

## **PRESS RELEASE**

# **IIT Hyderabad Researchers Develop Combination Therapy for Cancer**

**Combination therapy combines more than one therapeutic procedure & is being increasingly considered for treating cancer as it can deal with the heterogeneity of cancer cells in addition to providing synergic therapeutic effects**

**HYDERABAD, XX January 2020:** IIT Hyderabad Researchers have developed an efficient combination therapy for the treatment of cancer. This research has been undertaken in collaboration with researchers from University of Hyderabad, IIT Bombay and Bose Institute, Kolkata,

The researchers have developed a synergetic combination of photothermal therapy (PTT) and chemotherapy using a naturally derived anticancer agent and shown its efficacy in destroying cancer cells.

Combination therapy, which combines more than one therapeutic procedure, is being increasingly considered for treatment of cancer because it can deal with the heterogeneity of cancer cells in addition to providing synergic therapeutic effects. This research was led at IIT Hyderabad by Dr. Aravind Kumar Rengan, Assistant Professor, Department of Bio-Medical Engineering, IIT Hyderabad.

This groundbreaking work has recently been reported in the reputed peer-reviewed journal *Nanoscale*. The paper was co-authored by Ms. Tejaswini Appidi, Mr. Deepak Bharadwaj Pemmaraju, Mr. Rafiq Ahmad Khan, Mr. Syed Baseeruddin Alvi, Mr. Rohit Srivastava, Mr. Mahadeb Pal, Mr. Nooruddin Khan and Dr. Aravind Kumar Rengan.

**Explaining this research, Dr. Aravind Kumar Rengan, Assistant Professor, Department of Bio-Medical Engineering, IIT Hyderabad, said,** "In photothermal therapy, a material that converts light to heat is specifically sent to the tumor location, and when irradiated, causes ablation or destruction of the host cancer cells. IR780 is one such dye that absorbs near-infrared light and generates reactive oxygen species that kills the host cell. This dye is loaded onto a suitable carrier material and targeted at the cancer tissues."

The development of effective therapies that are specific to the cancer tissues and nontoxic to healthy tissues, remains the ultimate challenge in the war against cancer. Current gold-standard cancer treatment approaches such as surgery, chemotherapy and radiotherapy, continue to have limitations of adverse side effects to the healthy tissues/organs surrounding the tumor. The combined photothermal and CfAC therapy



holds significant promise for enhanced therapeutic benefits with minimal/no side effects when translated into human application.

The research team used liposomes – lipid nanoparticles a hundred thousand times smaller than the width of a single human hair – as the carriers for IR780 because of their low toxicity, flexibility, biocompatibility, biodegradability and non-immunogenicity.

The team loaded liposomes not only with IR780 but also with an anticancer agent called CfAC that is extracted from the plant Anthocephalous Cadamba.

These liposomes were tested against human breast cancer cells that were introduced into mice groups.

“We have demonstrated the synergistic and enhanced therapeutic benefits of combinational therapy against breast cancer with minimal/no adverse effects using biocompatible and biodegradable nanomaterials,” **added Dr. Rengan**

The team has also elucidated the mechanism of action of CfAC that causes cell death. They showed through in vitro studies that CfAC produces considerable amounts of reactive oxygen species, which can bring about cell death. Interestingly, CfAC did not produce reactive oxygen species inside healthy cells and can therefore be free of side-effects.

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**PHOTOGRAPH 1 CAPTION** - Dr. Aravind Kumar Rengan (L-Standing), Assistant Professor, Dept. of Biomedical Engineering, IIT Hyderabad, Mr. Deepak Bharadwaj Pemmaraju ((R)), Ph.D. Scholar, Dept. of Biomedical Engineering, IIT Hyderabad & Ms. Tejaswini Appidi, Ph.D. Scholar, Dept. of Biomedical Engineering, IIT Hyderabad.

**PHOTOGRAPH 2 CAPTION:** (L\_R)Dr. Aravind Kumar Rengan, Assistant Professor, Dept. of Biomedical Engineering, IIT Hyderabad, Mr. Deepak Bharadwaj Pemmaraju, Ph.D. Scholar, Dept. of Biomedical Engineering, IIT Hyderabad, & Ms. Tejaswini Appidi, Ph.D. Scholar, Dept. of Biomedical Engineering, IIT Hyderabad

### About [IIT Hyderabad](#)

Indian Institute of Technology Hyderabad (IITH) is one of the six new Indian Institutes of Technology established by the Government of India in 2008. In a short span of less than 10 years, the institute built on an imposing 570-acre campus and has been ranked among the top ten institutes for four consecutive years in the [National Institute Ranking Framework \(NIRF\)](#) released by the Ministry of Human Resource Development (MHRD), Government of India. The Institute was also ranked #10 in the first edition of [Atal Ranking of Institutions on Innovation Achievements \(ARIIA\)](#) introduced this year by MHRD to systematically rank all major higher educational institutions and universities in India on indicators related to ‘Innovation and Entrepreneurship Development’ among students and faculties.



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Indian Institute of Technology Hyderabad

IIT Hyderabad has close to 210 full-time faculty, 2,855 students of whom 20 per cent are women, nearly 200 state-of-the-art laboratories and five research and entrepreneurship centers. The Institute has a strong research focus with more than Rs. 500 crore of sanctioned research funding while Ph.D. scholars account for about 30 per cent of total student strength. IITH students and faculty are at the forefront of innovation with more than 1,500 research publications and patent disclosures, 300 sponsored/consultancy projects and 50 industry collaborations. IITH has MoUs with 50 universities in the U.S., Japan, Australia, Taiwan and Europe. IITH has been pioneering change in pedagogy with fractal academic programs that atomizes course modules, encourage interdisciplinary learning spanning innovative technology, fundamental science, liberal arts and creative arts like photography, theatre and painting.

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