

Establishment of a dosimeter suitable for assessing the risk from hazardous UVB component in solar light.

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Establishment of a dosimeter suitable for assessing the risk from hazardous UVB component in solar light.

Research Project

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07558204

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Allocation Type

Single-year Grants

Section

試験

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環境影響評価(含放射線生物学)

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Biological UVB dosimeter / Solar light / pyrimidine dimer / Nitrocellulose filter / Risk assessment / Monoclonal antibody / DNA damage

Research Abstract

In this study, we tried the establishment and the characterization of the personal solar UV dosimetry system which is like a film badge has been used for radiation monitoring. We used single strand DNA molecules on a small nitrocellulose membrane (2*4 cm) as a photoreceptor. This membrane was sealed up by a polyethylene filter with a silica gel that keeps humidity low. Various types of damage such as cyclobutane type pyrimidine dimer are induced in the DNA by solar UV exposure. After exposure to solar light, this membrane was treated with a cyclobutane type pyrimidine dimer specific monoclonal antibody ; TDM-2 and this was treated with the horseradish peroxidase conjugated second antibody. The colorization of diaminobenzidine on the membrane by this enzyme was quantitated by an image analyzer. The amount of colorization was correlated linearly with irradiated UV dose by Oriol solar simulator within a limited dose range, over this dose range the colorization level remains relatively constant. However when we used a blue polyethylene filter that cuts UV penetration to the membrane, the linear correlation was extended past the total daily UV dose per day in Japan. Induced damage was kept stable on the membrane for at least 22 days at both 37° C and 4° C , This membrane kept its ability to form cyclobutane pyrimidine dimer for more than 21 days when stored at both 37° C and 4° C. We observed no changes of the induction of cyclobutane type pyrimidine dimer in the temperature range between 15° C to 70° C.

Research Products (37 results)

All Other

All Publications (37 results)

- [Publications] Y. Ishigaki: "New immunodeficient mouse strains bred by introducing beige and xid mutations into the KSN nude strain." *Laboratory Animal Science*. 46. 418-424 (1996) 
- [Publications] T. Matsunaga: "The replication protein RPA confers structure-specific endonuclease activities to the XPF-ERCC1 and XPG subunits of human DNA repair excision nuclease" *Journal of Biological Chemistry*. 271. 11047-11050 (1996) 
- [Publications] A. R. Young: "The in situ repair kinetics of epidermal thymine dimers and 6-4 photoproducts in human skin types I and II" *Journal of Investigative Dermatology*. 106. 1307-1313 (1996) 
- [Publications] M. Wakasugi: "Purification of a novel UV-damaged-DNA binding protein highly specific for (6-4) photoproduct" *Nucleic Acids Research*. 24. 1099-1104 (1996) 
- [Publications] X. Qin: "Detection of ultraviolet photoproducts in mouse skin exposed to natural sunlight" *Japanese Journal of Cancer Research*. 87. 685-690 (1996) 
- [Publications] S. Takahashi: "Determination of cyclobutane pyrimidine dimer in the DNA from UV-B irradiated cucumber leaves" *Environmental Science*. 9. 461-466 (1996) 
- [Publications] T. Itoh: "Rodent complementation group 8 (ERCC8) corresponds to Cockayne syndrome complementation group A" *Mutation Research*. 362. 167-174 (1996) 
- [Publications] M. Ueda: "Higher cyclobutane pyrimidine dimer and (6-4) photoproduct yields in epidermis of normal humans with increased sensitivity to ultraviolet B radiation" *Photodermatology Photoimmunology and Photomedicine*. 12. 22-26 (1996) 
- [Publications] Y. Takeuchi: "Induction and repair of damage to DNA in cucumber cotyledons irradiated with UV-B" *Plant Cell Physiology*. 37. 181-187 (1996) 
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- [Publications] E. Eveno: "Different removal of ultraviolet photoproducts in genetically related xeroderma pigmentosum and trichothiodystrophy diseases" *Cancer Research*. 55. 4325-4332 (1995) 

- [Publications] H. Nakane: "High incidence of ultraviolet-B or chemical-carcinogen-induced skin tumors in mice lacking the xeroderma pigmentosum groupA gene" *Nature*. 377. 165-168 (1995) ▼
- [Publications] H. Yasutake: "Inhibitory effect of caffeine on potentially lethal damage repair in cisplatin-treated human osteosarcoma cells" *Anticancer Research*. 15. 831-837 (1995) ▼
- [Publications] C. A. Chadwick: "The detection of cyclobutane thymine dimers, (6-4) photolesions and the Dewar photoisomers in sections of UV-irradiated human skin using specific antibodies, and the demonstration of depth penetration effects" *Jpuranal of Photochemistry and Photobiology-B*. 28. 163-170 (1995) ▼
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- [Publications] P. H. Clingen: "Correlation of UVC and UVB cytotoxicity with the induction of specific photoproducts in T-lymphocytes and fibroblasts from normal human donors" *Photochemistry and Photobiology*. 61. 163-170 (1995) ▼
- [Publications] 二階堂 修: "抗変異原・抗発がん物質とその検索法(DNA修復の検出)" 講談社, 11 (1995) ▼
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