

# Contents

## Part I Human Sperm Chromatin Structure

- 1 Sperm Chromatin: An Overview** ..... 3  
Rod Balhorn
- 2 Sperm Nucleoproteins (Histones and Protamines)** ..... 31  
Ferran Barrachina, Ada Soler-Ventura, Rafael Oliva,  
and Meritxell Jodar
- 3 Sperm Nuclear Architecture** ..... 53  
W. Steven Ward

## Part II Laboratory Evaluation of Sperm Chromatin and DNA Damage

- 4 Sperm Chromatin Structure Assay (SCSA®): Evolution from Origin to Clinical Utility** ..... 65  
Donald P. Evenson
- 5 TUNEL Assay** ..... 91  
Monica Muratori and Elisabetta Baldi
- 6 TUNEL Assay by Benchtop Flow Cytometer in Clinical Laboratories** ..... 103  
Rakesh Sharma, Zeynep Cakar, and Ashok Agarwal
- 7 The Comet Assay** ..... 119  
Elva I. Cortés-Gutiérrez, Martha I. Dávila-Rodríguez,  
and Carmen López-Fernández
- 8 Sperm Chromatin Dispersion (SCD) Assay** ..... 137  
José Luis Fernández, Stephen Johnston, and Jaime Gosálvez
- 9 Cytochemical Tests of Sperm Chromatin Maturity** ..... 153  
Juris Erenpreiss and Ksenija Zubkova

<b>10</b>	<b>Is There an Optimal Sperm DNA Test?</b> .....	163
	Michelle M. Kim and Cigdem Tanrikut	

**Part III Etiology of Sperm DNA Damage: Biological and Clinical Factors**

<b>11</b>	<b>Oxidative Stress</b> .....	179
	Ralf Henkel and Michael Solomon	
<b>12</b>	<b>Apoptosis in Ejaculated Spermatozoa and in the Normal and Pathological Testes: Abortive Apoptosis and Sperm Chromatin Damage</b> .....	197
	Denny Sakkas and Hasan M. El-Fakahany	
<b>13</b>	<b>Defective DNA Repair in Spermiogenesis</b> .....	219
	Tiphanie Cavé, Olivier Simard, Marie-Chantal Grégoire, and Guylain Boissonneault	
<b>14</b>	<b>Defective Spermatogenesis and Sperm DNA Damage</b> .....	229
	Rakesh Sharma and Ashok Agarwal	
<b>15</b>	<b>Sperm Chromatin and Lifestyle Factors</b> .....	263
	Sarah K. Fatool and Avi Harlev	
<b>16</b>	<b>Cancer and Sperm DNA Damage</b> .....	281
	Peter T.K. Chan and Bernard Robaire	
<b>17</b>	<b>Sperm Chromatin and Environmental Factors</b> .....	301
	Aleksander Giwercman and Marcello Spanó	
<b>18</b>	<b>Sperm DNA Damage and Oocyte Repair Capability</b> .....	321
	Sezgin Gunes and Semra Sertyel	

**Part IV Clinical Studies on Utility of Sperm DNA Damage Tests**

<b>19</b>	<b>Experimental Studies on Sperm DNA Fragmentation and Reproductive Outcomes</b> .....	349
	Serafín Perez-Cerezales, Priscila Ramos-Ibeas, Eva Pericuesta Camacho, Raul Fernández-González, Angela Patricia López-Cardona, Ricardo Laguna-Barraza, Noelia Fonseca Balvís, Alejandro Chacón de Castro, Benjamin Planells, and Alfonso Gutiérrez-Adan	
<b>20</b>	<b>Sperm DNA and Natural Pregnancy</b> .....	365
	Marcello Spanó and Aleksander Giwercman	
<b>21</b>	<b>Sperm DNA and ART (IUI, IVF, ICSI) Pregnancy</b> .....	393
	Mona Bungum and Krzysztof Oleszczuk	

**22 Sperm DNA and Pregnancy Loss After IVF and ICSI** ..... 411  
 Nirlipta Swain, Gayatri Mohanty, and Luna Samanta

**23 Sperm DNA Tests Are Clinically Useful: Pro** ..... 431  
 Luke Simon, Douglas T. Carrell, and Armand Zini

**24 Sperm DNA Tests Are Clinically Useful: CON.** ..... 469  
 Katherine Rotker and Mark Sigman

**Part V Treatment Options for Men with Sperm DNA Damage**

**25 Antioxidant Therapy** ..... 479  
 Ahmad Majzoub and Ashok Agarwal

**26 Varicocelectomy** ..... 495  
 Matheus Roque and Sandro C. Esteves

**27 Physiological Intracytoplasmic Sperm Insemination Based on Hyaluronic Acid-Binding Ability** ..... 513  
 Mohammad Hossein Nasr-Esfahani, Shaghayegh Foroozan-Boroojeni, and Marziyeh Tavalae

**28 Advanced Sperm Processing/Selection Techniques** ..... 529  
 Ashok Agarwal and Manesh Kumar Panner Selvam

**29 Use of Testicular Sperm for ICSI: Pro** ..... 545  
 Sandro C. Esteves and Matheus Roque

**30 Debate on the Use of Testicular Sperm for ICSI: Con** ..... 559  
 Peter T.K. Chan

**31 Strategies to Diminish DNA Damage in Sperm Samples Used for ART** ..... 571  
 Jaime Gosálvez, Ashok Agarwal, and Sandro C. Esteves

**32 Sperm DNA Testing: Where Do We Go from Here?** ..... 589  
 Ahmad H. Al-Malki and Armand Zini

**Epilogue** ..... 595

**Index** ..... 597