

Cambridge University Press

0521835046 - Salmonella Infections: Clinical, Immunological and Molecular Aspects

Edited by Pietro Mastroeni and Duncan Maskell

Table of Contents

[More information](#)

## Contents

<i>List of contributors</i>	page xiv
<i>Preface</i>	xviii
<b>1 Epidemiological and clinical aspects of human typhoid fever</b>	<b>1</b>
1.1 Introduction	1
1.2 <i>Salmonella enterica</i> serovar Typhi	2
1.3 Epidemiology of typhoid fever	2
1.4 Pathophysiology of typhoid fever	6
1.5 Clinical features of typhoid fever	7
1.6 Diagnosis of typhoid fever	9
1.7 Management of typhoid fever	11
1.8 Control and prevention of typhoid fever	16
1.9 Conclusions	17
<b>2 Antibiotic resistance in <i>Salmonella</i> infections</b>	<b>25</b>
2.1 Introduction	25
2.2 Antibiotic resistance in <i>S. enterica</i> serovar Typhi	27
2.3 Antibiotic resistance in enteric fevers other than typhoid	36
2.4 Antibiotic resistance in non-typhoid <i>Salmonella enterica</i> serovars	36
2.5 The causes of resistance	43
2.6 Conclusions	48
<b>3 Host-specificity of <i>Salmonella</i> infections in animal species</b>	<b>57</b>
3.1 Introduction	57
3.2 <i>Salmonella</i> infections of cattle	58
3.3 <i>Salmonella</i> infections of pigs	64
3.4 <i>Salmonella</i> infections of domestic fowl and other avian species	68

Cambridge University Press

0521835046 - Salmonella Infections: Clinical, Immunological and Molecular Aspects

Edited by Pietro Mastroeni and Duncan Maskell

Table of Contents

[More information](#)

3.5	What are the determinants of <i>Salmonella</i> serovar host-specificity?	73
3.6	Do host-specific serovars use a strategy of stealth to cause systemic disease?	76
3.7	Dissemination of <i>Salmonella</i> to systemic tissues – an evolutionary dead-end or an alternative means of inter-animal spread?	77
3.8	Conclusions	79
3.9	Acknowledgements	80
<b>4</b>	<b>Public health aspects of <i>Salmonella enterica</i> in food production</b>	<b>89</b>
4.1	Introduction and historical perspective	89
4.2	Recent trends in <i>S. enterica</i> infections	90
4.3	Human disease caused by <i>S. enterica</i> and vehicles for its transmission to humans	92
4.4	Animal reservoirs of <i>S. enterica</i> infection	94
4.5	Milk and milk products as vehicles of infection	96
4.6	Meat and meat products and <i>S. enterica</i>	97
4.7	Contamination of poultry meat with <i>S. enterica</i>	98
4.8	Eggs and egg products as vehicles of infection and the <i>S. enterica</i> serovar Enteritidis pandemic	100
4.9	The infectious dose of <i>S. enterica</i>	105
4.10	Conclusions	107
<b>5</b>	<b>The <i>Salmonella</i> genome: a global view</b>	<b>117</b>
5.1	Introduction	117
5.2	Full genome sequences facilitate the study of <i>Salmonella</i>	117
5.3	Comparative genomics: old and new techniques	118
5.4	<i>In silico</i> tools for comparative genomics	119
5.5	Microarray technology as a tool for comparative genomics	120
5.6	Sequenced <i>Salmonella</i> genomes as tools for comparative genomics	121
5.7	<i>In silico</i> analysis of <i>Salmonella</i> genomes and comparisons between genome sequences	124
5.8	Mobile genetic elements: plasmids and bacteriophages	130
5.9	Fimbrial and pilus genes are highly variable between <i>Salmonella</i> genomes	133
5.10	Analysis of <i>Salmonella</i> genomes based on microarray technology	134

x

CONTENTS

Cambridge University Press

0521835046 - Salmonella Infections: Clinical, Immunological and Molecular Aspects

Edited by Pietro Mastroeni and Duncan Maskell

Table of Contents

[More information](#)

5.11 Genome sequences facilitate functional genomics	135
5.12 Conclusions	136
5.13 Acknowledgements	137
<b>6 Pathogenicity islands and virulence of <i>Salmonella enterica</i></b>	<b>146</b>
6.1 Introduction	146
6.2 Pathogenicity islands of <i>Salmonella</i>	147
6.3 <i>Salmonella</i> Pathogenicity Island 1	148
6.4 <i>Salmonella</i> Pathogenicity Island 2	154
6.5 <i>Salmonella</i> Pathogenicity Island 3	158
6.6 <i>Salmonella</i> Pathogenicity Island 4	159
6.7 <i>Salmonella</i> Pathogenicity Island 5	159
6.8 <i>Salmonella</i> Pathogenicity Island 6 (or <i>Salmonella</i> centisome 7 genomic island)	160
6.9 <i>Salmonella</i> Pathogenicity Island 7 (or Major Pathogenicity Island)	161
6.10 <i>Salmonella</i> Pathogenicity Islands 8 to 10	162
6.11 <i>Salmonella</i> genomic island 1	163
6.12 High Pathogenicity Island	164
6.13 Other SPI of <i>Salmonella</i> ?	164
6.14 Conclusions	165
6.15 Acknowledgements	167
<b>7 In vivo identification, expression and function of <i>Salmonella</i> virulence genes</b>	<b>173</b>
7.1 Introduction	173
7.2 Identification of virulence genes in vivo	174
7.3 Regulation of the expression of virulence genes	185
7.4 Functions of virulence genes involved in gastroenteritis and systemic disease	191
7.5 Conclusions	195
7.6 Acknowledgements	195
<b>8 Mechanisms of immunity to <i>Salmonella</i> infections</b>	<b>207</b>
8.1 Introduction	207
8.2 Models for the study of immunity to <i>S. enterica</i>	207
8.3 Early events in the interaction between <i>S. enterica</i> and the immune system	208
8.4 <i>S. enterica</i> reaches the phagocytic cells in the infected tissues	210
8.5 Dynamics of <i>S. enterica</i> spread and distribution at the single cell level	211

Cambridge University Press

0521835046 - Salmonella Infections: Clinical, Immunological and Molecular Aspects

Edited by Pietro Mastroeni and Duncan Maskell

Table of Contents

[More information](#)

xii

CONTENTS

8.6	Innate immunity and control of the early growth of <i>S. enterica</i> in the tissues	215
8.7	Progressive bacterial growth in the tissues results in lethal infections	219
8.8	The activation of the adaptive innate immune response and the suppression of bacterial growth in sublethal infections	220
8.9	The clearance of a primary infection requires the presence of T-cells	224
8.10	The initiation and development of antigen-specific immunity	225
8.11	Mechanisms of host resistance in secondary infections	228
8.12	Immunity to <i>S. enterica</i> infection in humans	230
8.13	Conclusions	237
8.14	Acknowledgements	239
9	Interactions of <i>S. enterica</i> with phagocytic cells	255
9.1	Introduction	255
9.2	Interactions of <i>S. enterica</i> with the macrophage endosomal pathways	256
9.3	Innate anti- <i>S. enterica</i> activity of the Nramp1 divalent metal transporter	258
9.4	Oxygen-dependent killing of <i>S. enterica</i>	260
9.5	Activation of macrophage activity against <i>S. enterica</i>	265
9.6	Conclusions	269
9.7	Acknowledgements	269
10	Interactions between <i>Salmonella</i> and dendritic cells: what happens along the way?	279
10.1	Introduction	279
10.2	Dendritic cells	279
10.3	Dendritic cells and the entry of <i>Salmonella</i> into the host	281
10.4	Dendritic cell interactions with <i>Salmonella</i> in the Peyer's patches	282
10.5	Dendritic cell interactions with <i>Salmonella</i> in mesenteric lymph nodes	284
10.6	Dendritic cell interactions with <i>Salmonella</i> in the spleen	286
10.7	Dendritic cell interactions with <i>Salmonella</i> in the liver	289
10.8	Conclusions	291
10.9	Acknowledgements	292

Cambridge University Press

0521835046 - Salmonella Infections: Clinical, Immunological and Molecular Aspects

Edited by Pietro Mastroeni and Duncan Maskell

Table of Contents

[More information](#)

11	Immunity to <i>Salmonella</i> in domestic (food animal) species	299
11.1	Introduction	299
11.2	Innate immunity	300
11.3	Adaptive immunity	304
11.4	Vaccines against <i>S. enterica</i> infections	308
11.5	Live <i>Salmonella</i> vaccines as vectors for the delivery of heterologous antigens in domestic species	311
11.6	Protection induced by live <i>S. enterica</i> vaccines by non-immune and non-specific immune mechanisms	312
11.7	Conclusions	313
12	Newer vaccines against typhoid fever and gastrointestinal salmonellosis	323
12.1	Introduction	323
12.2	Typhoid vaccines	323
12.3	Vaccines for use against non-typhoidal salmonellosis in humans	329
12.4	Vaccines for use in veterinary species	330
12.5	Novel approaches to the development of <i>S. enterica</i> vaccines	332
12.6	Conclusions	332
12.7	Acknowledgements	333
13	<i>S. enterica</i> -based antigen delivery systems	337
13.1	Introduction	337
13.2	<i>S. enterica</i> expressing heterologous antigens as multivalent vaccines	338
13.3	Expression systems for heterologous antigens in <i>S. enterica</i>	338
13.4	Immune responses against heterologous antigens expressed in <i>S. enterica</i>	344
13.5	<i>S. enterica</i> as a delivery system for DNA vaccines	349
13.6	New emerging applications of <i>S. enterica</i> as a vaccine vector	351
13.7	Conclusions	355
	<i>Index</i>	371

*The colour plates are situated between pages 206 and 207*