MEDICAL BREAKTHROUGHS
RESEARCH SUMMARY

TOPIC: HYDROGELS: JELLO-LIKE MATERIAL TREAT TUMORS: MEDICINE'S NEXT BIG THING?
REPORT: **MB #4737**

BACKGROUND: Cancer is not just one disease; there are many types. It can start in the lungs, the breast, the colon, or even in the blood. Cancers are different in the ways they grow and spread. It's the second leading cause of death in the United States. In 2020, there will be an estimated 1.8 million new cancer cases diagnosed and 606,520 cancer deaths in the United States. The peripheral nervous system refers to the parts of the nervous system that are outside the brain and spinal cord. It includes nerves that connect the head, face, eyes, nose, muscles, and ears to the brain. There are more than 100 billion nerve cells that run throughout the body.
(Source**:** https://acsjournals.onlinelibrary.wiley.com/doi/full/10.3322/caac.21590, https://www.merckmanuals.com/home/brain,-spinal-cord,-and-nerve-disorders/peripheral-nerve-disorders/overview-of-the-peripheral-nervous-sys///tem, https://www.cancer.org/research/cancer-facts-statistics.html)

HYDROGELS/DELIVERY: Nanofiber Hydrogels are a material that traps a large amount of liquid and keeps it in a fixed place. They look and work much like a spider web and are beneficial for targeted drug delivery and tissue regeneration. For Hydrogel delivery, researchers put it in water and mix it with a nanofiber-forming peptide that resembles Jello. Hydrogels are flexible because of their water content and are non-toxic which makes them applicable to the medical field. Hydrogels use is rapidly expanding because of the many ways to modify the structures to obtain desired functions. They can be designed to respond to a specific stimulus, and they're biocompatible and biodegradable which makes them good for use in biological and environmental applications.
(Source: Jeffrey Hartgerink**,** Professor, Chemistry and Bioengineering, Rice University, https://www.intechopen.com/books/emerging-concepts-in-analysis-and-applications-of-hydrogels/an-introduction-to-hydrogels-and-some-recent-applications)

NEW TECHNOLOGY: The nanofiber hydrogel allows for cancer treatment and peripheral nerve regeneration medicines to be delivered. Cancer patients going through chemotherapy have depleted immune systems. Some go through immunotherapy, which for 80 percent of patients has no effect. The hydrogels are loaded up with drugs and medicine and inserted around a tumor to modify the cellular behavior of the immune system. It wakes the cancer up, so to speak, and it can be killed off that way. It's also beneficial in peripheral nerve regeneration. When a nerve is damaged and dies there's a disconnect between the nerve and the target. Doctors make conduits, which is like a flexible straw, loaded with hydrogel that provides a pathway for the nerves to regrow toward their target. Darren Woodside, PhD, says, "In theory, combining the hydrogel with stem cells is much more effective because the cells stay concentrated in the area where the body needs them."
(Source: Jeffrey Hartgerink**,** Professor, Chemistry and Bioengineering, Rice University, Darren Woodside, PhD, VP for Research, Texas Heart Institute, https://www.intechopen.com/books/emerging-concepts-in-analysis-and-applications-of-hydrogels/an-introduction-to-hydrogels-and-some-recent-applications)

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If this story or any other Ivanhoe story has impacted your life or prompted you or someone you know to seek or change treatments, please let us know by contacting Marjorie Bekaert Thomas at mthomas@ivanhoe.com