Possible new Cancer treatment

Created by Oklahoma State biochemists

Recent synthesis of a new compound by Oklahoma State University biochemist Dr. Robert Matts and team is currently in the clinical trial of research in order to determine if it is efficient enough to be used on the market as a possible way of slowing and possibly stopping the growth of tumor cells. It involves the inhibition of a very specific protein called heat shock protein 90 (90 referring to the size of the protein). Which are known to be causative agents of tumor cells.

Heat shock proteins are responsible for folding proteins that are directly involved with the formation and progression of cancer cells. Recent research elsewhere has seemed to indicate that when these specific proteins are stopped or inhibited, it develops an attack like mechanism on multiple types of tumor causing pathways. This protein is associated with other enzymes that are also dependent on the heat shock protein as well as contribute to the formation of tumor cells. The new compound works by forming a specific chemical bond aided by hydrogen atoms from water. This chemical bond allows the newly synthesized molecule to bind to the specific amino acid on the polypeptide chain of the heat shock protein. Once bound to the heat shock protein the compound begins to slow down the further formation of heat shock proteins as well as inhibits the production of the specific enzymes associated with heat shock proteins. Slowly but surely reverses the growth of the cancer cell by causing it to regress instead of divide and grow uncontrollably. The effectiveness of the synthesized compound was tested via florescence polarization before the clinical trial in order

to prove that the compound was able to inhibit the production of heat shock proteins associated with tumor cells. The way the polarization testing worked was by first having the heat shock proteins and the enzymes dependent on them expressed naturally via a western blot. One the heat shock proteins had been naturally expressed and observed they then performed the same technique but this time added the newly synthesized compound where the heat shock proteins are supposed to form. They then took a western blot of the heat shock proteins with the compound and found that the enzymes associated with their production were hardly expressed as compared to the heat shock proteins under natural non inhibitory production. This in turn supported the hypothesis that the compound was able to inhibit the specific heat shock proteins that are closely associated to the formation of tumor cells leading to the current clinical trials.

Although the newly found compound’s mechanism of action for treating tumor cells seems very intimidating, it is very important that research such as this continue to be carried out. This research was based off of previous research that had synthesized a compound that stopped the production of heat shock proteins leading to tumor cells, but the problem was that it was extremely toxic to the liver. This compound synthesized by Dr. Matts and team uses an alternate mechanism of treatment while still attacking the same protein in order to not have such a harsh affect on the liver. Without the initial research of this mechanism of action we would not be one step closer to finding a cure for cancer such as we are now. The research being discussed is currently in the clinical trial stages

involving cancerous mice, but will soon be

applied in a clinical setting to human cancer

patient’s if found affective.

Khandelwal A, Kent CN, Balch M, et al. Structure-guided design of an Hsp90β N-terminal isoform-selective inhibitor. *Nature Communications*. 2018;9:425. doi:10.1038/s41467-017-02013-1.