

# Distribution of gold nanoparticles and clusters on bovine sperm after in vitro co-incubation

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## Abstract

Metal nanoparticles are able to enter different cell types including the female gamete very easily by different pathways and diffusion [1]. Therefore, the use especially of gold nanoparticles as marker or therapeutic tool is very promising. However, the accessibility of sperm to metal nanoparticle uptake is restricted and depends on the integrity of plasma- and acrosome membranes [2]. The study presented here demonstrates nanoparticle distribution on bovine sperm by confocal imaging of Alexa 488 and LNA conjugated gold nanoparticles (AuNP) sized 5nm and Alexa 488 and LNA conjugated 2nm gold clusters. Additionally, these samples were analyzed by flow cytometry to quantify sperm populations depending on their membrane integrity. The nanoparticles accumulated exclusively on sperm with compromised plasma membranes as diagnosed by propidium iodide counter staining and thus confirmed previous transmission electron microscopy data [2]. The midpiece and the equatorial zone were regions, where nanoparticles accumulated firstly and size independently. Nanoparticles were diagnosed in around 10% of sperm by flow cytometry. There was no significant difference in the nanoparticle uptake in sperm of 2nm clusters vs. AuNP of 5nm.

1 [Tiedemann D](#), Taylor U, Rehbock C, Jakobi J, [Klein S](#), [Kues W](#), [Barcikowski S](#), [Rath D](#); 2014 Reprotoxicity of gold, silver, and gold-silver alloy nanoparticles on mammalian gametes. *The Analyst* 139: 931-942.

2 [Barchanski A.](#); [Taylor U.](#); [Sajti C. L.](#); [Gamrad L.](#); [Kues W. A.](#); [Rath D.](#); [Barcikowski S.](#); 2015 Bioconjugated Gold Nanoparticles Penetrate Into Spermatozoa Depending on Plasma Membrane Status. *Journal of Biomedical Nanotechnology* 11:1-11.