

ヒト細胞における各種紫外線損傷の修復動態の比較解析

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The Studies on The Repair of DNA Damage Induced in Human Cells Irradiated with Ultraviolet Light (UV).

Research Project

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放射線生物学

Research Institution

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Thymine Dimer / (6-4) photoproducts / Dewar photoproducts / In vitro repair / Repair-patch size / Monoclonal antibody / Repair replication / Excision

Research Abstract

We established 9 monoclonal antibodies directed against ultraviolet (UV) light-induced DNA damage. Three of them recognize cyclobutane-type thymine dimers. Other 5 recognize (6-4) photoproducts, and one the Dewar isomer of (6-4) photoproducts.

By using these antibodies for assessing the amount of DNA damage induced and repaired in human cells irradiated with various wavelength of UV, we showed that human cells irradiated with 10 J/m² of 254 nm UV completely excised the (6-4) photoproducts from cellular DNA by 12 hr, whereas 50 % of thymine dimers remained in DNA 24 hr after UV-irradiation.

We incorporated in the present study ; an in vitro repair system using UV-irradiated plasmid and human cell-free extract. We found that the repair replication taken place in UV-plasmids was accompanied with the excision of both thymine dimers and (6-4) photoproducts. Furthermore, we investigated the repair of thymine dimers introduced in the plasmid by irradiating with 313 nm UV in the presence of acetophenone, and found that the repair-patch size of thymine dimer in the repair system settled from 14 to 24 bases per thymine dimer. This result resembles coincidentally to that of Escherichia coli.

The action spectra for the induction of photodamage in DNA irradiated with various wavelength of UV were analysed by the monoclonal antibodies. It was revealed that (6-4) photoproducts were efficiently photoisomerized by longer wavelength of UV (around 320 nm) which is contained in solar light. The results indicate that thymine dimers and the Dewar photoproducts are the main DNA damage induced by solar UV.

Research Products (18 results)

All Other

All Publications (18 results)

- [Publications] T.Matsunaga: "Base sequence specificity of a monoclonal antibody binding to (6-4)photoproducts" Mutation Research. 235. 187-194 (1990) ▼
- [Publications] T.Mori: "In situ (6-4)photoproduct determination by laser cytometry and autoradiography." Mutation Research. 236. 99-105 (1990) ▼
- [Publications] T.Higashi: "Hamster cell line suitable for transfection assay of transforming genes." Proceedings of National Academy of Sciences,U.S.A.87. 2409-2413 (1990) ▼
- [Publications] T.Mizuno: "Establishment of a monoclonal antibody recognizing cyclobutane-type thymine dimers in DNA:a comparative study with 64M-1 antibody specific for (6-4)photoproducts." Mutation Research. 254. 175-184 (1991) ▼
- [Publications] T.Mori: "Simultaneous establishment of monoclonal antibodies specific for either cyclobutane pyrimidine dimer or (6-4)photoproduct from the same mouse immunized with ultravioletirradiated DNA." Photochemistry and Photobiology. 54. 225-232 (1991) ▼
- [Publications] T.Matsunaga: "Wavelength dependent formation of thymine dimers and (6-4)photoproducts in DNA by monochromatic ultraviolet light ranging from 150 to 365 nm." Photochemistry and Photobiology. 54. 403-410 (1991) ▼
- [Publications] 二階堂 修: "動物実験代替法としての組織培養を用いた毒性試験の必要性 「細胞トキシコロジー-実験法」" 朝倉書店, 6 (1991) ▼
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