Nanoparticle-Enhanced Amoxicillin Conjugated With BabA Inhibitor

Ghosh, Ashmita (School: John B. Alexander High School)

Helicobacter pylori is a bacterial strain that attaches to gastric mucosal cells through its BabA adhesin, which begins growth of colonies that increase risk of peptic ulcers and gastric or colorectal cancer. Commonly used as treatment for H. pylori, amoxicillin is an antibiotic that destroys bacterial cell walls of harmful bacteria along with beneficial bacteria, hampering digestion and decreasing antibiotic efficiency. The project formulates and tests the efficacy of PLGA nanoparticle-enhanced amoxicillin conjugated with N-acetylcysteine ligands to target H. pylori colonies, preserve probiotic strains, and reduce risk of antibiotic resistance by smaller doses and shorter treatment periods. To formulate, regular amoxicillin is encapsulated within PLGA nanoparticles through double-emulsion-solvent-evaporation. Then, N-acetylcysteine is conjugated onto the nanoparticles' surface through the addition of stearic acid. Testing of enhanced amoxicillin uses Kirby-Bauer tests by inoculating MRS petri dishes with lactobacillus rhamnosus and placing filter paper discs impregnated with regular amoxicillin, nanoparticle-enhanced amoxicillin, and phosphate-buffered saline onto the dish. To measure data, a caliper measures zones of inhibition (in mm) for each disc. Drug release profiles measure concentrations of regular amoxicillin and nanoparticle-enhanced amoxicillin (in µg/mL) at 0.5 - 24 hour increments. I hypothesized that enhanced amoxicillin's zones of inhibition and concentrations would be at least 25% less than regular amoxicillin. Enhanced amoxicillin's zones of inhibition are 0 mm, a 100% decrease from regular amoxicillin. If released amounts are greater than those of regular amoxicillin during later increments, nanoparticle-enhanced amoxicillin is deemed effective.

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