

# Licensing Opportunity



## Protein C: A Zymogen for Anti-Cancer Treatment

- Large reduction in metastasis demonstrated in vivo
- Excellent safety profile

Oncology | Pharmaceuticals

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### Background

Zymogens in the coagulation cascade system are important components for regulating hemostasis and thrombosis. Currently drugs are marketed and developed to treat coagulation-related diseases and disorders, including hemophilia, von Willebrand disease, and thrombosis. They may also have a role in treating sepsis, and several clinical trials are underway to investigate this possible function of coagulation zymogens. No anti-cancer role, however, has ever been attributed to zymogens. Investigators at The Children's Hospital of Philadelphia Research Institute and the Academic Medical Centre of Amsterdam have now determined that zymogen Protein C in the coagulation system (almost completely) inhibits tumor metastasis in mice.

### The Technology

Zymogen protein C has been shown to inhibit tumor metastases for multiple tumor types in vivo. This effect was seen in the powerful lung metastasis mouse animal model, and data has also been generated showing this effect in murine breast cancer model as well. This discovery represents a novel anti-cancer use for protein C. In our models, protein C does not inhibit the coagulation cascade indicating the risk for thrombosis-related side effects is negligible (which is not the case when using the activated form of protein C (APC)). Protein C is already marketed for other uses with a favorable safety profile.

### In Vivo data

C57Bl/6 mice expressing murine forms of zymogen PC by viral-mediated gene transfer were subjected a well-established metastasis model. Notably, in the PC expressing mice, the rates of tumor metastasis were significantly reduced compared to controls. The protective effect of zymogen mPC remained even in the absence of protease-activated receptor (PAR-1), one main cellular receptor for the APC-mediated cytoprotective effect.

In particular, the lung metastasis rates in PAR-1 null mice expressing PC were lower than PAR-1 null mice injected with saline. Lastly, prolongation of the activated partial prothrombin time and increase blood loss following tail clipping assay was not observed in mice overexpressing zymogen PC. These findings support a novel and important role of zymogen PC in modulating tumor progression with minimal risk of bleeding.

### Applications

Zymogen protein C may serve an important novel anti-metastatic and, considering the fact that around 90% of cancer patients die due to metastasis, anti-cancer drug.

### R&D Status

Ongoing experiments address the importance of zymogen protein C in alternative cancer models (both primary and secondary metastasis).

### Intellectual Property

A PCT patent application was filed Feb. 28, 2011 protecting the use of the zymogen as an anti-tumor treatment. No third party has intellectual property protection for the zymogen used here.

### Inventors

V.R. Arruda, Hematology - Pediatrics, CHOP

K.A. High, Hematology - Pediatrics, CHOP

G. van Sluis, Internal Medicine, AMC

C.A. Spek, Center for Experimental and Molecular Medicine, AMC