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Review on Nanoparticle Toxicity and their Methods of Assessment in Humans

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Abstract: *Nanoparticles, also known as zero-dimensional particles, are tiny, solid, colloidal forms of matter with diameters ranging from 1nm to 102 nm. Engineering nanoparticles (NPs) at the atomic scale (100 nm in diameter) has produced a number of unique and practical uses in a variety of fields, including electronics, chemistry, environmental protection, medical imaging, illness diagnosis, drug delivery, and cancer. This review aims to analyse potential toxicological portal routes connected to NPs exposures in order to better understand the effects of these exposures on health and how to create appropriate monitoring and control techniques. In actuality, the skin pores, weakened tissues, injection, olfactory, respiratory, and digestive tracts are all entry points for these ultrafine particles into the body. One of the mechanisms of NPs' toxicity is ROS production, which can result in oxidative stress, inflammation, and subsequent damage to proteins, cell membranes, and DNA. This review includes information on several types of nanoparticle toxicity, including neurotoxicity, genotoxicity, ocular toxicity, and dermal toxicity. This study aims to outline techniques for evaluating the toxicity of nanoparticles, including in-vitro techniques such size and surface charge evaluation, cellular interaction test, proliferation assay, apoptosis assay, necrosis assay, and DNA Assay, Endotoxin, Oxidative Stress, and Damage Assay and in vivo techniques including Hematology, serum chemistry, histopathology, and biodistribution and clearance. The review also discusses measures that can be implemented to reduce the toxicity of nanoparticles.*

Keywords: Nanoparticle (NPs), Exposures, Toxicity, Assessment, Preventions

VIII. REFERENCES

[1]. Cristina Buzea, Ivan Pacheco, "Toxicity of Nanoparticles", 2019, 705-709
[2]. Daniel Mihai Teleanu, Cristina Chircov, Alexandru Mihai Grumezescu and Raluca Ioana Teleanu,
[3]. "Neurotoxicity of Nanomaterials: An up-to-date Overview", Jan 2019, 01-04
[4]. Saurabh Bhatia, "Nanoparticle Types, Classification, Characterization, Fabrication Methods and Drug Delivery Applications", 2016, 01-04
[5]. Busi Siddhardha, Madhu Dyavaiah, Kaviyarasu kasinathan, Koigoora Srikanth "Routes of Exposures and Toxicity of Nanoparticles", Springer Nature Singapore Pte Ltd. 2020, 268
[6]. Pak J Pharm Sci, Clarence Suh Yah, Geoffrey Simate Simate, Sunny Esayegbemu lyuke, "Nanoparticles And Their Routes Of Exposure", 2012, 477-91
[7]. Saurabh Sonwani , Simran Madaan, Jagjot Arora , Shalini Suryanarayan , Deepali Rangra , Nancy Mongia , Tanvi Vats , Pallavi Saxena, "Exposure to Atmospheric Nanoparticles and it's associated impacts on human health:A review",2021 ,05-08
[8]. Yi chao, Juan Li,Fang Liu, Xiyue li , Qin Jiang , Shanshan Cheng , Yuxiu Gu , "Consideration of interaction between nano particles and food components for the safety assessment of nano particles following oral exposure: a review",2016, 206- 210
[9]. Ingrid L Bergin, Frank A Witzmann, "Nanoparticle toxicity by the gastrointestinal route: evidence and knowledge gaps",2013 ,167-173
[10]. Royal Society of Chemistry, Xia Chen, Shuang Zhu, Xisu Hu, Daya Sun, Junling Yang, Cao Yang, Wei Wu, Yijian Li, Xianliang Gu, Minghui Li, Bo Liu, Lingling Ge, Zhanjun Gu, Haiwei Xu, "Toxicity and mechanism of mesoporous silica Nanoparticles in eyes", 2020, 13637-13653

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[11]. Marziyeh Ajdary, Mohammad Amin Moosavi, Marveh Rahmati, Mojtaba Falahati, Mohammad Mahboubi, Ali Mandegary, Saranaz Jangjoo, Reza Mohammadinejad and Rajender S. Varma, 2018, "Health Concerns of Various Nanoparticles: A Review of Their in Vitro and in Vivo Toxicity", 04-11

[12]. Guido Crisponi, Valeria M. Nurchi, Joanna I. Lachowicz, Massimiliano Peana, Serenella Medici, Maria Antomietta Z., "Toxicity of Nanoparticles: Etiology and Mechanisms", 2017, 524-534

[13]. Abderrahim Nemmar, Jorn A. Holme, Irma Rosas, Per E. Schwarze, and Ernesto Alfaro-Moreno,2013, "Recent Advances in Particulate Matter and Nanoparticle Toxicology: A Review of the In Vivo and In Vitro Studies",04-10

[14]. Javad Khalili Fard, Samira Jafari, Mohammad Ali Eghbal, "A Review of Molecular Mechanisms Involved in Toxicity of Nanoparticles", 2015, 448

[15]. Jane Cypriyana P J, Saigeetha S Lavanya Agnes Angalene Antony V. Samrot c, Suresh Kumar S Paulraj Ponniah Srikumar Chakravarthi, "Overview on toxicity of nanoparticles, it's mechanism, models used in toxicity studies and disposal methods – A review", 2021, 03-04

[16]. Hong Xie, Michael M. Mason and John Pierce Wise Sr, "Genotoxicity of metal nanoparticles", 2011, 251-258

[17]. Jane Cypriyana P., Saigeetha S., Lavanya Agnes Angalene J., Antony V. Samrot, Suresh Kumar S, Paulraj Ponniah, Srikumar Chakravarthi, "Overview on toxicity of nanoparticles, it's mechanism, models used in toxicity studies and disposal methods", 2021, 01-03

[18]. Hong Xie, Michael M. Mason and John Pierce Wise Sr, "Genotoxicity of metal nanoparticles", 2011, 251-258

[19]. Jaison Jeevanandam, Ahmed Barhoum, Yen S. Chan, Alain Dufresne and Michael K. Danquah, "Review on nanoparticles and nanostructured materials: history, sources, toxicity and regulations", 2018, 1062- 1067

[20]. Jasmine Jia'en Li, Sindu Muralikrishnan, Cheng-Teng Ng, Lin-Yue Lanry Yung and Boon Huat Bay,

[21]. "Nanoparticle-induced pulmonary toxicity", 2010, 1029-1032

[22]. Sara Hashempour, Saeed Ghanbarzadeh, Howard I Maibach, Marjan Ghorbani & Hamed Hamishehkar,

[23]. "Skin toxicity of topically applied nanoparticles", 2019, 386-389

[24]. Bryce J. Marquis, Sara A. Love, Katherine L. Braun and Christy L. Haynes, "Analytical methods to assess nanoparticle toxicity", 2009, 430-432

[25]. Seung Won Shin, In Hyun Song and Soong Ho Um, "Role of Physicochemical Properties in Nanoparticle Toxicity", 2015, 1354-1359

[26]. Sovan Lal Pal, Utpal Jana, P. K. Manna, G. P. Mohanta, R. Manavalan, "Nanoparticle: An overview of preparation and characterization", 2011, 01-03

[27]. Vinay Kumar, Neha Sharma, S. S. Maitra1, "In vitro and in vivo toxicity assessment of nanoparticles", 2017, 244-245

[28]. Dustin T. Savage, J. Zach Hilt, Thomas D. Dziubla, "In Vitro Methods for Assessing Nanoparticle Toxicity", 2019, 06-14

[29]. Yue-Wern Huang, Melissa Cambre and Han-Jung Lee, "The Toxicity of Nanoparticles Depends on Multiple Molecular and Physicochemical Mechanisms", 2017, 02-03

[30]. Poonam Takhar and Sheefali Mahant, "In vitro methods for Nanotoxicity Assessment: Advantages and Applications",2011, 393-395

[31]. Sara A. Love, Melissa A. Maurer-Jones, John W. Thompson,Yu-Shen Lin, and Christy L. Haynes,

[32]. "Assessing Nanoparticle Toxicity", 2012, 05-08

[33]. Alexandra Kroll, Mike H. Pillukat, Daniela Hahn, Jürgen Schnekenburger, "Current in vitro methods in nanoparticle risk assessment: Limitations and challenges", 2008, 371-372

[34]. Nikolai Khlebtsovab and Lev Dykmana, "Biodistribution and toxicity of engineered gold nanoparticles: a review of in vitro and in vivo studies", 2010, 1650-1651

[35]. Busi Siddhardha, Madhu Dyavaiah, Kaviyarasu Kasinathan, "Model Organisms to Study Biological Activities and Toxicity of Nanoparticles", 2020, 132