Molecular Imprinting of Silica Microspheres on Human Chorionic Gonadotropin

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The technique of molecule imprinting prepares polymers with specific binding sites for a target molecule. Monomers are polymerized with a template present, arranging into a polymer matrix that can rebind the template once removed and creates the potential use of the polymers as artificial antibodies. The same process can be used to synthesize silica microspheres. The aim of this study was to test the ability of silica microspheres to bind human chorionic gonadotropin and be used as antibodies. 26.4 ml of tetraethoxysilane, 4.7 ml of water, 6.6 ml of 0.12 M hydrochloric acid, and 11.5 ml of 70% ethanol were mixed with 6.6 ml of γ-aminopropyltriethoxysilane, 10 ml of 0.1 M sodium dodecyl sulfate, 10 ml of ink, and 1.064 mg of human chorionic gonadotropin with an addition of 150 ml of water. The microspheres formed were rinsed, dried, and separated by centrifugation, then washed in acetic acid/methanol until absorbance at 284 nm was 0.004 and suspended in 100 microliters of human chorionic gonadotropin. When passed over a pregnancy test nitrocellulose strip a possible microsphere line was formed but the results were inconclusive due to microspheres binding at the edge following the coffee ring effect. This was exacerbated due to the microsphere and pore ratio not being optimal. The nitrocellulose test will be characterized and nonspecific binding prevention will be done by immersing the entire nitrocellulose strip in the microspheres followed by rinsing. A new nitrocellulose assay with optimal pores will be created to retest microspheres.