ملخص مشروع رسالة ماجستير-١

عنوان المشروع باللغة العربية	التعبير الجيني ماقبل الإلتهابات لمركبات السيتوكينات في مختلف أجهزة الجرذان المعالجة بمركب جليكول عديد الإثلين المجردة والمغلفة بجزيئات الذهب النانوية
عنوان المشروع باللغة الإنجليزية/ English	Proinflammatory cytokines gene expression in different organs of rats treated with naked and polyethylene glycol coated gold nanoparticles
المشرف الرئيس/ Advisor	Professor Haseeb A. Khan
التخصص الدقيق للمشرف الرئيس/ Minor Specification	Molecular Biology and Medical Biochemistry
المشرف المساعد/ Co-Advisor	Professor Abdullah S. Alhomida
المدة المتوقعة لإنجاز البحث منذ الحصول على موافقة عمادة الدراسات العليا	10-12 months
Abstract or synopsis of the proposal (200 words or less):	In the emerging field of nanomedicine, gold nanoparticles (GNPs) possess promising therapeutic possibilities due to their unique properties such as biocompatibility, high surface reactivity and resistance to oxidation. The promise of GNPs for so many different biological applications has led to a strong interest in studying their potential to cause deleterious effects in biological systems and how these effects might be mitigated. Most of the previous studies used in-vitro systems to test inflammatory responses of nanoparticles that may not actually reflect the real biological response of body organs. In fact, certain NPs have shown opposite effects under in-vitro and in-vivo conditions. Current understanding of the biocompatibility of GNPs is controversial. The biological response to GNPs can be altered using capping agents such as polyethylene glycol (PEG). The functionalization of GNPs with PEG has been shown to increase their stability, both in vivo and in vitro. Recently we have shown unique patterns of proinflammatory cytokines such as IL-1β, IL-6 and TNF-α in different organs rats exposed to naked GNPs. However, the trend of these cytokines in response to PEG-coated GNPs is not known and is the aim of this study.
Hypothesis or scientific justification of the proposal	Nanoparticles (NPs) are attractive drug delivery vehicles for targeted organ-specific as well as systemic therapy. However, their interaction with

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	the immune system offers an intriguing challenge. NPs, depending on their physicochemical characteristics and compositions, interact with the immune system resulting in either enhancement or suppression of immune function. Although GNPs are chemically inert their immunological response in the body has been a subject of interest. GNPs are often used as pre-coated with PEG. Once in the body, coated NPs tend to be become naked in a time-dependent manner. It is therefore important to investigate the immunoreactivity of both naked and coated GNPs for clear understanding of their biocompatibility with particular interest in their biomedical applications. Cytokines are important mediators and regulators of the immune response and are generally recognized as biomarkers of immunotoxicity. Measuring the cytokines gene expression and immunoreactivity in different organs of rats exposed to GNPs will provide new insights in the biosafety of GNPs.
Specific objectives	(1) To determine the proinflammatory cytokines gene expression in different organs of rats exposed to naked and functionalized gold nanoparticles. (2) To evaluate organ-specific changes at protein level expression using immunohistochemistry.
Methodology and Major Techniques to be used	Adult male rats will be randomly divided into treatment groups. One group will serve as control and receive vehicle only. The treatment groups will receive different sizes and doses of naked and PGE-coated GNPs for 1 and 5 days, respectively. The rats will be sacrificed 24 h after the last injection of GNPs. The specimens of different organs will be isolated and immediately immersed in RNA Later solution (Qiagen) and stored at 4°C until RNA extraction. Total RNA will be isolated from different organs using RNAEasy kit (Qiagen, Germany). Expressions of mRNAs for the proinflammatory cytokines, IL-1β, IL-6 and TNF-α will be quantified by real-time RT-PCR. GAPDH will be used as a housekeeping gene for normalizing the expression data. Immunohistochemistry will be

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	used to determine organ-specific changes at the protein level. The data were analyzed by one-way analysis of variance (ANOVA) followed by Dunnett's multiple comparison test using SPSS statistical package. P values less than 0.05 were considered as statistically significant.
Availability of Samples	YES ○ NO ◉
Availability of Chemicals	YES ◉ NO ○
Availability of Instruments	YES ◉ NO ○
Availability of Ethical Approval (if needed)	YES ○ NO ◉ Required, Yes, after Bioethical Committee approval of the use of animal, we will make rats diabetic and then will obtain retinal samples
Project Funded	YES ◉ NO
Recent References	1. Khan HA, Abdelhalim MA, Alhomida AS, Al Ayed MS. Effects of gold nanoparticles on proinflammatory cytokines mRNA expression in rat liver and kidney. Biomed Res Int 2013; 2013: 590730. 2. Khan HA, Abdelhalim MA, Alhomida AS, Al Ayed MS. Transient increase in IL-1β, IL-6 and TNF-α genes expression in liver of rats exposed to gold nanoparticles. Genet Mol Res 2013; 12 (4): 5851-5857. 3. Khan HA, Abdelhalim MA, Al Ayed MS, Alhomida AS. Effect of gold nanoparticles on glutathione and malondialdehyde levels in liver, lung and heart of rats. Saudi J Biol Sci 2012; 19: 461-464.