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The Purdue College of Pharmacy is pleased to honor and recognize the outstanding research and scholarship generated by our faculty each month. This month we highlight Dr. Yoon Yeo, Associate Department Head and Associate Professor of Industrial and Physical Pharmacy. She also holds a courtesy appointment as Associate Professor in the Weldon School of Biomedical Engineering at Purdue.

Dr. Yeo’s recent publication, “Intraperitoneal chemotherapy of ovarian cancer by hydrogel depot of paclitaxel nanocrystals”, can be read in J. Control Release (August 10, 2016; 235:91-8). The project was conducted in Dr. Yeo’s laboratory RHPH G14 in collaboration with Bo Sun (2016 IPPH graduate, currently a post-doc at Johns Hopkins), Maie Taha (IPPH graduate student), Benjamin Ramsey, Sandra Torregrosa-Allen, and Bennett Elzey (Biological Evaluation Shared Resource, Purdue University Center for Cancer Research).

In this article, Dr. Yeo’s team reports the development of a hydrogel depot of paclitaxel nanocrystals and its use in intraperitoneal (IP) chemotherapy of ovarian cancer. IP chemotherapy has been pursued as a promising post-surgical therapy of peritoneal carcinomas. Several clinical studies suggest therapeutic benefits of IP chemotherapy compared to intravenous therapy. However, IP chemotherapy has not become a routine component of ovarian cancer treatment, due to the increased time and effort requirement and the treatment-related complications. To overcome this challenge, the team has worked on developing new drug delivery systems that maximize the duration of IP chemotherapy in ovarian cancer. In the present study, they use a nanocrystal form of paclitaxel to help dissolve the drug in aqueous medium and disperse the nanocrystals in a hydrogel precursor, which can be injected as liquid but forms a gel after IP injection. The team shows that a single IP injection of nanocrystal-gel attenuated the growth of tumors and prolonged the survival of tumor-bearing mice significantly better than Taxol. This demonstrates the benefit of prolonged drug retention in local chemotherapy of IP tumors.

“For IP chemotherapy to provide the anticipated benefits, it is critical that the formulation control the drug release and avoid burst initial release and bulk drug absorption to the systemic circulation. Our results demonstrate the promise of a gel depot as an IP drug delivery system,” says Dr. Yeo.