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RESEARCH AREA

Metal nanoparticles have a great potential in cancer treatment due to a broad spectrum of anti-cancer activities. Nano-sized materials are able to accumulate in the tumor tissue owing to the fenestrated endothel of the tumor blood vessels. Moreover, the large specific surface of nanoparticles can be functionalized with tumor-specific ligands to achieve active tumor targeting. Among metal nanomaterials, silver and gold nanoparticles are the most promising entities for oncotherapeutic applications. Silver nanoparticles induce apoptosis in tumor cells by triggering the production of reactive oxygen species, whereas gold nanoparticles potentiate the efficacy of ionizing radiation, thus possess radiosensitizing activity on tumor cells. Metal nanoparticles are also excellent combinational partners of chemotherapeutic agents and of different treatment modalities. Besides the tumor-targeting activity of nanoparticles, nano-sized materials can be used to modulate the cancer promoting activity of other cell types such as cancer-associated fibroblasts and tumor-associated macrophages in the tumor microenvironment, thus we examine how metal nanoparticles affect the paracrine cross-talk between cells in the tumor tissue in order to attenuate tumor progression, invasion and dissemination.

TECHNIQUES AVAILABLE IN THE LAB

Maintaining *in vitro* human cell cultures, detection of cell proliferation, *in vitro* toxicity measurements, detection of cell migration by scratch assay, invasion assays, gelatin zymography, Western blot analysis, conventional PCR, Real-time PCR, immunocytochemistry, fluorescence microscopy, isolation of primary cells, toxicity measurements on 3D cell cultures, clonogenic assay to detect the colonyforming capabilities of tumor cells.

SELECTED PUBLICATIONS

Igaz, N, Szőke, K., Kovács, D., Buhala, A., Varga, Z, Bélteky, P., Rázga, Zs., Tiszlavicz, L, Vizler, Cs., Hideghéty, K,, Kónya, Z, Kiricsi, M. (2020) Synergistic radiosensitization by gold nanoparticles and the histone deacetylase inhibitor SAHA in 2D and 3D cancer cell cultures. **Nanomaterials 10:** 158.

Kovács, D., **Igaz, N.**, Marton, A., Rónavári, A., Bélteky, P., Bodai, L., Spengler G., Tiszlavicz, L., Rázga Zs., Hegyi P., Vizler, Cs., Boros, I., Kónya, Z, Kiricsi M. (2020) Core-shell nanoparticles suppress metastasis and modify the tumoursupportive activity of cancer-associated fibroblasts **J Nanobiotechnology 18:** 18.

Szerencsés, B., **Igaz, N.**, Tóbiás, Á., Prucsi, Zs., Rónavári, A., Bélteky, P., Madarász, D., Papp, Cs., Makra, I., Vágvölgyi, Cs., Kónya Z, Pfeiffer, I., Kiricsi, M. (2020) Size-dependent activity of silver nanoparticles on the morphological switch and biofilm formation of opportunistic pathogenic yeasts. **BMC Microbiol 20:** 176.

Gopisetty, M. K., Kovács, D., **Igaz, N.**, Rónavári, A., Bélteky, P., Rázga, Zs., Venglovecz, V., Csoboz, B., Boros, I., Kónya, Z., Kiricsi, M. (2019) Endoplasmic reticulum stress: major player in size-dependent inhibition of P-glycoprotein by silver nanoparticles in multidrug-resistant breast cancer cells. **J Nanobiotechnology 17:** 9.

Rónavári, A., Kovács, D., **Igaz, N.**, Vágvölgyi, Cs., Boros, I., Kónya, Z., Pfeiffer, I., Kiricsi, M., (2017) Biological activity of green-synthesized silver nanoparticles depends on the applied natural extracts: a comprehensive study. **Int J Nanomedicine 12:** 871-883.