CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

Onyinyechi C. Onyeador

Project Number

S0519

Project Title

Non-autonomous Cell Proliferation Regulation by Endothelial PAK2

Abstract

Objectives/Goals

The objective of this study was to identify a soluble growth factor secreted by endothelial cells, expression of which is normally suppressed by the presence of vascular endothelial PAK2, and which increases in amount when the Pak2 gene is deleted in mouse endothelial cells.

Methods/Materials

A dot-blot growth factor-targeted antibody array was probed with conditioned medium from endothelial cells (EC) isolated from endothelial-specific Pak2 deletion and wild-type mouse brains and lungs. Medium is conditioned by exposure to cultured cells for 24 hours to accumulate secreted factors. Blots were developed to assess changes in amounts of twenty-four types of growth factors known to influence EC growth in angiogenesis. Finally, a Millipore Scepter automated cell counter was used to perform cell growth/proliferation assays of suspended live cells.

Results

Dot-blot growth factor matrix analysis of angiogenesis-related factors indicated that in endothelial cells having deleted Pak2, there was a significant increase in production of one soluble angiogenic cytokine factor: interleukin-6 (IL-6). This was also accompanied by significant decrease in synthesis of multiple factors, including Eotaxin1, GM-CSF, IFNgamma, IL13, IL9, TIMP2, TNFA, THPO, and VEGF.

Conclusions/Discussion

Identifying endothelial Pak2-related changes of angiogenic growth factors supports our hypothesis by providing a mechanistic basis for differences in both endothelial and total cellular proliferation observed in mice having deleted endothelial Pak2. The increase of soluble IL-6 when Pak2 is deleted in endothelial cells is persuasive as the source of total cell proliferation, based on known characteristics of IL-6. These data suggest that natural mutations in vascular cell Pak2 may produce proliferative pathologies in humans.

Summary Statement

I identified that the souble growth factor interleukin-6 is secreted by endotheial cells and normally suppressed by PAK2, and increases in amount when the PAK2 gene is deleted in endothelial cells.

Help Received

I carried out the project in the lab of Dr. Rebecca Stockton of LABiomed. Dr. Stockton provided me with use of her facilities and resources, and her guidance. Taline Shishonian also provided guidance and supervision.