

# Indian medicine incinerated silver particles and their application in cancer therapy

Subramaniyan Parimalam S<sup>1</sup>, Badilescu S<sup>1</sup>, Bhat R<sup>1</sup>, Piekny A<sup>2</sup>, Packirisamy M<sup>1</sup>

<sup>1</sup>Department of Mechanical and Industrial Engineering, Concordia University  
Montreal, Quebec, Canada

ssubhathirai@gmail.com; simonabadilescu0@gmail.com; rama.bhat@concordia.ca;  
mpackir@encs.concordia.ca

<sup>2</sup>Department of Biology, Concordia University  
Montreal, Quebec, Canada  
alisa.piekny@concordia.ca

## Extended Abstract

There is a growing demand for non-toxic metallic nanoparticles for biomedical imaging, targeted drug delivery and other therapeutic applications. Metallic nanoparticle based cancer therapy could be superior to conventional chemotherapy, where targeted drug delivery is required. Incinerated ash (parpam) of Gold (Au) (Swarna parpam), Silver (Ag) (Velli parpam), Copper (Cu) (Sembu parpam, and Iron (Fe) (Aya parpam), have been used for the past many 100 years, by Siddha, Ayurveda and Unani, the three traditional medical systems in India. They are used to treat various chronic diseases, including cancer. The respective metals are treated with herbal extracts and incinerated into nano/micro particles, suitable for oral administration. Following this, our group reported the effect of incinerated Au particles on normal and cancerous cells, their behavior inside these cells - nuclear accumulation, cell entry pathways and toxicity<sup>1</sup>.

Our work is the initial step towards using metallic particles used in the Indian medical system for targeted cancer therapy. We reported that the Indian Au nano particles were found non-toxic and localized in the different parts of the HeLa cells through our examinations using hyperspectral microscopy, SEM and Raman spectroscopy. As a next step, we plan to examine Ag nanoparticles interaction with cancer cells. The specificity in their effects on respective cancer cells, cervical cancer (HeLa), Colon cancer (HCT 116) and lung cancer (A549), needs to be elucidated. This will aid in understanding the behavior of different nano-metals inside the cancer cells.

**Objective:** Investigate incinerated metal nano/micro particles (Ag, Fe and C) used in Indian medicine to treat cancer.

**Novelty:** The intracellular behavior of Ag nanoparticles, used in the Indian medicine and their effect on different cancer cells are studied for the first time.

**Method:** The cellular intake of the nanoparticles are studied through cellular entry assays and hyperspectral imaging. The protein profiles will be determined through immunochemistry studies, respectively. The physiochemical properties of the nanoparticles will be characterized using, SEM, EDS and DLS.

**Results:** Hyperspectral imaging was used to analyses these metal ashes (parpams) for the first time. The size of the metal ashes range from a few nm to <1000 nm. The preliminary results shows that the particles did not have significant effect on the cell proliferation of HeLa, HCT 116 and A549. The Indian Ag particles were found to enter into the A549 cells.

**Scope:** This study will lead to the use of specific metal nanoparticles for particular cancer conditions. Further, this work will open the door to novel metallic particles for multidirectional biomedical applications.

**Conclusion:** Nanomedicine is considered as the last option when treating cancer and other chronic diseases by the Indian medical system. But the pharmacokinetics of these drugs are not been elucidated. Our work will aid in understanding the effect of these drugs at the cellular level, resulting in the safe use of them at the early stages of cancer.

## References

- [1] D. Beaudet, S. Badilescu, K. Kuruvinashetti, A. Sohrabi Kashani, D. Jaunky, S. Ouellette, A. Piekny and M. Packirisamy, "Comparative study on cellular entry of incinerated ancient gold particles (Swarna Bhasma) and chemically synthesized gold particles," *Sci. Rep.*, vol. 7, no. 1, 2017.