## Contents

	1
	1
	1
xposure to radiofrequency	
	2
mobile phone technology	
	3
3	4
	4
	4
	5
	6
S Northarn Iraland	/ 7
Northern Ireland	/
	7
	8
2DR)	9
	10
	10
	11
lecommunications	12
1	14
	15
inology	16
industry to the UK economy	17
	19
	19
	20
	21
	21
	22
	22
	22
	23
	25
	26
ie Technology	27
	27
	27
	28
	20
	20
	29 29 29
	29 29 30
	29 29 30 33
	xposure to radiofrequency mobile phone technology s s Northern Ireland RPB) decommunications nology industry to the UK economy

Output from mobile phones	35
Output from base stations	36
Field penetration into the body: dosimetry	38
Scientific Evidence	40
Interaction of radiofrequency fields with tissues	40
Mechanisms	40
Thermal effects	41
Heating in the head	41
Non-thermal effects	42
Mobile phones Base stations	45 45
Experimental studies	43 45
Significance of experiments on molecules, cells and animals	45
Stimulus conditions	46
Biological issues	48
Nervous system: can exposure cause functional changes in the brain and	
brain and affect behaviour?	48
Effects on cell membranes: do RF fields affect the movement of	
substances across membranes?	48
Calcium efflux	50
Neuronal excitability	51
Neurotransmitter systems	52
Electroencephalograms (EEGs) in animals	55
Motor activity	55
Auditory responses	56
Learning and memory	56
Blood–brain barrier	60
Studies of melatonin	60
Effects on the eye	61
Overall conclusions of effects on the nervous system	63
Cancer-related studies: can exposure to RF radiation affect carcinogenic processes?	63
Ornithine decarboxylase: does exposure to RF radiation, in vitro	
or in vivo, affect its catalytic action?	64
Gene expression: does exposure to RF radiation initiate changes	
in the action of genes?	65
Does RF radiation affect cell growth, survival or proliferation?	66
Genotoxicity: does exposure of cells to RF radiation cause DNA	
damage, mutation or chromosomal aberrations?	6/
Mutagenesis DNA damage: <i>in vitro</i> studies	00 68
DNA damage: <i>in vivo</i> studies	69
DNA damage: indirect indicators	70
Long-term studies of cancer induction in animals	73
Spontaneous tumour incidence	73
Epigenetic effects: does RF radiation interact with known genotoxic agents	
to enhance their promotional effects?	74
Tumour transplantation: does RF radiation enhance the progression of	
transplanted tumours?	76
General conclusions from studies of cancer	76
Haematopoetic system, immune system and longevity	17

5

Reproduction and development	78		
Influences on the cardiovascular system Summary and conclusions on animal and cellular experimental studies			
Brain function	81		
Studies of cognitive performance	81		
Electroencephalogram (EEG)	84		
Conclusions from studies on brain function	85		
Effects on heart and blood pressure	85		
Conclusions on heart and blood pressure studies	86		
Mobile phones and driving	86		
Experimental evidence for effects on driving	87		
Conclusions on experimental evidence for effects	07		
on driving	88		
Enidemiological avidence for affects on driving	88		
Conclusions on anidential solution of the effects	00		
Conclusions on epidemiological evidence for effects	00		
Enidemialaciaal studios on concercl health offects	90		
Epidemiological studies on general nearth effects	90		
Studies of people using mobile phones	92		
Mortality and cancer incidence	92		
Other health effects	92		
Exposure to RF radiation through work and hobbies	93		
Cancer	93		
Health outcomes other than cancer	97		
Residence near radio and television transmitters	97		
Conclusions from epidemiological studies	99		
Proposals for further research			
use of mobile phones	00		
Cohort study of users of mobile phones	99		
Symptoms in mobile phone users	100		
Mobile phone use and motor vehicle accidents	101		
Effect of mobile phone base stations on well-being	101		
Conclusions based on overall scientific evidence	101		
Overall recommendations for future research	102		
Annex – Current research funding	104		
A Pressutionary Approach	107		
	107		
Risk assessment	107		
The precautionary principle/approach	100		
Application of the precautionary approach to mobile phone technology	110		
Exposure guidelines for radiofrequency radiation	110		
Base stations	114		
National register of base stations	115		
Exclusion zones	115		
Audit of base stations	115		
Planning process	116		
Base stations near schools	117		
Developments in rural areas	118		
Mobile phones	118		

6

	Information for consumers	118
	Shields	119
	Hands-free kits	120
	Use by children	120
	Use near hospitals	121
	Use while driving	121
	Annex – Current planning procedures for telecommunications development	122
	Legal position	122
	Policy guidance	123
	Scotland	124
	Northern Ireland	125
7	References	126
Glossary		146
Appendix A – Independent Expert Group on Mobile Phones Appendix B – Written evidence		150
		155
Appendix C – Meetings		159