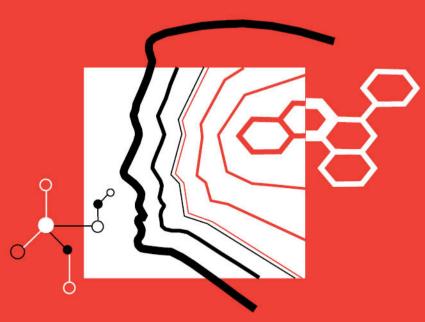


# Environmental Health Criteria 241

## DDT in Indoor Residual Spraying: Human Health Aspects



IOMC INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS A cooperative agreement among FAO, ILO, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD



### **Environmental Health Criteria 241**

DDT IN INDOOR RESIDUAL SPRAYING: HUMAN HEALTH ASPECTS



The International Programme on Chemical Safety (IPCS) was established in 1980. The overall objectives of the IPCS are to establish the scientific basis for assessment of the risk to human health and the environment from exposure to chemicals, through international peer review processes, as a prerequisite for the promotion of chemical safety, and to provide technical assistance in strengthening national capacities for the sound management of chemicals.

This publication was developed in the IOMC context. The contents do not necessarily reflect the views or stated policies of individual IOMC Participating Organizations.

The Inter-Organization Programme for the Sound Management of Chemicals (IOMC) was established in 1995 following recommendations made by the 1992 UN Conference on Environment and Development to strengthen cooperation and increase international coordination in the field of chemical safety. The Participating Organizations are FAO, ILO, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD. UNDP is an Observer. The purpose of the IOMC is to promote coordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

WHO Library Cataloguing-in-Publication Data

DDT in indoor residual spraying: human health aspects.

(Environmental health criteria; 241)

1.DDT - adverse effects. 2.Pesticide residues - toxicity. 3.Air pollution, Indoor. 4.Risk assessment. I.World Health Organization.

(NLM classification: WA 240)

ISBN 978 92 4 157241 5 ISSN 0250-863X

#### © World Health Organization 2011

All rights reserved. Publications of the World Health Organization can be obtained from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int). Requests for permission to reproduce or translate WHO publications—whether for sale or for non-commercial distribution—should be addressed to WHO Press at the above address (fax: +41 22 791 4806; e-mail: permissions@who.int).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either express or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

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

#### **CONTENTS**

AC	ACRONYMS AND ABBREVIATIONS					
ΙN	TROD	UCTIO	N	1		
			ORT OF WHO EXPERT CONSULTATION CHARACTERIZATION	3		
1.	INTE	RODUCTION				
2.	CONSENSUS STATEMENT					
	2.1	Data considerations Evaluation of studies post-dating the hazard				
	2.2	assessi		5		
		2.2.1		6		
		2.2.2		6		
	2.3					
		2.3.1	Exposures for use in risk characterization	7		
		2.3.2		8		
		2.3.3		9		
			2.3.3.1 Acute poisoning	9		
			2.3.3.2 Carcinogenicity	9		
			2.3.3.3 Developmental effects	11		
			2.3.3.4 Reproductive effects: males	13		
			2.3.3.5 Reproductive effects: females	15		
		2.3.4	Overall conclusions of the risk characterization	16		
PA	RT B-	-HAZ	ARD AND EXPOSURE ASSESSMENTS	19		
1.	SUM	MARY	AND CONCLUSIONS	20		
	1.1			20		
	1.2		didentification	20 24		
	1.3					
	1.4	Exposure assessment 2				

#### EHC 241: DDT in Indoor Residual Spraying: Human Health Aspects

2.	CHEMICAL IDENTITY				31	
3.	EXPOSURE SOURCES AND METRICS				33	
	3.1 3.2		of exposi		33 34	
4.	KINE	ETICS AND METABOLISM				
5.	HEPATIC EFFECTS AND ENZYME INDUCTION				44	
	5.1 5.2		-	als and in vitro systems	44 46	
6.	NEUROTOXICITY				49	
	6.1 6.2		•	als and in vitro systems	49 50	
7.	IMMUNOTOXICITY				52	
	7.1 7.2	•				
8.	CARCINOGENICITY					
	8.1	8.1.1 8.1.2 8.1.3	Rats Other lab	ooratory animals ons for laboratory animals	54 54 61 63 64	
	8.2	Humans 8.2.1 8.2.2	Ecologic Case-cor 8.2.2.1 8.2.2.2 8.2.2.3 8.2.2.4 8.2.2.5	al and cohort studies ntrol and nested case—control studies Breast cancer Testicular cancer Liver cancer Lymphocytic cancers Lung cancer Pancreatic cancer	64 64 70 70 74 75 77 80 80 81	
	8.3	Mode of			82	

	9.	GENOTOXICITY					
		9.1	Summary of past studies				
		9.2	Recent			86	
			9.2.1		ry animals and in vitro systems	86	
			9.2.2	Humans		86	
	10.	END	OOCRINOLOGICAL AND REPRODUCTIVE				
		EFFECTS					
		10.1		es mellitus		89	
		10.2	Thyroid effects				
			10.2.1	In vitro		91	
					ry animals	91	
			10.2.3	Humans		92	
		10.3	Reproductive and developmental toxicity			95	
			10.3.1	In vitro		95	
			10.3.2	Laborato	ry animals	96	
				10.3.2.1	Multigeneration studies	96	
				10.3.2.2	Effects on fertility in males	98	
				10.3.2.3	Effects on fertility in females	100	
				10.3.2.4	Developmental toxicity	101	
				10.3.2.5	Reproductive endocrine effects	105	
			10.3.3	Humans		110	
				10.3.3.1	Male reproductive functions and		
					hormone levels	110	
				10.3.3.2	Female reproductive functions	118	
				10.3.3.3	Developmental effects	125	
	11.	HAZ	ARD CH	HARACTE	CRIZATION	144	
		11.1 Summary of hazard identification for use in hazar					
			charact	erization		144	
		11.2	Dose–response assessment				
			11.2.1	Methods used for dose–response assessment		147	
				Non-cand		151	
				11.2.2.1	Experimental animal studies	160	
				11.2.2.2	Human studies	162	
			11.2.3	Carcinog	enicity	165	
				11.2.3.1	Experimental animal studies	165	
				11.2.3.2	Human studies	171	

v

#### EHC 241: DDT in Indoor Residual Spraying: Human Health Aspects

12.	EXPOSURE ASSESSMENT			
	12.1	Introduction		
	12.2	DDT application by spray operators	173	
	12.3	Generic model for occupational and residential		
	exposure			
	12.4	•	177	
		12.4.1 Adipose tissue	177	
		12.4.2 Blood	178	
	12.5	Residents in sprayed areas	188	
		12.5.1 Known residents of sprayed houses	188	
		12.5.2 General population living in areas using		
		indoor residual spraying	194	
	12.6	Summary of adult occupational and residential		
		exposure	210	
	12.7	Breast milk	214	
		12.7.1 Known residents of sprayed houses	215	
		12.7.2 General population living in areas using		
		indoor residual spraying	220	
	12.8	Summary of infant exposure	229	
	12.9	Uncertainties	231	
RE	FERE	NCES	232	
		I: PARTICIPANTS IN THE WHO CONSULTATION HAZARD ASSESSMENT	271	
		2: PARTICIPANTS IN THE WHO CONSULTATION HUMAN EXPOSURE ASSESSMENT	273	
		3: PARTICIPANTS IN THE WHO CONSULTATION RISK CHARACTERIZATION	275	
		4: ESTIMATION OF CONVERSION FACTOR TO ATE LIPID-ADJUSTED SERUM LEVELS OF DDT	277	
(20	10) GE	5: WORKED EXAMPLE FOR DDT OF THE WHO ENERIC MODEL FOR EXPOSURE DURING RESIDUAL SPRAYING	290	

#### **ACRONYMS AND ABBREVIATIONS**

 $\Sigma$ DDT sum of DDT and its derivatives as measured in any

particular study ("total DDT")

ADI acceptable daily intake

a.i. active ingredient

AIC Akaike's information criterion

ALAT alanine aminotransferase

AR androgen receptor

ASAT aspartate aminotransferase

BMD benchmark dose

BMD<sub>10</sub> benchmark dose for a 10% response

BMDL lower 95% confidence limit on the benchmark dose lower 95% confidence limit on the benchmark dose

for a 10% response

BMI body mass index

BNBAS Brazelton Neonatal Behavioural Assessment Scale

bw body weight

cAMP cyclic adenosine monophosphate
CAR constitutive androstane receptor
CAS Chemical Abstracts Service

CFV control flow valve
CI confidence interval
CYP cytochrome P-450
DAT donamine transporter

## 预览已结束,完整报告链接和二维码如下:

https://www.yunbaogao.cn/report/index/report?reportId=5\_28674



