14 in any HSP mutant strain.

Thus, we hypothesize that HSPs control amyloidogenic processes; overexpression of *Al*IbpA can compensate for the lack of *Ec*IbpA, significantly reducing the amounts of amyloids in the matrix, and for this requires its full N-terminus.

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Curcumin-capped Poly-L-Lysine modified gold nanoparticles for delivery of mRNA to cervical cancer cells

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Cervical cancer is a leading cause of female death in developing communities, with a mortality rate of 265 653 annually. The non-communicable disease shows immense complexity at the epigenetic, genetic and cellular levels, limiting conventional treatment. Immunotherapeutic nanoparticle-based platforms enable researchers to co-deliver immunomodulatory agents, target tumours, and improve pharmacokinetics while minimising collateral toxicity to healthy cells. In this preliminary study, gold nanoparticles (AuNPs) were biologically synthesised and capped with curcumin, an aqueous extract of *C. longa*, that possesses an array of additional anti-carcinogenic properties. The green synthesis of nanoparticles has been shown to reduce cytotoxicity and enhance economic and environmental benefits. The nanoparticles were further functionalised using the cationic polymer, poly-L-lysine (PLL) and stabilised with polyethylene glycol (PEG). Nanocomplexes were characterised using UV-vis, and Fourier transform infra-red (FTIR) spectroscopy, transmission electron microscopy (TEM), and nanoparticle tracking analysis (NTA). F*luc*-mRNA binding, compaction and nuclease protection was assessed using the band shift, dye displacement and nuclease digestion assays, respectively. The degree of cytotoxicity of the nanocomplexes in the human embryonic kidney (HEK293) and cervical carcinoma (HeLa) cells was evaluated using the MTT assay, and transgene expression monitored using the luciferase reporter gene assay. Results highlighted the favourable properties of the PLL-PEG-AuNP nano-system, such as small size, colloidal stability, efficient binding and protection against nucleases, low cytotoxicity, and significant transgene expression. This proof of principle study has shown potential for safe and efficient delivery of mRNA, necessitating further studies using a therapeutic mRNA molecule for the immunotherapeutic intervention in cervical cancer.

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Influence of monthmorillonite adsorbents on the efficacy of removing of pharmaceuticals from water

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Hydrophobic montmorillonite modified with trimethyl stearyl ammonium and untreated montmorillonite were used to adsorb carbamazepine, ibuprofen and paracetamol. The efficiency of adsorption was investigated under static conditions depending on the pH of the solution, temperature, contact time, the initial concentration of pharmaceuticals and the mass ratio of adsorbents. In the course of the experiments, the optimal conditions for the use of adsorbents were selected. Of the adsorbents tested, untreated montmorillonite is less effective than hydrophobic montmorillonite, which has a higher adsorption capacity to pharmaceuticals in the following order: carbamazepine → ibuprofen → paracetamol. In the course of the experiments, the optimal conditions for the use of adsorbents were selected. Within the concentration range of 10-50 μg/ml, the most optimal