Unique Compound Inhibits Angiogenesis in Cancer and Eye Diseases

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BACKGROUND

Because uncontrolled growth of blood vessels (angiogenesis) contributes to the progression of diverse diseases from cancer to macular degeneration, drugs targeting the neovasculature are obvious candidates to control unwanted vascularization and tumor growth. However, most anti-angiogenic drugs must be taken up into the target cell in order to exert their effects. The availability of a potent drug that tackles angiogenesis via a different mode presents a valuable therapeutic strategy for diseases that depend on abnormal neovasculature.

TECHNOLOGY DESCRIPTION

University researchers have synthesized a novel lipopeptide, Somocystinamide A (ScA), which is a synthetic version of a compound isolated from marine cyanobacteria. ScA is distinguished by a lipophilic structure similar to native membrane components and this unique structure enables ScA to directly integrate into cellular membranes, perturb normal lipid homeostasis and selectively activate caspase 8, leading to programmed cell death.

APPLICATIONS

The promise of anti-angiogenic drugs in is reflected in the plethora of clinical trials. The obvious applications are reflected in the distribution of ~3000 human anti-angiogenesis trials:

~85% are designed to treat various forms of cancer and

~10% are for macular degeneration and a other eye diseases (e.g., choroid & retinal diseases)

ADVANTAGES

Advantages of ScA include:

- A bioactive lipopeptide that can directly integrate into lipophilic structures such as liposomes, thus acting a bioactive structural component. This does not require active uptake into the liposome interior, and leaves the interior free for other cargo.
- Excellent potency, with an IC50 of 0.5pM against human endothelial cells and 80nM in zebra fish;
- Long, lipophilic hydrocarbon chains are readily formulated into liposomes, which can be further customized and or targeted.; and
- Combination therapy whereby ScA melts into the liposomal bilayer and additional anti-cancer drug(s) can be loaded into the liposomal lumen.In sum, ScA's unique, lipophilic structure confers improved functionality and efficacy, which may greatly improve the therapeutic window over other, anti-angiogenic drugs.

STATE OF DEVELOPMENT

ScA has been incorporated into stable, liposomal nanoparticles of 100 nM in size, which retain full potency and excellent activity *in vitro* and *in vivo*. *In vivo*, ScA blocks endothelial cell tube formation and developmental angiogenesis in zebrafish models.

ScA:

- induces apoptosis selectively via caspase 8 activation and *in vivo* studies confirm that a single local dose of ScA (500ng/kg) inhibits the growth of both caspase 8-expressing and deficient tumors via action on vascular cell caspase-8.
- inhibits tube formation in HUVEC/matrigel model of angiogenesis at pM concentrations.
- experiments assessing activity of Ag-ScA conjugates are in process.

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OTHER INFORMATION

KEYWORDS

Somocystinamide A, anti-angiogenesis, apoptosis, anti-cancer drug, cancer, inflammatory diseases, eye disease, age related macular degeneration, combination therapy

CATEGORIZED AS

- **Medical**
  - Disease: Cancer

RELATED CASES

2007-225-0

Discovery of Natural Antiangiogenic Leads (Powerpoint)

INTELLECTUAL PROPERTY INFO

Patent pending; publication number: US20100266675

RELATED MATERIALS

- www.marinebiotech.org - 05/11/2012
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PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,045,401	06/02/2015	2007-225

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Marine Natural Product Yields Cancer Therapeutic (NCE)
- Anti-inflammatory compounds for dermatology and chronic inflammation

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