

March 13, 2015

## Ashland introduces Chronogen YST™ biofunctional inspired by the science of circadian rhythms

### New extract derived from yeast proteins revitalizes healthy-looking skin in vitro

SHANGHAI, China - Molecular and environmental biologists have conducted a range of studies over the past 30 years that show how biological processes based on 24-hour rhythms enable plants and organisms to anticipate and prepare for regular environmental changes. More recently, in vivo tests revealed that certain biophysical and physiological parameters of human skin also change in accordance with circadian rhythms. Skin temperature, sebum production, pH, electrical charge potential (capacitance) and transepidermal water loss (TEWL) appear to follow the circadian clock.<sup>1</sup> Applying the science of circadian regulation to skin care, Ashland (NYSE: ASH) has introduced Chronogen YST™ biofunctional, a new extract derived from yeast protein that may help to maintain skin's cellular rhythm and guard against UV damage in vitro for healthy-looking skin.\*

"Over the past 10 years, research has shown that skin cells are partly regulated by the 24-hour rhythm," said Neil Astles, marketing manager for biofunctionals, Ashland Specialty Ingredients. "More than 20 percent of gene expression in a given tissue falls under circadian regulation.<sup>2</sup> This regulatory function within skin cells, however, may be disrupted by external factors. Chronogen YST promotes expression within clock gene proteins in vitro to resynchronize optimal skin function."

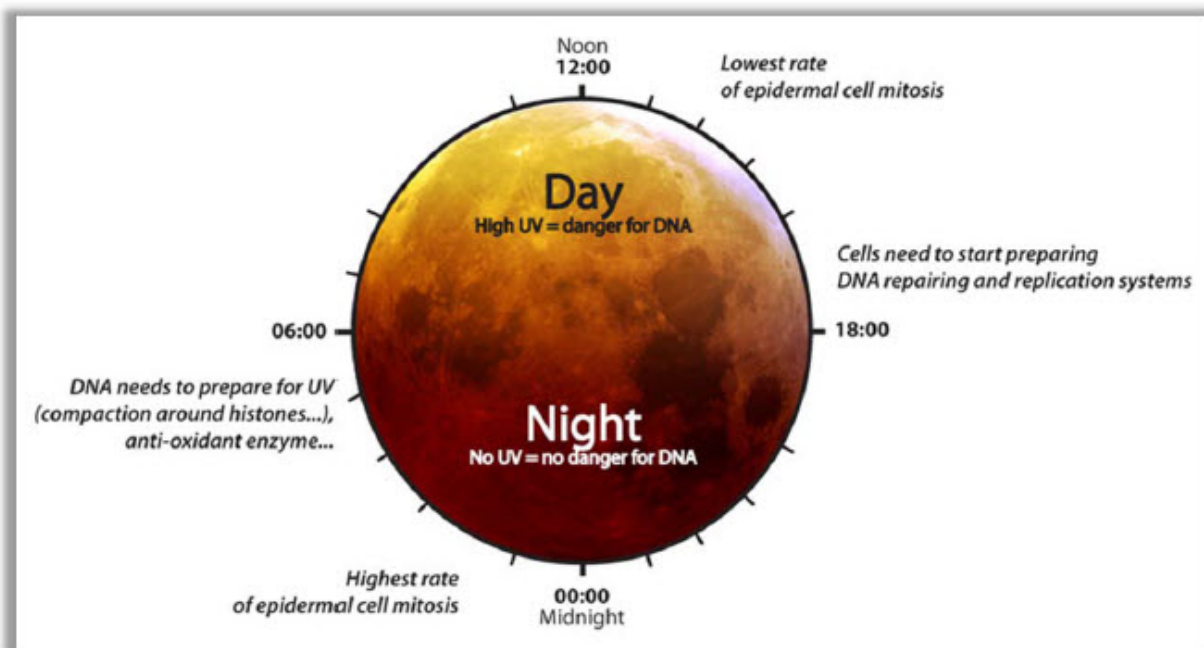
### Epigenetics in skin care

Epigenetics-based skin care involves modifications in the activation of certain genes without changing its underlying DNA structure. Specifically, clock genes are now recognized as key regulators that play a vital role in the expression of many genes, including some that reside in skin cells. Modulating clock gene expression for beneficial effects on skin represents a major breakthrough in cosmetic science.

A case in point can be seen in the area of UV exposure. At night, cells undergo DNA repair and replication procedures based partly on the expression of clock genes within a closed loop system. In contrast, at the beginning of the day, DNA needs to prepare for UV exposure with antioxidant enzymes. This 24-hour cycle can be disrupted by UV exposure and, accordingly, impede cell regeneration. Even small amounts of UV damage can result in disruption to the cells' 24-hour cycle.<sup>3</sup>

Figure 1 depicts the normal circadian cycle of DNA repair and replication at night, and antioxidant enzyme initiation during the day.

The Circadian DNA Cycle



A small double blind study against a placebo cream with 10 volunteers ranging in age from 23 to 38 years indicated a measurable improvement in skin turnover in vivo after 21 days (two applications per day) with topical cream containing 1 percent active Chronogen YST.

"Using a small concentration of the Chronogen YST in skin creams and serums may help to resynchronize the skin's circadian clock. Just as importantly, Chronogen YST may help improve skin turnover, a skin parameter that slows with aging," said Neil Astles.

### **Skin care applications of Chronogen YST**

Ashland clinically tested Chronogen YST [INCI: Water (aqua) (and) Glycerin (and) Hydrolyzed Yeast Protein (Proposed)] at 1 percent, and based on these results, recommends the biofunctional for use in day-time formulations to help skin boost its natural defenses against UV-induced damage; night-time formulations to boost the skin's own processes in skin regeneration; anti-aging formulations with claims based on epigenetic science; and formulations to help maintain the skin's "synchronized" internal clock.

### **Chronogen YST on display at PCHI China Exhibition and Conference**

Compliant with China's cosmetic rules, Ashland demonstrated the technical merits of Chronogen YST at the Personal Care and Homecare Ingredients (PCHI) exhibition held March 12-14 in Guangzhou, China. For more information about Chronogen YST and other functional and biofunctional ingredients available from Ashland (China) Holdings Co., Ltd., visit Ashland at Stand 3A24.

### **About Ashland Specialty Ingredients**

Ashland Specialty Ingredients is the #1 global producer of cellulose ethers and a global leader in vinyl pyrrolidones. It offers industry-leading products, technologies and resources for solving formulation and product-performance challenges. Using natural, synthetic and semisynthetic polymers derived from plant and seed extract, cellulose ethers and vinyl pyrrolidones, as well as acrylic and polyurethane-based adhesives, Specialty Ingredients offers comprehensive and innovative solutions for today's demanding consumer and industrial applications. Key customers include: pharmaceutical companies; makers of personal care products, food and beverage companies; manufacturers of paint, coatings and construction materials; packaging and converting companies; and oilfield service companies. Visit [ashland.com](http://ashland.com) to learn more

### **About Ashland**

Ashland Inc. (NYSE: ASH) is a global leader in providing specialty chemical solutions to customers in a wide range of consumer and industrial markets, including architectural coatings, automotive, construction, energy, food and beverage, personal care and pharmaceutical. Through our three commercial units - Ashland Specialty Ingredients, Ashland Performance Materials and Valvoline - we use good chemistry to make great things happen for customers in more than 100 countries. Visit [ashland.com](http://ashland.com) to learn more.

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<sup>1</sup>Analysis of Circadian and Ultradian Rhythms of Skin Surface Properties of Face and Forearm of Healthy Women. Le Fur I, Reinberg A, Lopez S, Morizot F, Mechkouri M, Tschachler E, *J Invest Dermatol*, 117(3), 718-24, 2001.

<sup>2</sup>Healthy clocks, healthy body, healthy mind. Reddy A, O'Neil J, *Trends in Cell Biology*, Vol. 20, Issue 1, 36-44, 2010.

<sup>3</sup>Low-dose Ultraviolet B Rays Alter the mRNA Expression of the Circadian Clock Genes in Cultured Human Keratinocytes. Kawara S, Mydlarski R, Mamelak AJ, Freed I, Wang B, Watanabe H, Shivji G, Tavadia SK, Suzuki H, Bjarnason GA, Jordan RC, Sauder DN, *J Invest Dermatol*, 119 (6), 1220-3, 2002.

\*In the U.S., some skin care protection claims may fall under an OTC drug monograph 21 CFR Part 347. Similar restrictions may exist in other parts of the world. It is the purchaser's responsibility to determine the applicability of any drug or cosmetic regulations to its products.

### **FOR FURTHER INFORMATION:**

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