

CONTENTS

NOTE TO THE READER.....	1
LIST OF PARTICIPANTS.....	3
PREAMBLE.....	7
A. GENERAL PRINCIPLES AND PROCEDURES.....	9
1. Background.....	9
2. Objective and scope.....	10
3. Selection of agents for review.....	12
4. Data for the <i>Monographs</i>	12
5. Meeting participants.....	13
6. Working procedures.....	14
B. SCIENTIFIC REVIEW AND EVALUATION.....	15
1. Exposure data.....	16
2. Studies of cancer in humans.....	18
3. Studies of cancer in experimental animals.....	23
4. Mechanistic and other relevant data.....	26
5. Summary.....	30
6. Evaluation and rationale.....	31
References.....	36
GENERAL REMARKS.....	39
THE MONOGRAPHS.....	41
Carbon Black	43
1. Exposure Data.....	43
1.1 Chemical and physical data.....	43
1.2 Production and use.....	56
1.3 Occurrence.....	63
1.4 Regulations and guidelines.....	80
1.5 References.....	82
2. Studies of Cancer in Humans.....	89
2.1 Industry-based studies.....	89

2.2	Community-based case–control studies	104
2.3	References	107
3.	Studies of Cancer in Experimental Animals	110
3.1	Oral administration	110
3.2	Inhalation exposure.....	111
3.3	Intratracheal administration	116
3.4	Dermal application	118
3.5	Subcutaneous administration.....	119
3.6	Intraperitoneal administration.....	121
3.7	Combined administration with known carcinogens	121
3.8	References	122
4.	Mechanistic and Other Relevant Data.....	125
4.1	Particle deposition, retention and clearance	125
4.2	Toxic effects	147
4.3	Reproductive and developmental effects.....	159
4.4	Genetic and related effects	160
4.5	Comparison of toxicokinetics and toxicodynamics of inhaled poorly soluble particles in animals and humans	166
4.6	References	172
5.	Summary of Data Reported.....	185
5.1	Exposure data	185
5.2	Human carcinogenicity data	186
5.3	Animal carcinogenicity data.....	188
5.4	Mechanistic considerations and other relevant data	188
6.	Evaluation and Rationale.....	190
6.1	Cancer in humans	190
6.2	Cancer in experimental animals	190
6.3	Overall evaluation	190
6.4	Rationale.....	190
	Titanium Dioxide	193
1.	Exposure Data.....	193
1.1	Chemical and physical data	193
1.2	Production and use.....	199
1.3	Occurrence and exposure.....	205
1.4	Regulations and guidelines.....	210
1.5	References	212
2.	Studies of Cancer in Humans	215
2.1	Case report.....	215
2.2	Cohort studies.....	215
2.3	Community based case–control studies.....	221
2.4	References	223

3. Studies of Cancer in Experimental Animals	224
3.1 Oral administration	224
3.2 Inhalation exposure.....	225
3.3 Intratracheal administration.....	226
3.4 Subcutaneous injection.....	228
3.5 Intraperitoneal injection.....	228
3.6 Administration with known carcinogens	229
3.7 References	230
4. Mechanistic and Other Relevant Data.....	232
4.1 Humans.....	232
4.2 Experimental systems.....	235
4.3 References	265
5. Summary of Data Reported.....	272
5.1 Exposure data	272
5.2 Human carcinogenicity data	272
5.3 Animal carcinogenicity data.....	273
5.4 Mechanistic considerations and other relevant data	273
6. Evaluation and Rationale.....	275
6.1 Cancer in humans	275
6.2 Cancer in experimental animals	275
6.3 Overall evaluation	275
6.4 Rationale.....	275
Talc Not Containing Asbestiform Fibres.....	277
1. Exposure Data.....	277
Introduction	277
1.1 Chemical and physical data.....	278
1.2 Production and use.....	287
1.3 Occurrence and exposure.....	295
1.4 Regulations and guidelines.....	310
1.5 References	312
2. Studies of Cancer in Humans	318
2.1 Occupational exposure	318
2.2 Cosmetic use of talc.....	341
2.3 Use of talc in pleurodesis.....	378
2.4 References	379
3. Studies of Cancer in Experimental Animals.....	383
3.1 Oral administration.....	383
3.2 Inhalation exposure.....	384
3.3 Intratracheal administration.....	386
3.4 Subcutaneous administration.....	386
3.5 Intraperitoneal administration.....	387

3.6	Intrapleural and intrathoracic administration.....	388
3.7	Ovary implantation.....	388
3.8	References.....	389
4.	Mechanistic and Other Relevant Data.....	391
4.1	Humans.....	391
4.2	Experimental systems.....	395
4.3	References.....	399
5.	Summary of Data Reported.....	406
5.1	Exposure data.....	406
5.2	Human carcinogenicity data.....	407
5.3	Animal carcinogenicity data.....	410
5.4	Mechanistic considerations and other relevant data.....	410
6.	Evaluation and Rationale.....	412
6.1	Cancer in humans.....	412
6.2	Cancer in experimental animals.....	412
6.3	Overall evaluation.....	412
6.4	Rationale.....	412
	LIST OF ABBREVIATIONS.....	415
	CUMULATIVE INDEX TO THE <i>MONOGRAPHS</i> SERIES.....	419

NOTE TO THE READER

The term ‘carcinogenic risk’ in the *IARC Monographs* series is taken to mean that an agent is capable of causing cancer under some circumstances. The *Monographs* evaluate cancer hazards, despite the historical presence of the word ‘risks’ in the title.

Inclusion of an agent in the *Monographs* does not imply that it is a carcinogen, only that the published data have been examined. Equally, the fact that an agent has not yet been evaluated in a *Monograph* does not mean that it is not carcinogenic.

The evaluations of carcinogenic risk are made by international working groups of independent scientists and are qualitative in nature. No recommendation is given for regulation or legislation.

Anyone who is aware of published data that may alter the evaluation of the carcinogenic risk of an agent to humans is encouraged to make this information available to the Section of IARC Monographs, International Agency for Research on Cancer, 150 cours Albert Thomas, 69372 Lyon Cedex 08, France, in order that the agent may be considered for re-evaluation by a future Working Group.

Although every effort is made to prepare the monographs as accurately as possible, mistakes may occur. Readers are requested to communicate any errors to the Section of IARC Monographs, so that corrections can be reported in future volumes.