Study links nicotine with breast cancer growth and spread

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A study published in *Cancer Research*, a journal of the American Association for Cancer Research, suggests a possible role for nicotine in breast tumor development and metastases.

The study, conducted by researchers at the Beth Israel Deaconess Medical Center, is among the first to explore the effects of nicotine on mammary cells.

"Although numerous studies indicate the role of nicotine exposure in tumor promotion, little is known about the effect of nicotine on breast tumor development, especially on the metastatic process of breast cancer," said lead author Chang Yan Chen, Ph.D., M.D., at Beth Israel Deaconess Medical Center.

Through a series of in vitro tests Chen and her team of researchers determined that breast epithelial-like MCF10A cells and cancerous MCF7 cells both express several subunits of nAChR (nicotine receptor), that when bound, initiate a signaling process, potentially increasing cell growth and migration.

"The best known role of nAChR is in the nerve system," Chen said. "Although cells from various tissue origins express different subunits of nAChR, we know very little about the functions of nAChR in non-neuronal cells and tissues, in particular in mammary cells."

"We were able to determine that mammary cells express different

subunits of nAChR and that nicotine, possibly through perturbing cell cycle checkpoints, potentiates tumorigenesis in mammary cancer-prone or cancer cells," Chen said.

In vivo studies confirmed these findings. When injected into the tail of a mouse the cancerous MCF7 cells migrated to the lungs.

From in vivo and in vitro studies, it indicates that nicotine is not a conventional carcinogen, but rather it combines with other yet to be determined factors to enable tumorigenesis.

"In vitro and in vivo tests showed that no metastasis occurs when the administration of nicotine alone," said Chen. "At this point we can only suggest that nicotine potentiates the growth-related process."

Chen hopes to conduct more studies, in particular under the genetic backgrounds with loss or defect of different tumor suppressors, to further explore the effects of nicotine in relation to first- and second-hand exposure, on breast cancer initiation and development.

Source: American Association for Cancer Research