BRAC UNIVERSITY
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Department of Pharmacy

PHARMA HIGHLIGHTS

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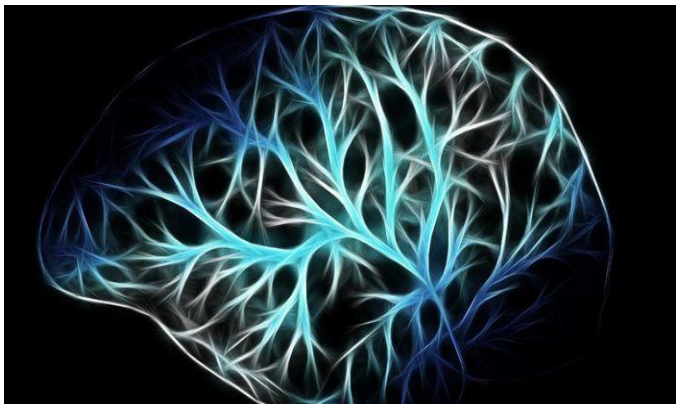
New Drug Prevents Dementia After Head Injury



Scientists from the University of South Australia have identified a new drug that could potentially help prevent the development dementia following repeated head injuries, especially for athletes. Chronic traumatic encephalopathy (CTE) is a progressive and fatal brain disease linked to the accumulation of a protein known as hyperphosphorylated tau. The build-up of this protein in the brain affects cognition and behavior. The condition is a form of head injury-associated dementia.

After a head injury, the brain releases a neurotransmitter called substance P which is known to modulate the perception of pain. This neurotransmitter also has a role in the secondary injury process after traumatic brain injury. Substance P is linked particularly with neuroinflammation, increased blood-brain barrier permeability and edema formation, which has shown association with increased intracranial pressure. In the case of CTE, substance P has also shown a correlation with increased amounts of tau protein that collected inside neurons. This build-up causes several effects including memory problems, confusion, changes in personality, aggressive behavior, depressive mood and suicidal thoughts.

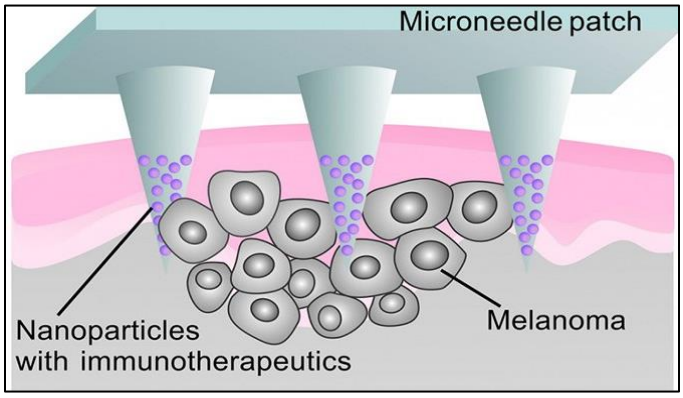
In the study, scientists used a drug known as a Neurokinin-1 (NK-1) receptor antagonist to block substance P in animal models of CTE. In doing so, they were able to prevent the development of tau protein tangles in the brain which would have led to neurological problems. The researchers now hope that CTE could be prevented via the same mechanism in humans. Future studies will be focused on translating the treatment into human clinical trials, where it may be able to aid athletes who play contact sports including boxers and footballers, as well as military veterans who sustain head injuries during conflict. However, that this may take several years as currently, CTE can only be diagnosed post-mortem.

Written by: Md Kaykobad Hossain (TA)

3D Printed Microneedles for Anticancer Therapy of Skin Tumors

The study focuses on 3D printed microneedles by utilizing biocompatible polymer for transdermal insulin delivery in order to attain lower glucose level along with excellent hypoglycemia control. 3D microneedles were manufactured employing stereolithography and inkjet

The study illustrates the efficacy of 3D printed biocompatible polymeric microneedles coated with cisplatin for treating epidermal skin tumors. 3D microneedles were printed using stereolithography to enhance piercing capacity to almost 80% penetration. The study also revealed rapid cisplatin release with elevated anticancer activity and tumor regression. Transdermal delivery of anticancer agents utilizing 3D microneedle is a non-invasive approach for treating skin tumors and preferred superior to the conventional methods due to rapid localized effect and enhanced bioavaibility along with improved patient compliance without causing skin irritation and infection.



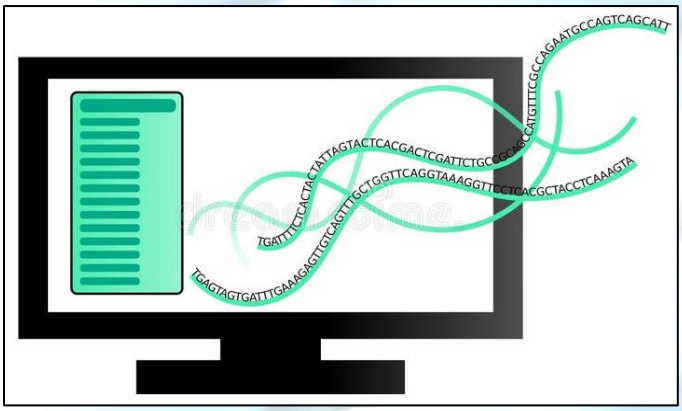
Novel 3D printed biocompatible microneedle is a recently developed method and it is evident to explore new possibilities for transdermal drug administration of various drugs to treat skin cancer with maximum efficiency. The incorporation of stereolithographic 3D printing and smooth inkjet coating facilitates drug delivery without any loss and ensures tumor suppression and elimination with an outcome of 100% animal survival.

The study manifests following aspects:

- Rapid localized effect and enhanced bioavailability
- No symptom of irritation or infection
- Piercing impermeable layer of skin without stimulating pain
- Microneedles can be loaded with formulations varying from microgram to milligram
- Uniform coating ensures no loss of drug material during insertion
- Tumor suppression and elimination with efficacy

Written by: Sinthia Masud (ID: 17346049)

Cancer Cell Lines Are Too Dissimilar from Human Cancer Cells



A new study, from Johns Hopkins Medicine researchers suggests that cultured cancer cells lack genetic similarity to humans. This is concerning because cancer cell lines are often used in drug development efforts. These findings could potentially create a shift in focus in cancer treatment development from cell lines to genetically engineered mice and tumoroids. The study uses a computer modeling technique that compares RNA sequences among cancer genomes.

The results indicate that cancer cell lines are genetically inferior to other models, the genetically engineered mice and tumoroids performed so very well by comparison. The dissimilarities in the genetics were theorized to be due to the differences between a human cell's natural environment and a laboratory growth environment.

These conclusions were a result of the new modeling technique called CancerCellNet developed by the research team. With CancerCellNet, the team compared the genetic makeup of RNA sequences with data from a cancer genome atlas and found that genetically engineered mice and tumoroids have RNA sequences most similar to cancer cells. They found this to be true in 4 out of every 5 tumor types they tested, which included breast, lung, and ovarian cancers.

CancerCellNet uses RNA to analyze genetic similarities for multiple reasons. RNA is a pretty good surrogate for cell type and cell identity, which are key to determining whether lab-developed cells resemble their human counterparts. RNA expression data is very standardized and available to researchers, and less subject to technical variation that can confound a study's results.

The researchers have submitted a patent for CancerCellNet and extend the hope that their findings will help inform current and future cancer research models and will continue to work on making CancerCellNet more reliable and precise.

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