Environmental Health Criteria 14

ULTRAVIOLET RADIATION

World Health Organization

INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY

ENVIRONMENTAL HEALTH CRITERIA 14

ULTRAVIOLET RADIATION

This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of either the World Health Organization or the United Nations Environment Programme.

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ORGANISMS, MAMMALIAN CELLS AND TISSUE, AND INVERTEBRATES

NOTE TO READERS OF THE CRITERIA DOCUMENTS

While every effort has been made to present information in the criteria documents as accurately as possible without unduly delaying their publication, mistakes might have occurred and are likely to occur in the future. In the interest of all users of the environmental health criteria documents, readers are kindly requested to communicate any errors found to the Division of Environmental Health, World Health Organization, Geneva, Switzerland, in order that they may be included in corrigenda which will appear in subsequent volumes.

In addition, experts in any particular field dealt with in the criteria documents are kindly requested to make available to the WHO Secretariat any important published information that may have inadvertently been omitted and which may change the evaluation of health risks from exposure to the environmental agent under examination, so that the information may be considered in the event of updating and re-evaluation of the conclusions contained in the criteria documents.

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ENVIRONMENTAL HEALTH CRITERIA FOR ULTRAVIOLET RADIATION

A WHO Task Group on Environmental Health Criteria for Ultraviolet Radiation met in Geneva from 30 October to 3 November 1978. Dr V. Vouk, Manager, Health Criteria and Standards, Division of Environmental Health opened the meeting on behalf of the Director-General. The Task Group reviewed and revised the third draft criteria document and made an evaluation of the health risks from exposure to ultraviolet radiation (UVR).

The first draft was prepared by Professor F. Urbach of the Temple University School of Medicine, Philadelphia, PA, USA on the basis of reviews prepared by Dr Y. Skreb of the Institute of Medical Research and Occupational Health, Zagreb, Yugoslavia, Professor F. Stenbäck of the Department of Pathology, University of Kuopio, Kuopio, Finland, and the Sysin Institute of General and Community Medicine, USSR. The second and third drafts were prepared taking into account comments received from the national focal points and from the United Nations Environmental Programme (UNEP), the International Labour Organisation (ILO), the World Meteorological Organization (WMO), and the International Atomic Energy Agency (IAEA).

The collaboration of these national institutions, international organizations, WHO collaborating centres, and individual experts is gratefully acknowledged. The Secretariat wishes to thank, in

particular, Professor Urbach for his help in all phases of preparation of the document and Dr M. Faber of the Finsen Institute, Copenhagen, Denmark, who assisted the Secretariat in the final editing of the document.

This document is based primarily on original publications listed in the reference section together with several recent reviews of the health aspects of UVR including publications by Urbach (1969), Fitzpatrick et al. (1974), and Forbes et al. (1978).

Details of the WHO Environmental Health Criteria Programme including some of the terms frequently used in the documents may be found in the introduction to the Environmental Health Criteria Programme published together with the environmental health criteria document on mercury (Environmental Health Criteria 1 -- Mercury, World Health Organization, Geneva, 1976), and now available as a reprint.

1. SUMMARY AND RECOMMENDATIONS FOR FURTHER STUDIES

1.1 Summary

Exposure to ultraviolet radiation (UVR) occurs from both natural and artificial sources. The sun is the principal natural source. The known effects of UVR on man may be beneficial or detrimental, depending on a number of circumstances.

Artificial UVR sources are widely used in industry and, because of the germicidal properties of certain portions of the UVR spectrum, they are also used in hospitals, biological laboratories, and schools. UVR is extensively used for therapeutic purposes, as in the prevention of vitamin D deficiency, the treatment of skin diseases, and for cosmetic purposes. Artificial UVR sources are available as consumer products.

The migration of people between areas of different UVR exposure, whether for occupational or recreational reasons gives rise to unforseen exposures.

UVR can be classified into UV-A, UV-B, and UV-C regions. Wavelengths in the UV-C region (200-280 nm) cause unpleasant, but usually not serious effects on the skin and eye. Although UV-C is very efficiently absorbed by nucleic acids, the overlying dead layers of skin absorb the radiation to such a degree that there is only mild erythema and, usually, no late sequelae, even after repeated exposures. Since solar UVR below 290 nm is effectively absorbed by stratospheric ozone, no such radiation reaches living organisms from natural sources.