CONTENTS

BIOMARKERS AND RISK ASSESSMENT: CONCEPTS AND PRINCIPLES

	PREFACE			
1.	INTRODUCTION	11		
	1.1 Biomarkers - concepts	11		
	1.2 Definitions	12		
	1.3 Biomarkers and the risk assessment process	13		
2.	USES OF BIOMARKERS			
	2.1 Use in health risk assessment	15		
	2.2 Use for clinical diagnosis	15		
	2.3 Use for monitoring purposes	16		
3.	SELECTION AND VALIDATION OF BIOMARKERS			
	3.1 Selection - practical aspects	21		
	3.1.1 General laboratory considerations	21		
	3.1.2 Quality assurance and control	22		
	3.2 Validation and characteristics of biomarkers	22		
4.	ETHICS AND SOCIAL CONSIDERATIONS	23		
5.	BIOMARKERS OF EXPOSURE			
6.	BIOMARKERS OF EFFECT			
	6.1 Haematological biomarkers	37		
	6.2 Nephrotoxicity biomarkers	38		
	6.3 Liver toxicity biomarkers	38		
	6.4 Biomarkers of immunotoxicity	39		
	6.5 Biomarkers of pulmonary toxicity	40		
	6.6 Biomarkers of reproductive and			
	developmental toxicity	42		
	6.7 Biomarkers of neurotoxicity	44		
7.	BIOMARKERS AND CHEMICAL CARCINOGENESIS			
	7.1 Analysis of chemicals and metabolites	46		
	7.2 Biomarkers for genotoxic carcinogens	48		

EHC 155: Biomarkers and Risk Assessment: Concepts and Principles

		7.2.1	Beneral Compilations	48
		7.2.2	DNA adducts in human samples	49
			Protein adducts	50
		7.2.4	Cytogenetic methods	51
		7.2.5	Chromosome damage	52
		7.2.6	Sister chromatid exchange	52
		7.2.7	Micronuclei	55
		7.2.8	Aneuploidy	55
		7.2.9	Mutation	55
	7.3	Bioma	arkers for non-genotoxic carcinogenesis	57
8.	BIOMARKERS OF SUSCEPTIBILITY			
9.	SUN	MMAR	RY	64
10.	RECOMMENDATIONS			65
	10.1 General			65
	10.2 Research			65
	10.3 Applications			66
	REFERENCES			67
	RESUME			77
	RESUMEN			80