Peptide Inhibitors of Human Voltage Gated Proton Channel hHv1 Activity to Reduce Inflammation

Tech ID: 32566 / UC Case 2020-678-2

BRIEF DESCRIPTION

Human voltage-gated proton channels (hHv1) are implicated in a wide range of biological responses, including capacitation of sperm and stimulation of the innate immune response. Human sperm undergo a process called capacitation in the female reproductive tract, whereby intracellular pH rises and stimulates a progesterone-induced Ca2+ influx. Researchers at the University of California, Irvine have discovered that this calcium influx is controlled by albumin activation of Hv1 voltage-gated proton channels. Albumin activation of hHV1 in neutrophils also supports production and release of reactive oxygen species and protease during the immune respiratory burst. These findings demonstrating a stimulatory role of albumin in both sperm and neutrophils has led to new therapeutic approaches to fertility and the treatment of inflammatory diseases.

FULL DESCRIPTION

Human sperm undergo a process called capacitation in the female reproductive tract, which allows sperm to undergo the acrosomal reaction required to penetrate the egg and fertilize the oocyte. Proton channels, such as Hv1, are thought to play a role in sperm activation and maturation. Albumin acts directly on human Hv1 channels to activate and open them and is critical in the capacitation and maturation process; Researchers at the University of California, Irvine have utilized this discovery to create a therapeutic to aid fertilization and expanded their findings to show the same activation effect of albumin on neutrophils that stimulates release of reactive oxygen species and proteases from neutrophils. Peptide blockers were designed based on the interaction of albumin with hHV1 and shown to suppress the response, having the potential to modulate this inflammatory response.

SUGGESTED USES

Fertility treatments, treatment of inflammatory diseases with modulators of Hv1

ADVANTAGES

Provides 34-fold higher level of albumin in the female reproductive track compared to semen, which is essential to capacitation. Activation of hHV1 in neutrophils by albumin as a result of immune stimulation results in sustained release of reactive oxygen species, thus blocking the interaction with the channel has the potential to treat inflammatory diseases.

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	WO 2022/251637	12/01/2022	2020-678

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OTHER INFORMATION

CATEGORIZED AS

- » **Medical**
  - » Disease: Autoimmune and Inflammation
  - » Disease: Cancer
  - » Disease: Respiratory and Pulmonary System
  - » New Chemical Entities, Drug Leads
  - » Therapeutics

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