Targeting the DDB1-CUL4A Ubiquitin Ligase for Cancer Prevention and Intervention

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Technology description

This invention teaches an approach and provides examples of agents that can prolong the activities of the NER (Nucleotide excision repair) enzyme, and therefore, enhance the cellular ability to repair DNA damages caused by environmental carcinogens and oxidation stress. This invention may find a wide range of applications in skin care and in conditions that benefit from the enhancement of DNA repair including cancer prevention and treatment. A method for screening for such agents is also taught. Nucleotide excision repair (NER) is the cellular mechanism to remove damaged DNA (e.g. DNA adducts) caused by exposure to carcinogens (e.g. radiation and chemicals) and oxidative stress. Research at Weill Cornell Medical College discovered that the inhibition of a novel negative regulator of NER prolongs and enhances DNA repair activities in vivo. Skin-specific knockout of a gene that is a key component of this novel negative regulator in mice demonstrated drastically improved resistance to skin cancer development caused by UV or chemical carcinogens. The knockout mice otherwise are normal (See figure). This novel negative regulator of NER and its inhibition present a new technology platform to develop products, consumer and clinical, for conditions that may benefit from prolonged and enhanced DNA repair activities. These may include skin care, anti-cancer and other health-related products.

Application area

DNA repair enhancing agents are product candidates to:
delay skin aging in skin care products (DNA adducts caused by radiation)
prevent and treat cancers (esp. skin, lung, liver)
heart and vascular diseases (smoking-induced DNA adducts)
neurologic disorders related to DNA damage caused by oxidative stress and certain toxins

Advantages

The first down-regulator for NER enzyme
No need to repeatedly cover our body with chemical shield
One active ingredient provides protection for UVA, UVB, and chemical carcinogens
Can be incorporated into wide range skin care products

The first non-nicotine lung cancer prevention product

Institution

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