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# Soybean agglutinin-conjugated silver nanoparticles nanocarriers in the treatment of breast cancer cells

Rocio Guadalupe Casañas Pimentel, Viviana Robles Botero, Eduardo San Martín Martínez , Consuelo Gómez García & Juan Paulo Hinestroza

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## Abstract

Silver nanoparticles (AgNPs) induce diverse cell-death mechanisms, similar to those promoted by anticancer chemotherapeutics; however, they have not been tested *in vivo* because their action is not limited to cancer cells. Therefore, *in vivo* evaluations of their effectiveness should be developed with targeting systems. Breast cancer shows changes in the sugar expression patterns on cell surfaces, related to cancer progression and metastases; those changes have been identified previously by the specific binding of soybean agglutinin (SBA). Here is proposed the use of SBA to target the AgNP activity in breast cancer. For that, the present work reports the synthesis of AgNPs ( $3.89 \pm 0.90$  nm) through the polyol method, the generation of AgNP nanocarriers, and the bioconjugation protocol of the nanocarrier with SBA. The free AgNPs, the AgNP nanocarriers, and the SBA-bioconjugated AgNP nanocarriers were tested for cytotoxicity in breast cancerous (MDA-MB-231 and MCF7) and non cancerous (MCF 10A) cells, using the MTT assay. AgNPs demonstrated cytotoxic activity *in vitro*, the non cancerous cells (MCF 10A) being more sensible than the cancerous cells (MDA-MB-231 and MCF7) showing LD<sub>50</sub> values of 128, 205, and 319  $\mu$ M Ag, respectively; the nanoencapsulation decreased the cytotoxic effect of AgNPs in non cancerous cells, maintaining or increasing the effect on the cancer-derived cells, whereas the SBA-bioconjugation allowed AgNP cytotoxic activity with a similar behavior to the nanocarriers. Future experiments need to be developed to evaluate the targeting effect of the SBA-bioconjugated AgNP nanocarriers to study their functionality *in vivo*.

Keywords: Breast cancer, silver nanoparticles, nanocarriers, soybean agglutinin, bioconjugation



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