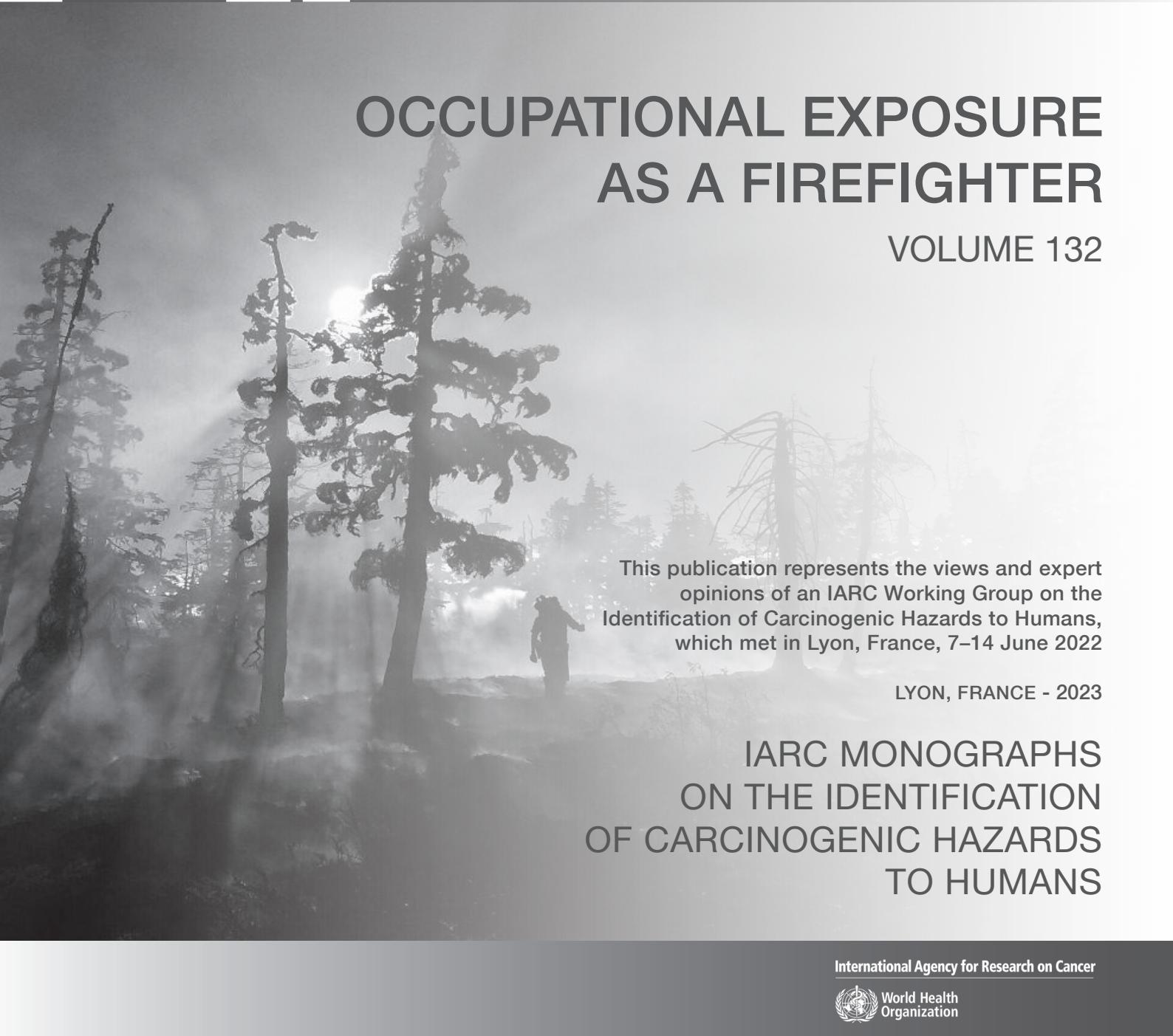


OCCUPATIONAL EXPOSURE AS A FIREFIGHTER

VOLUME 132



This publication represents the views and expert opinions of an IARC Working Group on the Identification of Carcinogenic Hazards to Humans, which met in Lyon, France, 7–14 June 2022

LYON, FRANCE - 2023

IARC MONOGRAPHS
ON THE IDENTIFICATION
OF CARCINOGENIC HAZARDS
TO HUMANS

CONTENTS

NOTE TO THE READER	1
LIST OF PARTICIPANTS	3
PREAMBLE	9
A. GENERAL PRINCIPLES AND PROCEDURES	9
1. Background	9
2. Objective and scope	10
3. Selection of agents for review	11
4. The Working Group and other meeting participants	11
5. Working procedures	13
6. Overview of the scientific review and evaluation process	14
7. Responsibilities of the Working Group	16
B. SCIENTIFIC REVIEW AND EVALUATION	17
1. Exposure characterization	17
2. Studies of cancer in humans	20
3. Studies of cancer in experimental animals	25
4. Mechanistic evidence	28
5. Summary of data reported	31
6. Evaluation and rationale	32
References	37
GENERAL REMARKS	41
1. EXPOSURE CHARACTERIZATION	47
1.1 Definition of the agent	47
1.2 Qualitative information about firefighting	49
1.3 Detection and quantification	69
1.4 Exposure to fire effluents, according to type of fire and level of exposure	90
1.5 Exposures other than fire effluents and polycyclic aromatic hydrocarbons	109
1.6 Factors that modify or mediate effects of exposure	130
1.7 Regulations and guidelines	134

1.8 Quality of exposure assessment in key epidemiological studies of cancer and mechanistic studies in humans	138
References	147
2. CANCER IN HUMANS.....	189
2.1 Cancers of the lung and respiratory system, including mesothelioma	190
2.2 Cancers of the urogenital system.....	257
2.3 Cancers of lymphatic and haematopoietic tissues.....	333
2.4 Cancers of the skin, thyroid, and brain	388
2.5 Cancers of the colon and rectum, oesophagus, stomach, and other sites.....	436
2.6 Cancer of all sites combined.....	509
2.7 Case reports	518
2.8 Meta-analyses	521
2.9 Evidence synthesis for cancer in humans.....	525
References	545
3. CANCER IN EXPERIMENTAL ANIMALS.....	551
4. MECHANISTIC EVIDENCE.....	553
Overview of mechanisms for carcinogens to which firefighters are exposed.....	553
4.1 Evidence relevant to key characteristics of carcinogens.....	555
4.2 Other relevant evidence	696
References	696
5. SUMMARY OF DATA REPORTED	707
5.1 Exposure characterization	707
5.2 Cancer in humans	708
5.3 Cancer in experimental animals.....	712
5.4 Mechanistic evidence	712
6. EVALUATION AND RATIONALE	717
6.1 Cancer in humans	717
6.2 Cancer in experimental animals.....	717
6.3 Mechanistic evidence	717
6.4 Overall evaluation	717
6.5 Rationale	717
LIST OF ABBREVIATIONS	719
ANNEX 1. Supplementary material for Section 1, Exposure Characterization	725
ANNEX 2. Supplementary material for Section 2, Cancer in Humans	727
SUMMARY OF FINAL EVALUATIONS.....	729