WiSys TECHNOLOGY FOUNDATION™

WiSys Ref: T140007

Novel Skin Whitening Agent(s)

Background

The global cosmetics industry is a $460 billion dollar market with the skin whitening sector valued at $381 million in 2014. This growing market is expected to increase at a CAGR of 11.7% reaching a projected $827.9 million by 2021 with the Asia Pacific region representing the largest market share (66.3%) followed by the United States (19.1%). According to a report by Frost & Sullivan, factors that are driving the market include an increase in developing opportunities in the West as well as the growth of natural plant-based extracts as an innovative approach to address the increasingly stringent regulatory and safety requirements for skin whitening agents.

Skin whitening agents inhibit production of the pigment melanin which in turn produces a lighter skin tone. Most agents work by inhibiting tyrosinase synthesis, a key enzyme in melanogenesis. While there are numerous skin whitening agents on the market, most products only provide for short-term efficacy and many possess adverse side effects. In fact, hydroquinone-based products (representing 29.6% of the market) are known to be a skin irritant, are banned in Europe and are no longer consider GRASE (Generally Recognized as Safe and Effective) in the US. As such, the opportunity and demand for the development of natural and safe agents, that can be produced cost effectively, cannot be overstated.

Technology & Current R&D Status:

Following on from earlier research focused on development of stilbenoid-based derivatives for antimicrobial activity (isolated originally from the sweet fern *Comptonia peregrina)*, Researchers at the University of Wisconsin-River Falls (UW-River Falls) have generated a preclinical data package using zebrafish embryos which demonstrates lead analogues to possess potent skin-lightening activity. The zebrafish embryo model makes an excellent model for pigmentation studies due to the rapid and well-conserved melanocyte development and melanin synthesis. Lead compound, A11, has been shown to have more potent activity compared to a number of current skin-lightening compounds including arbutin which required a significantly higher concentration (300mM) to achieve comparable effects as A11 at 10µM (70% versus 90% inhibition, respectively) (Figure 1). Most importantly, A11 caused no detectable toxicity, whereas niaciamide and tretinoin caused strong toxicity to developing embryos while gallic acid killed the embryos at 50mM and arbutin caused cardiac degeneration.

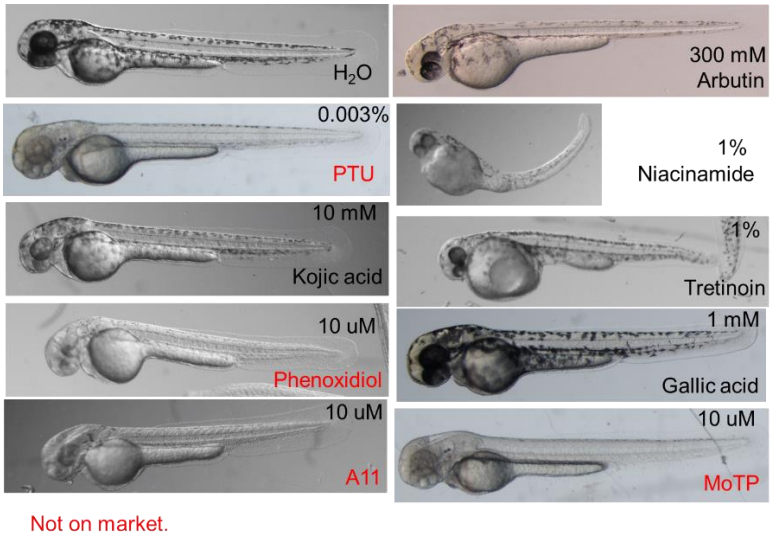

Figure 1. Pigment Reduction in Zebrafish Embryos, 24-68 hours post fertilization (hpf)

When tested for long-term efficacy, A11-incubated embryos demonstrated a 50% recovery of pigment 48 hours after wash, suggesting longer-acting skin-lightening effect as compared to other products which fully recovered (100%) their pigment within 24 hours after wash. Importantly, while A11 possessed these longer-acting effects, this study also demonstrated that the effects are reversible which, is an important factor, for skin-whitening agents.

Unlike most products on the market, A11 does not appear to act by inhibiting the tyrosinase enzyme and preliminary studies in a melanoma cell line suggest that the molecule may possess a different mechanism of action and may lead to skin-lightening via the control of melanocyte development and/or proliferation. Further studies are underway to better understand the molecular mechanisms of A11 using fish embryo and human melanocyte cell lines. In addition, a further in vivo study utilizing a guinea pig model has been proposed to further validate the skin-lightening activity of A11 and related analogues.

Partnering Opportunity:

WiSys Technology Foundation is the designated technology transfer office for the Comprehensive Campuses of the University of Wisconsin System. WiSys is currently seeking a strategic industry partner to assist in the further development of T140007 providing a route to market for its use as a novel skin whitening agent.

Intellectual Property:

WiSys currently holds rights to a pending PCT application (WO2016/014529) for T140007 with claims covering the use of a skin lightening compound for inhibiting melanin synthesis and/or removing existing pigmentation from skin. In addition, WiSys holds rights to US issued patent (8,530,512) which covers the composition of matter for select analogues.

Investigators:

Cheng-Chen Huang, Ph.D. is an Assistant Professor in Biology at University of Wisconsin-River Falls and lead inventor of T140007. Dr. Huang obtained his Ph.D. in Cell and Development Biology at Rutgers University in New Brunswick, NJ. His area of expertise lies in developmental biology, genetics and cardiovascular biology.

References:

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