Homing Peptides to Receptors of Heart Vasculature

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Technology description

While investigating the molecular basis of age-related cardiac disease, scientists at the Weill Medical College discovered that certain known receptors are expressed differentially in aging or unhealthy vs. young or healthy cardiac microvasculature. Working in mice, they have identified and characterized two sets of peptides that home differentially and specifically to either aged cardiac microvasculature or healthy cardiac microvasculature. These peptides can be conjugated with known diagnostic imaging or therapeutic agents.

The peptides that home to young healthy vasculature include TNFalpha analogs. This lead investigators to find that young hearts have more TNF receptor 1 than do older hearts and also surprisingly discovered that treatment of myocardial infarction with TNFalpha itself markedly reduced the extent of myocardial infarction in young hearts, but induced apoptosis of cardiac cells in older hearts. Other peptides with high affinity for young hearts include analogs to human granulocyte-colony stimulating factor (G-CSF), trypsin inhibitor V, tenascin-C and cyclin-dependent kinase subunit 2.

The other set of peptides are analogs to Brain Derived Neurotrophic Factor (BDNF) and have more affinity for older hearts. The investigators found that trkB receptor (binds BDNF) is far more prevalent in older hearts than in younger hearts.

As part of today's personalized medicine, it is essential to determine the health condition of a patient's heart to decide on the correct treatment, to predict outcome or to follow the response to a particular therapy. These peptides can be used as biological markers of healthy vs. damaged cardiac microvasculature or as targeted delivery agents of therapeutic drugs.

Cornell's patent application covers both the composition of these peptides and methods of their use in diagnostic and therapeutic applications.

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