

Bone Morphogenetic Protein-2 and Protein-4 in Treatment and Diagnosis of Cancer

Background

Lung Cancer is the leading cause of cancer deaths in both men and women in the United States with an estimated 154, 900 deaths from the disease. The survival rate for lung cancer patients is about 5 years. This poor survival rate is in part due to metastasis of the lung cancer, the mechanism of which is poorly understood to date despite intensive research. However, proper diagnosis of lung cancer can result in early detection and prevention of the cancer. Lung cancer is currently diagnosed via imaging tests or through the biopsy of sample tissues taken from the patients. More recently, tumor markers are also used. But these methods have several disadvantages.

Studies at UMDNJ have demonstrated that expression of bone morphogenetic proteins, BMP-2 and/or BMP-4, is linked to cancer invasion and growth. BMPs are transmembrane morphogenetic proteins that are members of the TGF superfamily of proteins and have been studied for their ability to induce bone formation. BMP-2 and BMP-4 are secreted proteins inducing pluripotential mesenchymal differentiation and are required for the normal embryonic development of many organs. Both BMP-2 and BMP-4 can induce the migration of normal vascular endothelial and mononuclear cells. **The present invention reveals the use of BMP-2 and/or BMP-4 proteins in the treatment and diagnosis of cancers.**

Description of the Technology

UMDNJ researchers have shown by representational difference analysis (RDA) that BMP-2 is overexpressed not only in lung cancers but also in other human cancers. In addition, BMP-4 overexpression was detected in human lung cancer specimens. Studies with recombinant BMP-2 revealed a dose related increase in migration, as well as, invasion and growth of human lung cancer cell lines indicating that BMP-2 is a stimulant of human lung cancer cell migration and invasion. Furthermore, inhibition of BMP-2 using noggin, a natural inhibitor of BMP-2 and BMP-4, reduced the size of tumors in nude mice and down regulated the expression of VEGF and sonic hedgehog in lung cancer cell lines. Taken together, the data from these studies reveal that BMP-2 and BMP-4 proteins can be used as a target in the treatment of cancers that exhibit an increased expression of these proteins.

Additionally, it was found that the expression of BMP-2 was elevated in blood serum samples indicating that elevated levels of these proteins in biological samples is diagnostic of the presence of cancer.

Advantages of BMP2

- Tumor markers lack organ and tumor specificity and cannot be used for screening of lung cancer in asymptomatic patients. Moreover, serum concentrations of these markers are not tightly correlated with tumor burden. For example, low concentrations of these markers does not exclude lung cancer.
- The scans cost about \$300 per patient and are not covered by insurance and non-small cell lung cancer is difficult to track using this method.

Applications

- . •For the treatment of cancer by inhibition of BMP-2 and/or BMP-4 activity.
- . • For the diagnosis of cancer by measuring the level(s) of BMP-2 and/or BMP-4 in a biological sample

Patent Status

- . • United States application was published on 10/31/2002 (Publication No.: US-2002-0159986-A1)
- . •CIP application was published on 07/17/2003 (Publication No.: US-2003-0134790-A1)

Licensing Opportunity

This technology is available for exclusive license.

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