USES OF HYDROGEL EMBEDDED WITH TRIPLE HELIX MICRO RNA PARTICLE IN THE TREATMENT OF BREAST TUMORS

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Twenty years ago scientist discovered that cancer can develop from the disruption in the small strands of RNA known as microRNA which are responsible for tuning of gene expression in cells.So treatment of tumors is possible by adjusting the levels of microRNA.

Recent research scientists have developed a new mechanism of introducing such microRNAs in the cells by twisting the RNA into 3 strands and embedding them in dextran and dendrimer (tissue glue)and successfully introduce the RNA into the tumor cell. Twisting of the RNA was done and was transformed into triple helix which is more stable than ssRNA or dsRNA. To the triple helix added dendrimer molecule form nanoparticles and then dextran was added and the formulation was added to solid tumors. Once it was injected the microRNA-dendrimer particle is absorbed into the tumor cell and the enzyme helicase cuts the triple strand into 3 individual microRNAs. MicroRNAs alter the gene expression by interfering with mRNA protein synthesis mechanism. Out of the 3 microRNAs 2 are targeted sequence and the third one only to stabilize: 1st strand mimics the naturally occurring microRNA called miR-205,frequently silenced in tumor cells; 2nd stand blocks the microRNA called miR-221,overactive in cancer cells.

The discovery was made by performing an experiment on 15 mice who were infected with breast tumor.The mice were divided in groups of three.To the first group of mice nothing was used for treatment and consequently the mice died,to the second group chemotherapy was used and they died after a few days with slight shrinkage of the tumor and to third group this technique was applied as a result of which the tumors shrank upto 90% and metastasis formation decresed upto 75% and all the mice of this group survived. Although this technique was initially used on mice but due to great success recently more than 10,000 people in U.S. has been treated with this technique and success rate over 90% of the cases. Although scientists have agreed to this technique still a lot of discussions are going on regarding the applicability of this technique for universal use because of the variability of genetic constituent of people residing in different part of the globe.

However ever since now this technique has been considered to be the best therapeutic technique for the treatment of solid tumors in comparison to chemotherapy and radiotherapy which has devastating side effects. Scientists are trying every possible way to universalize this technique.