# Effect of copper nanoparticles and copper nanoparticles nanoemulsion on the healing of burn wounds

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## Introduction:

The discovery and production of antibiotics was a major step forward in pathogen elimination, and one of the greatest achievements in medicine. However, excessive and inappropriate use of antibiotics leads to an emerging need to search for new effective broad-spectrum antibacterial agents [1]. Copper nanoparticles have shown great potential as antimicrobial agents with low levels of toxicity [2]. Besides the improved wound healing effect of nanoparticles can be potentially achieved by incorporating a particle into nanoemulsion formulation [3].

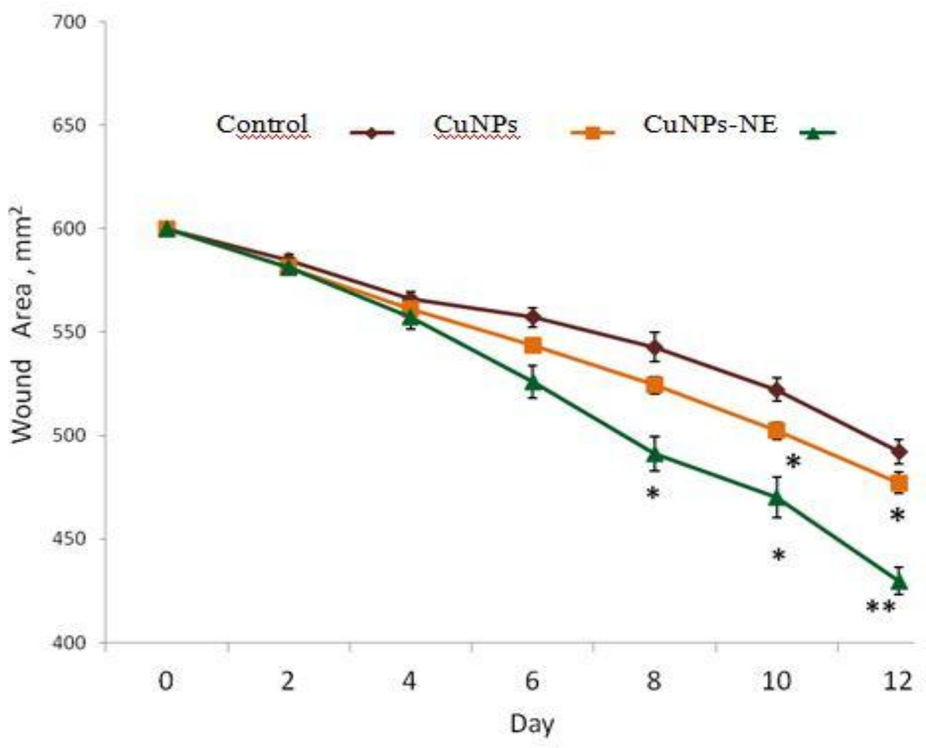
## Aim:

To compare the wound healing properties of copper nanoparticles (CuNPs) and copper nanoparticles nanoemulsion(CuNPs-NE) on experimental model of second-degree thermal burns in male Wistar rats.

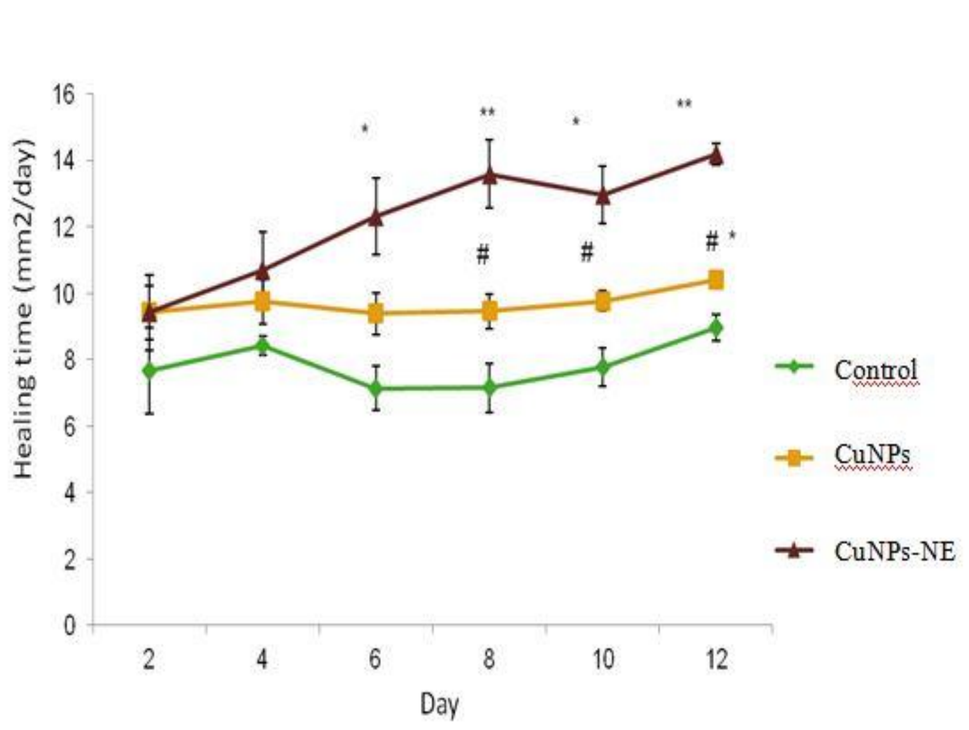
## Methods:

The experimental groups treated with CuNPs colloid solution and copper nanoparticles nanoemulsion were compared with the untreated negative control group for the 12-day duration of the experiment. The planimetry studies (average size of the wound, the rate of wound healing and reduction of wound diameter) and histological analysis were evaluated.

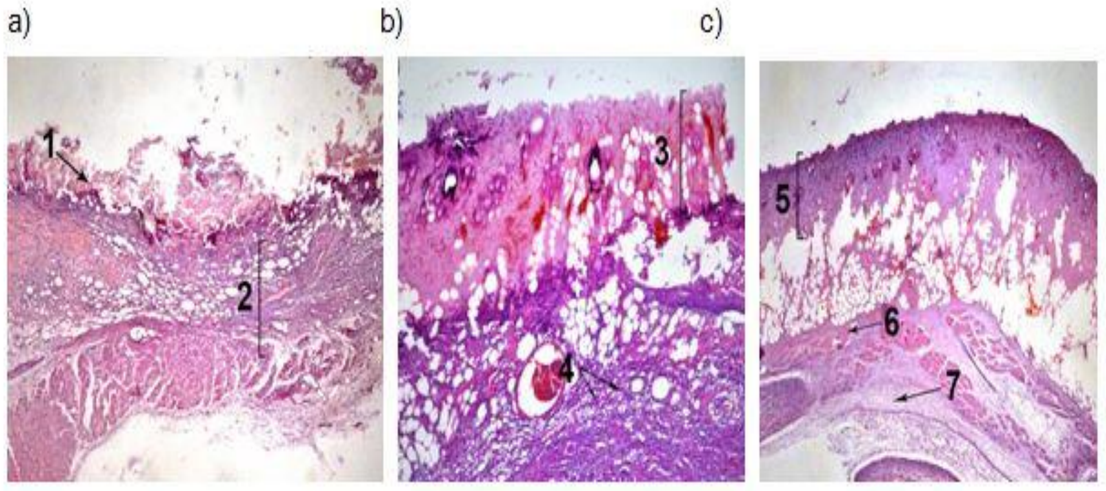
**Effect of CuNPs formulations treatments on wound area in rats**




**Rate of wound healing**




**Histological examination of wounds in rats 12 days post-treatment**




a) control group, untreated burns; b) Group I, burns treated with CuNPs; c) Group II, burns treated with CuNPs_NE. Hematoxylin and eosin stain, 400× magnification. The tissue structural elements are numbered in the following order: 1 – epidermis (arrow indicator); 2- inflammatory infiltration in the scar; 3- scab; 4 - inflammatory zone with leukocyte infiltration (arrows); 5 - descvametion scab; 6 - epithelization (arrow); 7 - deposit of immature collagen fibers (arrow)

## Conclusion:

The encapsulating of nanoparticles in nanoemulsion can improve the therapeutic potential promote wound healing

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2. *Champagne V.K., Helfritch D.J.* A demonstration of the antimicrobial effectiveness of various copper surfaces // J Biol Eng. – 2013. -7. – P 8.
3. *Hajialyani M., Tewari D., Sobarzo-Sanchez., Nabavi SM, et al.* Natural product-based nanomedicines for wound healing purposes: therapeutic targets and drug delivery systems // Int J Nanomedicine. – 2018. -13. –P. 5023–5043.