

Normal P axis. PR, rate & rhythm  
p V1 -1.0 mV or more negative  
Q/S in V1 & V2  
ST-T negative ANT/LAT/INF  
T > -30 mV. ST > -0.05 mV

**GlobalData»**  
MediPoint

## **HERNIA REPAIR – GLOBAL ANALYSIS AND MARKET FORECASTS**

## Executive Summary

Overall Hernia Repair, Key Metrics in Major Markets		
	2012	2019
<b>Prevalence of Hernias*</b>	19 million	20 million
<b>Procedure Volumes+</b>		
US	1.172m	1.248m
5EU	769,000	780,000
South America	609,000	646,000
APAC	5.430m	5.817m
<b>Market Sales (\$m)</b>		
US	\$422m	\$444m
5EU	\$239m	\$232m
South America	\$172m	\$204m
APAC	\$1.011bn	\$1.239bn
<b>Market Drivers</b>	<b>Importance</b>	<b>Satisfaction</b>
Consistent Hernia Prevalence	↑↑↑	↑↑
Transition from Open to Laparoscopic Hernia Repair	↑↑↑	↑↑
Fall of Watchful Waiting	↑↑↑	↑↑
Residents Being Trained in Laparoscopic Hernia Repair	↑↑↑	↑
<b>Market Barriers</b>		
Group Purchasing Organizations		
Reimbursement		
Cost		
Self-Gripping Technology		
Mosquito Net Mesh		
Source: GlobalData, Primary Research Interviews with Leading Herniologists and General Surgeons (2013).		
Note: 5EU = France, Germany, Italy, Spain, and UK.		
*Assuming that the hernia market is solely composed of inguinal, incisional, and umbilical hernias.		
+Procedure volumes are approximated. See accompanying forecast model for specific numbers.		

## Sales for Hernia Mesh Repair by Region

GlobalData estimates the overall hernia repair market in 2012 to be \$1.844 billion across the 10 regions covered in this report, which are the United States (US), France, Germany, Italy, Spain, the United Kingdom (UK), Japan, Brazil, China, and India. By the end of the forecast period in 2019, sales will have grown to over \$2.120 billion with a Compound Annual Growth Rate (CAGR) of 2.01%.

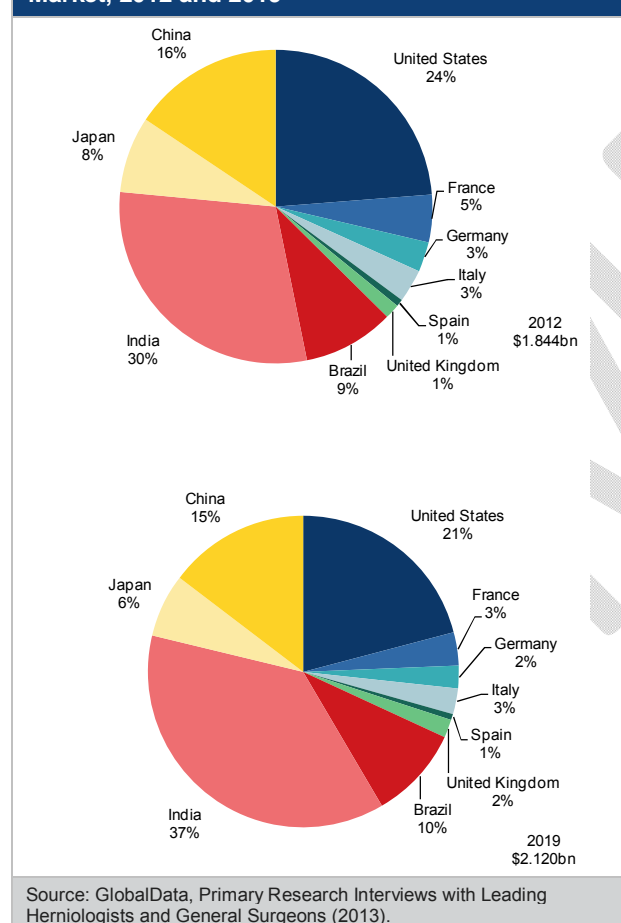
While the developed economies of Japan and the United States occupy a large proportion of the global hernia repair market, it is the developing nation of India that occupies nearly a third of the global market, at 30% in 2012. The sheer population of the country and their improving market access to healthcare is fueling annual procedural volumes upwards of three million. Additionally, the country has an overwhelming adoption of composite meshes for incisional hernia repair that is driving growth in market value through their higher average selling prices.

Besides India, the United States is one of the largest economies represented in the global market in 2012, with a 24% share. While the procedure volumes are a third of India's procedure volumes, the country derives its significant market valuation through its adoption of more expensive meshes such as biological, composite and 3D meshes.

## Executive Summary

Over the course of the forecast, India's position as a market-leading economy will be further cemented. India's share of the global hernia repair market is expected to significantly increase, so that it occupies 37% by 2019. The primary drivers for this growth are the large growth in the population and the adoption of the laparoscopic technique.

**Overall Hernia Mesh Repair Revenue by Major Market, 2012 and 2019**



### Growth of the Laparoscopic Technique

Hernia repair has evolved over the years to address the challenges in treating patients and to continue the mission of reducing the recurrence rates and the incidences of postoperative pain. More recently, there has been a shift in surgical technique from an open approach to a laparoscopic approach that has resulted in improvements in a variety of patient outcomes. Clinical trials have validated laparoscopy's positive impact on chronic pain, average recovery period, and recurrence rate. The major markets covered in this report are experiencing varying adoption levels of this technique. Some countries, such as the United States and India, will experience significant adoption over the forecast period, while other countries, such as Italy and Spain, are going to have stagnant growth over the forecast period.

### Barriers Impede Growth

Mesh manufacturers in the hernia repair market not only face the typical hurdles of reimbursement but also face competition from market substitutes. Manufacturers of higher-priced composite, 3D and biological meshes are not being adequately reimbursed. Flatsheet meshes are close to a third of their prices and offer comparable results for certain clinical outcomes. Additionally, a new category of self-fixating meshes has the potential to emerge. Surgeons are optimistic of the technology despite its ambivalent clinical outcomes. If these clinical outcomes prove to be substantial enough to drastically improve patient

## Executive Summary

outcomes or reduce operating costs, this new class of meshes will significantly reduce the market shares of older mesh classes. Additionally, the excellent clinical trial results of mosquito net mesh are significantly impacting the entrance of traditional mesh manufacturer's product lines into poorer economies.

While the clinical investigation of the laparoscopic technique has produced significant improvements in patient outcomes, it has only produced the initial momentum for this dynamic shift, and additional forces will be needed to sustain its growth. Laparoscopy still has a lot of skeptics despite the state of its clinical trial data, its added costs, and the large learning curve required to achieve a high rate of operative success. Additional clinical investigations need to be conducted in order to validate this technique's clinical and economic benefits in the treatment of hernias. This is where the majority of this market's unmet needs lie. A successful undertaking of these types of investigations would not only appeal to surgeons and patients but also to insurance companies, who are playing an increasing role in determining a modality's success.

### Opportunities for Current and Future Players

Despite the challenges that the hernia repair market faces, there are still opportunities for medical device manufacturers to increase revenue and continue to improve patient outcomes. Published literature has cemented the benefits of the laparoscopic technique and surgeons have begun flocking to the technique as a result. Certain meshes utilized with the laparoscopic technique carry a much higher average selling price than the standard flatsheet meshes and thus present a significant opportunity for revenue growth.

Literature has also revealed the long learning curve associated with the technique. Surgeons are expected to respond to this by operating in a more specialized setting so they can achieve better patient outcomes. The needs of these specialized laparoscopic surgeons are going to be drastically different than the needs of the general surgeon in a large community hospital. Companies can incorporate these needs into specialized meshes that offer properties and prices that appeal to this surgeon population.

## Executive Summary

### What Do Physicians Think?

There has been a large shift in surgical technique from an open repair to a laparoscopic approach. Clinical investigations have found the approach to produce lower incidences of chronic pain and recurrence and a reduced recovery period for patients to return to normal activities.

*“There is a big push from the patients and the industry to have less invasive procedures now.”*

*-Key Opinion Leader, April 2013*

More specifically, surgeons have become more partial to performing laparoscopic transabdominal pre-peritoneal (TAPP) procedures rather than totally extraperitoneal (TEP) procedures. The TAPP procedure is technically much easier to perform than TEP, since the latter procedure is associated with a much more difficult field of view.

*“Most of the surgeons that do laparoscopic [procedures] do TAPP but we are the rare [clinic] that does TEP.”*

*-Key Opinion Leader, April 2013*

Some surgeons remain skeptical on the benefits of the laparoscopic approach.

*“[Laparoscopy] has not [demonstrated enough added] benefit that it will change [the] number of procedures done laparoscopically.”*

*-Key Opinion Leader, April 2013*

*“[I will do] a laparoscopic repair but I prefer to do an open repair. I feel it can be as good. You have to select the cases. I’m only comfortable doing laparoscopic when it’s a relatively small defect.”*

*-Key Opinion Leader, April 2013*

However, there exists reluctance among the surgeon community to adopt the laparoscopic approach given the immensely higher learning curve for the procedure. This is not expected to be an issue with the next generation of surgeons who are currently being trained in the procedure and are receiving the practice early in their career.

*“You do need to train the residents to do the procedures. The residents do like doing the laparoscopic procedures. The next generation of guys will want to do everything laparoscopically.”*

*-Key Opinion Leader, April 2013*

Watchful waiting is a concept that was derived from the high complication rates associated with hernia surgery, including infection, recurrence, and chronic pain. Some surgeons thought delaying surgical interventions in asymptomatic patients would shield patients from unnecessary treatment. However, recently published clinical trial data has found that watchful waiting only delays surgery and a large percentage of patients will inevitably have to undergo repair. However, there are some surgeons that utilize watchful waiting in certain patient circumstances.



## Executive Summary

*“Yes. Watchful waiting is very popular, especially for umbilical hernia and especially if the patient is not symptomatic or not obese. If the patient is obese, than watchful waiting is not really a good idea. But if it’s a lean patient and he can palpitate his own hernia and he does not feel any pain then it’s no problem to keep it.”*

*-Key Opinion Leader, April 2013*

Besides watchful waiting, the reimbursement landscape presents a large hurdle for the adoption of more expensive meshes. Large pore and small pore meshes have average selling prices that are approximately a third of the average selling price of composite, biological, or 3D meshes.

*“I always try to convince people that it is not the administration that is doing the surgery, it’s the surgeons. What is best for the patients is the best for all of us. That is not the typical approach of our society or healthcare.”*

*-Key Opinion Leader, April 2013*

*“I think the reimbursement is going to be the [clearest] decision in the future. In the UK, they are trying to decrease the prices by doing a Lichtenstein with local anesthesia. So composite meshes are just too expensive.”*

*-Key Opinion Leader, April 2013*

## Table of Contents

**1 Table of Contents**

<b>1</b>	<b>Table of Contents .....</b>	<b>7</b>
1.1	List of Tables .....	18
1.2	List of Figures .....	23
<b>2</b>	<b>Introduction .....</b>	<b>28</b>
2.1	Catalyst.....	29
<b>3</b>	<b>Disease Overview .....</b>	<b>30</b>
3.1	Anatomy & Physiology .....	30
3.1.1	Inguinal Hernias.....	30
3.1.2	Incisional Hernias .....	32
3.1.3	Umbilical Hernias.....	33
3.2	Pathophysiology.....	34
3.2.1	Inguinal Hernia .....	34
3.2.2	Incisional Hernia .....	36
3.2.3	Umbilical Hernia .....	36
3.3	Clinical Presentation .....	37
3.3.1	Symptoms.....	37
3.3.2	Diagnosis.....	38
3.3.3	Clinical Outcomes.....	39
3.4	Epidemiology .....	44
3.4.1	Inguinal Hernias.....	44
3.4.2	Incisional Hernias .....	50

## Table of Contents

3.4.3	Umbilical Hernias.....	56
3.5	Economic Impact .....	61
3.5.1	Open versus Laparoscopic Repair .....	61
3.5.2	Watchful Waiting.....	62
3.5.3	US .....	63
3.5.4	European Union.....	64
3.5.5	APAC.....	65
3.5.6	South America .....	65
4	<b>Competitive Assessment .....</b>	<b>66</b>
4.1	Overview.....	66
4.2	Large Pore Meshes.....	67
4.2.1	Overview .....	67
4.2.2	Angimesh R2 (Angiologica) .....	70
4.2.3	Assumesh (Assut Europe) .....	72
4.2.4	Cristalene (Abiss Analytical Biosurgical Systems).....	73
4.2.5	Hexapro Mesh (Agency for Medical Innovation).....	74
4.2.6	Optilene Mesh (B. Braun) .....	75
4.2.7	Omyra Mesh (B. Braun).....	79
4.2.8	ProLite Ultra Mesh (Atrium Medical) .....	81
4.2.9	Surgimesh 1 & 2 and XLIGHT (Aspide Medical) .....	83
4.2.10	Surgimesh PET 2D (Aspide Medical).....	84
4.2.11	Surgimesh WN (Aspide Medical) .....	86
4.2.12	Vypro Mesh (Ethicon) .....	88



## Table of Contents

4.3	Small Pore Meshes .....	90
4.3.1	Overview .....	90
4.3.2	Premilene Mesh (B. Braun).....	92
4.3.3	Prolene Mesh (Ethicon) .....	94
4.3.4	ProLite Mesh (Atrium Medical).....	96
4.3.5	Repol Angimesh (Angiologica).....	98
4.4	Composite Meshes .....	99
4.4.1	Overview .....	99
4.4.2	4DDome (Cousin Biotech) .....	101
4.4.3	B-Foil (Assut Europe) .....	103
4.4.4	Biomesh CA.B.S Air Composite (Cousin Biotech).....	104
4.4.5	C-QUR Mesh (Atrium Medical) .....	105
4.4.6	C-QUR TacShield (Atrium Medical) .....	106
4.4.7	C-QUR V-Patch (Atrium Medical) .....	108
4.4.8	C-QUR CentriFX (Atrium Medical).....	109
4.4.9	C-QUR FX Mesh (Atrium Medical).....	110
4.4.10	Parietex Composite (Covidien) .....	111
4.4.11	Parietex ProGrip Self Fixating Mesh (Covidien) .....	113
4.4.12	Sorbimesh (Assut Europe).....	114
4.4.13	Surgimesh Cible (Aspide Medical) .....	115
4.4.14	Surgimesh Diablo (Aspide Medical) .....	117
4.4.15	Surgimesh M.O.P.P. (Aspide Medical).....	118
4.4.16	Surgimesh XB (Aspide Medical) .....	120

## Table of Contents

4.4.17	Ultrapro Mesh (Ethicon).....	122
4.5	3D Meshes.....	123
4.5.1	Overview .....	123
4.5.2	3DMax Mesh (C.R. Bard).....	126
4.5.3	Bio-A Hernia Plug (W. L. Gore & Associates) .....	128
4.5.4	Laparomesh (Assut Europe).....	130
4.5.5	Perfix Plug (C.R. Bard) .....	131
4.5.6	ProLoop Mesh (Atrium Medical).....	133
4.5.7	Surgimesh Easyplug (Aspide Medical).....	134
4.5.8	Surgimesh PET 3D (Aspide Medical).....	137
4.5.9	Surgimesh XD (Aspide Medical) .....	138
4.5.10	Repol Plug Cap (Angiologica).....	140
4.6	Biologic Hernia Meshes .....	141
4.6.1	Overview .....	141
4.6.2	AlloDerm Regenerative Tissue Matrix (LifeCell).....	144
4.6.3	Allomax Surgical Graft (Davol).....	146
4.6.4	Biodesign Hernia Graft (Cook Medical).....	149
4.6.5	Permacol Surgical Implant (Covidien).....	152
4.6.6	Strattice (LifeCell) .....	153
5	Unmet Needs .....	155
5.1	Overview.....	155
5.2	Specialized Laparoscopic Clinics .....	155
5.3	Increased investigation of TAPP versus TEP procedures .....	156

## Table of Contents

5.4	Competitive Pricing for Premium Hernia Meshes .....	157
5.5	Economic and Financial Impact of Laparoscopic Techniques .....	158
5.6	Research and Development of Self-Fixating Meshes .....	159
5.7	Registry for Laparoscopic Hernia Repair .....	160
<b>6</b>	<b>Pipeline Products .....</b>	<b>162</b>
6.1	Overview .....	162
6.2	Clinical Trial Analysis .....	163
6.2.1	Overview .....	163
6.2.2	Trials to Watch .....	163
<b>7</b>	<b>Industry Overview .....</b>	<b>165</b>
7.1	Procedure Trends .....	165
7.1.1	Global .....	165
7.1.2	US .....	170
7.1.3	France .....	171
7.1.4	Germany .....	172
7.1.5	Italy .....	173
7.1.6	Spain .....	174
7.1.7	UK .....	175
7.1.8	Japan .....	176
7.1.9	Brazil .....	177
7.1.10	China .....	178
7.1.11	India .....	179
7.2	Market Access .....	180

## Table of Contents

7.2.1	Cost Concerns.....	180
7.2.2	Group Purchasing Organizations.....	181
7.2.3	Distribution Networks.....	181
7.2.4	Access to Healthcare.....	182
7.3	Reimbursement Trends.....	183
7.3.1	Overview.....	183
7.3.2	US.....	183
7.3.3	5EU.....	184
7.3.4	South America.....	185
7.3.5	APAC.....	186
7.4	Regulatory Issues/Recalls.....	187
7.5	Added Indications.....	187
7.6	Mergers & Acquisitions/Key Partnerships.....	187
7.6.1	Baxter Acquires Synovis Life Technologies.....	187
7.6.2	Covidien Acquires Tissue Science Laboratories.....	188
8	Current and Future Players.....	189
8.1	Trends in Corporate Strategy.....	189
8.2	Company Profiles.....	190
8.2.1	Abiss Analytic Biosurgical Solutions.....	190
8.2.2	AMI: Agency for Medical Innovation.....	191
8.2.3	Angiologica.....	192
8.2.4	Aspide Medical.....	194
8.2.5	Assut Europe.....	195

## Table of Contents

8.2.6	Atrium Medical.....	196
8.2.7	B. Braun Surgical.....	198
8.2.8	Cook Medical.....	200
8.2.9	Cousin Biotech .....	201
8.2.10	Covidien .....	203
8.2.11	C.R. Bard.....	205
8.2.12	Ethicon .....	207
8.2.13	FEG Textiltechnik mbH.....	208
8.2.14	Proxy Biomedical.....	209
8.2.15	TEI Biosciences.....	210
8.2.16	W. L. Gore & Associates.....	212
<b>9</b>	<b>Market Drivers, Opportunities and Barriers.....</b>	<b>215</b>
9.1	Market Drivers.....	215
9.1.1	Consistent Hernia Prevalence.....	215
9.1.2	Transition from Open Hernia Repair to Laparoscopic Hernia Repair.....	215
9.1.3	Fall of Watchful Waiting .....	217
9.1.4	Residents Being Trained on Laparoscopic Technique .....	219
9.2	Opportunities .....	221
9.2.1	Invest in Composite Meshes Designed Specifically for Laparoscopic Repair .....	221
9.2.2	Market Meshes to Specialized Centers.....	222
9.2.3	Focus on Countries Experiencing Increasing Composite Mesh Adoption.....	223
9.2.4	Develop Business Relationships with Robotic Surgery Equipment Manufacturers .....	224
9.3	Market Barriers .....	225

## Table of Contents

9.3.1	Group Purchasing Organizations .....	225
9.3.2	Reimbursement .....	226
9.3.3	Cost .....	227
9.3.4	Self-Gripping Technology .....	227
9.3.5	Mosquito Net Mesh .....	229
<b>10</b>	<b>Country Outlooks &amp; Forecasts .....</b>	<b>231</b>
10.1	Major Markets Overview .....	231
10.1.1	Overall Hernia Repair Market .....	231
10.1.2	Overall Inguinal Hernia Repair Market .....	235
10.1.3	Overall Incisional Hernia Repair Market .....	237
10.1.4	Overall Umbilical Hernia Repair Market .....	239
10.2	US .....	241
10.2.1	Overall Hernia Repair Market .....	241
10.2.2	Inguinal Hernia Repair Market .....	244
10.2.3	Incisional Hernia Repair Market .....	244
10.2.4	Umbilical Hernia Repair Market .....	245
10.3	France .....	245
10.3.1	Overall Hernia Repair Market .....	245
10.3.2	Overall Inguinal Hernia Repair Market .....	247
10.3.3	Overall Incisional Hernia Repair Market .....	247
10.3.4	Overall Umbilical Hernia Repair Market .....	248
10.4	Germany .....	248
10.4.1	Overall Hernia Repair Market .....	248



## Table of Contents

10.4.2 Overall Inguinal Hernia Repair Market .....	250
10.4.3 Overall Incisional Hernia Repair Market .....	250
10.4.4 Overall Umbilical Hernia Repair Market .....	251
10.5 Italy .....	251
10.5.1 Overall Hernia Repair Market .....	251
10.5.2 Overall Inguinal Hernia Repair Market .....	253
10.5.3 Overall Incisional Hernia Repair Market .....	254
10.5.4 Overall Umbilical Hernia Repair Market .....	254
10.6 Spain .....	255
10.6.1 Overall Hernia Repair Market .....	255
10.6.2 Overall Inguinal Hernia Repair Market .....	256
10.6.3 Overall Incisional Hernia Repair Market .....	257
10.6.4 Overall Umbilical Hernia Repair Market .....	257
10.7 UK .....	258
10.7.1 Overall Hernia Repair Market .....	258
10.7.2 Overall Inguinal Hernia Repair Market .....	259
10.7.3 Overall Incisional Hernia Repair Market .....	260
10.7.4 Overall Umbilical Hernia Repair Market .....	260
10.8 Japan .....	260
10.8.1 Overall Hernia Repair Market .....	260
10.8.2 Overall Inguinal Hernia Repair Market .....	262
10.8.3 Overall Incisional Hernia Repair Market .....	262
10.8.4 Overall Umbilical Hernia Repair Market .....	262

## Table of Contents

10.9	Brazil.....	263
10.9.1	Overall Hernia Repair Market.....	263
10.9.2	Overall Inguinal Hernia Repair Market.....	264
10.9.3	Overall Incisional Hernia Repair Market.....	265
10.9.4	Overall Umbilical Hernia Repair Market.....	265
10.10	India.....	265
10.10.1	Overall Hernia Repair Market.....	265
10.10.2	Overall Inguinal Hernia Repair Market.....	267
10.10.3	Overall Incisional Hernia Repair Market.....	267
10.10.4	Overall Umbilical Hernia Repair Market.....	267
10.11	China.....	268
10.11.1	Overall Hernia Repair Market.....	268
10.11.2	Overall Inguinal Hernia Repair Market.....	269
10.11.3	Overall Incisional Hernia Repair Market.....	270
10.11.4	Overall Umbilical Hernia Repair Market.....	270
11	Appendix.....	271
11.1	Bibliography.....	271
11.2	Abbreviations.....	286
11.3	Report Methodology.....	287
11.3.1	Overview.....	287
11.3.2	Coverage.....	287
11.3.3	Primary Research.....	288
11.3.4	Secondary Research.....	288

## Table of Contents

11.3.5 Forecasting Methodology.....	289
11.4 General Surgeons and Herniologists Included in this Study .....	290
11.5 About the Authors .....	292
11.5.1 Joseph A. Gregory, Analyst, Surgical Devices .....	292
11.5.2 Derek Archila, MBA, Director of Research and Analysis, Medical Devices.....	292
11.6 Global Head of Healthcare .....	293
11.6.1 Bonnie Bain, Ph.D., Global Head of Healthcare .....	293
11.7 About MediPoint.....	294
11.8 About GlobalData.....	294
11.9 Disclaimer .....	294

## Table of Contents

### 1.1 List of Tables

Table 1: Layers of the Abdominal Wall .....	30
Table 2: Distribution by Sex in the Major Markets, 2012 .....	44
Table 3: Inguinal Hernia, Distribution by Age in the Major Markets, 2012.....	45
Table 4: Hernia Mesh Classifications .....	66
Table 5: Large Pore SWOT Analysis, 2013.....	69
Table 6: Product Profile – Angimesh R2.....	71
Table 7: Product Profile – Assumesh .....	72
Table 8: Product Profile – Cristalene.....	74
Table 9: Product Profile – Hexapro Mesh.....	75
Table 10: Product Profile – Optilene Mesh .....	76
Table 11: Product Profile – Optilene Mesh LP .....	77
Table 12: Product Profile – Optilene Mesh Elastic.....	78
Table 13: Product Profile – Omyra Mesh.....	80
Table 14: Product Profile – ProLite Ultra Mesh.....	82
Table 15: Product Profile – Surgimesh 1 & 2 and XLIGHT.....	83
Table 16: Product Profile – Surgimesh PET 2D.....	85
Table 17: Product Profile – Surgimesh WN .....	87
Table 18: Product Profile – Vypro Mesh .....	89
Table 19: Small Pore SWOT Analysis, 2013 .....	91
Table 20: Product Profile – Premilene Mesh .....	92
Table 21: Product Profile – Premilene Mesh Plug .....	93
Table 22: Product Profile – Prolene Mesh .....	95
Table 23: Product Profile – ProLite Mesh .....	97

## Table of Contents

Table 24: Product Profile – Repol Angimesh .....	98
Table 25: Composite Meshes SWOT Analysis, 2013 .....	100
Table 26: Product Profile – 4DDome .....	102
Table 27: Product Profile – B-Foil .....	103
Table 28: Product Profile – Biomesh CA.B.S. Air Composite .....	104
Table 29: Product Profile – C-QUR Mesh .....	106
Table 30: Product Profile – C-QUR TacShield .....	107
Table 31: Product Profile – C-QUR V-Patch .....	108
Table 32: Product Profile – C-QUR CentriFX .....	109
Table 33: Product Profile – C-QUR FX Mesh .....	110
Table 34: Product Profile – Parietex Composite .....	112
Table 35: Product Profile – Parietex ProGrip Self Fixating Mesh .....	113
Table 36: Product Profile – Sorbimesh .....	115
Table 37: Product Profile – Surgimesh Cible .....	116
Table 38: Product Profile – Surgimesh Diablo .....	118
Table 39: Product Profile – Surgimesh M.O.P.P. ....	119
Table 40: Product Profile – Surgimesh XB .....	121
Table 41: Product Profile – Ultrapro Mesh .....	122
Table 42: 3D Meshes SWOT Analysis, 2013 .....	125
Table 43: Product Profile – 3DMax Mesh .....	127
Table 44: Product Profile – Bio-A Hernia Plug .....	129
Table 45: Product Profile – Laparomesh .....	131
Table 46: Product Profile – Perfix Plug .....	132
Table 47: Product Profile – ProLoop FX Mesh .....	133

## Table of Contents

Table 48: Product Profile – Easyplug .....	136
Table 49: Product Profile – Surgimesh PET 3D.....	138
Table 50: Product Profile – Surgimesh XD .....	139
Table 51: Product Profile – Repol Plug Cap .....	140
Table 52: Biological Meshes SWOT Analysis, 2013 .....	142
Table 53: Product Profile – AlloDerm Regenerative Tissue Matrix .....	145
Table 54: Product Profile – Allomax Surgical Graft .....	147
Table 55: Product Profile – Biodesign Hernia Graft .....	150
Table 56: Product Profile – Permacol Surgical Implant.....	152
Table 57: Product Profile – Strattice.....	153
Table 58: Overall Unmet Needs – Current Level of Attainment and Importance.....	155
Table 59: Company Portfolio – Abyss Analytic Biosurgical Solutions .....	190
Table 60: Abyss Analytic Biosurgical Solutions SWOT Analysis, 2013 .....	191
Table 61: Company Portfolio – AMI: Agency for Medical Innovation .....	191
Table 62: AMI: Agency for Medical Innovation SWOT Analysis, 2013.....	192
Table 63: Company Portfolio – Angiologica.....	192
Table 64: Angiologica SWOT Analysis, 2012 .....	193
Table 65: Company Portfolio – Aspide Medical .....	194
Table 66: Aspide Medical SWOT Analysis, 2013.....	195
Table 67: Company Portfolio – Assut Europe .....	195
Table 68: Assut Europe SWOT Analysis, 2013 .....	196
Table 69: Company Portfolio – Atrium Medical.....	196
Table 70: Atrium Medical SWOT Analysis, 2013 .....	197
Table 71: Company Portfolio – B. Braun .....	199



## Table of Contents

Table 72: B. Braun SWOT Analysis, 2012.....	200
Table 73: Company Portfolio – Cook Medical.....	200
Table 74: Cook Medical SWOT Analysis, 2013 .....	201
Table 75: Company Portfolio – Cousin Biotech .....	202
Table 76: Cousin Biotech SWOT Analysis, 2013.....	202
Table 77: Company Portfolio – Covidien .....	203
Table 78: Covidien SWOT Analysis, 2013.....	204
Table 79: Company Portfolio – C. R. Bard .....	205
Table 80: C. R. Bard SWOT Analysis, 2013.....	206
Table 81: Company Portfolio – Ethicon .....	207
Table 82: Ethicon SWOT Analysis, 2013.....	208
Table 83: Company Portfolio – FEG Textiltechnik .....	208
Table 84: FEG Textiltechnik SWOT Analysis, 2013.....	209
Table 85: Company Portfolio – Proxy Biomedical.....	210
Table 86: Proxy Biomedical SWOT Analysis, 2013 .....	210
Table 87: Company Portfolio – TEI Biosciences.....	211
Table 88: TEI Biosciences SWOT Analysis, 2013 .....	211
Table 89: Company Portfolio – W. L. Gore & Associates.....	213
Table 90: W. L. Gore & Associates SWOT Analysis, 2012 .....	214
Table 91: Laparoscopic Adoption Across the Major Markets, 2012 and 2019 .....	216
Table 92: Composite Mesh Adoption in Inguinal Hernia Repair across Major Markets, 2012 and 2019 .....	223
Table 93: Composite Mesh Adoption in Incisional Hernia Repair across Major Markets, 2012 and 2019.....	224
Table 94: Global Hernia Repair Sales Forecast (\$bn) Forecast, 2010–2019.....	231
Table 95: Trends in Laparoscopic Inguinal Hernia Repair for Major Markets, 2012 and 2019 .....	237

## Table of Contents

Table 96: Trends in Laparoscopic Incisional Hernia Repair for Major Markets, 2012 and 2019 .....	239
Table 97: Trends in Laparoscopic Umbilical Hernia Repair for Major Markets, 2012 and 2019.....	241
Table 98: US Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	242
Table 99: France Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	246
Table 100: Germany Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019.....	249
Table 101: Italy Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	252
Table 102: Spain Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	255
Table 103: UK Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	258
Table 104: Japan Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	261
Table 105: Brazil Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	263
Table 106: India Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	266
Table 107: China Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019.....	268

## Table of Contents

## 1.2 List of Figures

Figure 1: Inguinal Hernia.....	31
Figure 2: Layers of the Abdominal Wall.....	32
Figure 3: Anatomy of an Umbilical Hernia .....	33
Figure 4: Indirect Inguinal Hernia .....	34
Figure 5: Direct Inguinal Hernia .....	35
Figure 6: Entrance Points for Laparoscopic Inguinal Hernia Repair .....	42
Figure 7: Prevalence of Total Inguinal Hernias in the US, 2010–2019 .....	47
Figure 8: Prevalence of Total Inguinal Hernias in the 5EU, 2010–2019 .....	48
Figure 9: Prevalence of Total Inguinal Hernias in South America, 2010–2019 .....	49
Figure 10: Prevalence of Total Inguinal Hernias in APAC, 2010–2019.....	50
Figure 11: Prevalence of Total Incisional Hernias in the US, 2010–2019 .....	52
Figure 12: Prevalence of Total Incisional Hernias in the 5EU, 2010–2019 .....	53
Figure 13: Prevalence of Total Incisional Hernias in South America, 2010–2019 .....	54
Figure 14: Prevalence of Total Incisional Hernias in APAC, 2010–2019 .....	55
Figure 15: Prevalence of Total Umbilical Hernias in the US, 2010–2019 .....	57
Figure 16: Prevalence of Total Umbilical Hernias in the 5EU, 2010–2019.....	58
Figure 17: Prevalence of Total Umbilical Hernias in South America, 2010–2019 .....	59
Figure 18: Prevalence of Total Umbilical Hernias in APAC, 2010–2019.....	60
Figure 19: Global Company Market Share, Large Pore Meshes, 2012 .....	70
Figure 20: Structure of Angimesh R2 .....	70
Figure 21: Structure of Assumesh.....	72
Figure 22: Structure of Cristalene .....	73
Figure 23: Structure of Hexapro Mesh .....	74

## Table of Contents

Figure 24: Structure of Optilene Mesh.....	76
Figure 25: Structure of Optilene Mesh LP .....	77
Figure 26: Structure of Optilene Mesh Elastic .....	78
Figure 27: Structure of Omyra Mesh .....	79
Figure 28: Structure of ProLite Ultra Mesh .....	81
Figure 29: Structure of Surgimesh 1 & 2 and XLIGHT .....	83
Figure 30: Structure of Surgimesh PET 2D .....	84
Figure 31: Structure of Surgimesh WN.....	86
Figure 32: Structure of Vypro Mesh.....	88
Figure 33: Global Company Market Share, Small Pore Meshes, 2012.....	91
Figure 34: Structure of Premilene Mesh .....	92
Figure 35: Structure of Premilene Mesh Plug .....	93
Figure 36: Structure of Prolene Mesh.....	94
Figure 37: Structure of ProLite Mesh.....	96
Figure 38: Structure of Repol Angimesh.....	98
Figure 39: Global Company Market Share, Composite Meshes, 2012 .....	101
Figure 40: Structure of the 4DDome.....	101
Figure 41: Structure of B-Foil.....	103
Figure 42: Structure of the Biomesh CA.B.S. Air Composite.....	104
Figure 43: Structure of C-QUR Mesh .....	105
Figure 44: Structure of C-QUR TacShield .....	106
Figure 45: Structure of C-QUR V-Patch .....	108
Figure 46: Structure of C-QUR CentriFX.....	109
Figure 47: Structure of C-QUR FX Mesh.....	110

## Table of Contents

Figure 48: Structure of Parietex Composite.....	111
Figure 49: Structure of Parietex ProGrip Self Fixating Mesh.....	113
Figure 50: Structure of Sorbimesh .....	114
Figure 51: Structure of Surgimesh Cible.....	115
Figure 52: Structure of Surgimesh Diablo.....	117
Figure 53: Structure of Surgimesh M.O.P.P. ....	118
Figure 54: Structure of Surgimesh XB.....	120
Figure 55: Structure of Ultrapro Mesh .....	122
Figure 56: Global Company Market Share, Composite Meshes, 2012.....	126
Figure 57: Structure of the 3DMax Mesh.....	126
Figure 58: Structure of the Bio-A Hernia Plug.....	128
Figure 59: Structure of Laparomesh.....	130
Figure 60: Structure of Perfix Plug .....	131
Figure 61: Structure of ProLoop Mesh .....	133
Figure 62: Structure of Surgimesh Easyplug Standard .....	134
Figure 63: Structure of Surgimesh WN Easyplug .....	135
Figure 64: Structure of Surgimesh WN Easyplug No Touch .....	135
Figure 65: Structure of Surgimesh PET 3D .....	137
Figure 66: Structure of Surgimesh XD.....	138
Figure 67: Structure of Repol Plug Cap.....	140
Figure 68: Global Company Market Share, Biological Meshes, 2012.....	143
Figure 69: Structure of the AlloDerm Regenerative Tissue Matrix.....	145
Figure 70: Structure of the Allomax Surgical Graft.....	147
Figure 71: Structure of the Biodesign Hernia Graft .....	149

## Table of Contents

Figure 72: Structure of the Permacol Surgical Implant.....	152
Figure 73: US Hernia Repair Procedure Volumes, 2010 to 2019 .....	166
Figure 74: 5EU Hernia Repair Procedure Volumes, 2010 to 2019 .....	167
Figure 75: South American Hernia Repair Procedure Volumes, 2010 to 2019 .....	168
Figure 76: APAC Hernia Repair Procedure Volumes, 2010 to 2019 .....	169
Figure 77: Open versus Laparoscopic Procedure Volumes, US, 2010–2019 .....	170
Figure 78: Open versus Laparoscopic Procedure Volumes, France, 2010–2019 .....	171
Figure 79: Open versus Laparoscopic Procedure Volumes, Germany, 2010–2019.....	172
Figure 80: Open versus Laparoscopic Procedure Volumes, Italy, 2010–2019.....	173
Figure 81: Open versus Laparoscopic Procedure Volumes, Spain, 2010–2019 .....	174
Figure 82: Open versus Laparoscopic Procedure Volumes, UK, 2010–2019 .....	175
Figure 83: Open versus Laparoscopic Procedure Volumes, Japan, 2010–2019.....	176
Figure 84: Open versus Laparoscopic Procedure Volumes, Brazil, 2010–2019 .....	177
Figure 85: Open versus Laparoscopic Procedure Volumes, China, 2010–2019.....	178
Figure 86: Open versus Laparoscopic Procedure Volumes, India, 2010–2019 .....	179
Figure 87: Global Hernia Repair Sales Forecast (\$m) 2010–2019 .....	232
Figure 88: Composition of Global Hernia Market, 2012 and 2019 .....	233
Figure 89: Global Hernia Mesh Repair Market by Geography, 2012 and 2019.....	234
Figure 90: Global Inguinal Hernia Mesh Repair Market by Geography, 2012 and 2019 .....	236
Figure 91: Global Incisional Hernia Mesh Repair Market by Geography, 2012 and 2019 .....	238
Figure 92: Global Umbilical Hernia Mesh Repair Market by Geography, 2012 and 2019.....	240
Figure 93: US Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019.....	243
Figure 94: France Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	246
Figure 95: Germany Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	249



## Table of Contents

Figure 96: Italy Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	253
Figure 97: Spain Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019.....	256
Figure 98: UK Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019.....	259
Figure 99: Japan Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	261
Figure 100: Brazil Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	264
Figure 101: India Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019 .....	266
Figure 102: China Hernia Mesh Repair Sales (\$m) Forecast, 2010–2019.....	269

SAMPLE

## Introduction

## 2 Introduction

Hernia is a term used to describe the protrusion of an internal organ or tissue through a weak portion of a muscle or connective tissue. The majority of hernias occur in the abdomen, where they are caused by a combination of increased abdominal pressure and a weakness in a particular portion of the abdomen (which is often present at birth). Certain conditions such as obesity and persistent coughing can cause an increase in intra-abdominal pressure and contribute to hernia development.

There are several types and subtypes of hernias, classified based on their location, pathophysiology, and the presence of the condition or contributing factors at birth. There are three hernia types that essentially comprise the entire hernia market, inguinal (71%), umbilical (14%), and incisional (4.7%) (Dabbas et al., 2011). While another form of hernia, epigastric, was found to have a slightly higher prevalence than incisional (6.6%), it is not the focal point of medical and industry research as incisional hernia repairs are. Inguinal hernias occur when intra-abdominal contents protrude through a weak spot in the abdominal wall near the groin. Incisional hernias develop after an incision from an abdominal surgery does not properly heal. Umbilical hernias are protrusions of intra-abdominal contents through the abdominal wall near the naval region. The most common symptom with these types of hernias is persistent pain, which is present in varying degrees.

Since the various types of hernias differ in patients by severity, the amount of resultant pain can range from nonexistent to debilitating. Currently, a debate exists amongst surgeons over whether to surgically manage a hernia upon its diagnosis or to wait until the hernia begins producing debilitating symptoms. Thus the percentage of patients with a particular type of hernia that are surgically managed varies between geographies.

## Introduction

When discussing those patients that decide to undergo surgical interventions for their hernia, the topic will typically turn towards the method of operation. We are in the midst of a tidal shift from the standard method of open repair to the technically difficult method of laparoscopic repair. The laparoscopic approach has been shown to decrease hospital stays but is characterized by a longer learning curve and the potential for serious complications (Salameh et al., 2002). Additionally, the procedure has been shown to decrease recurrence rates and reduce postoperative pain (Liem et al., 1997). With this transition to a minimally invasive technique comes the utilization of a new type of mesh.

This report focuses on the adoption patterns in hernia mesh and surgical techniques in 10 major global markets (the United States, France, Germany, Italy, Spain, the United Kingdom, Japan, Brazil, China and India) presently and through 2019.

### 2.1 Catalyst

The advancement of hernia repair has been hallmarked by three significant shifts in surgical treatment. The first was the transition from the “tension” techniques, which involved the use of sutures to tie adjacent tissue layers together, to a “tension-free” technique that incorporated flat sheets of mesh to bridge the defect. The second transition was the overwhelming adoption of large pore meshes in replacement of small pore meshes. Both shifts were prompted by improvements in patient outcomes. The third transition is currently underway as surgeons adopt the laparoscopic technique over the standard open technique.

Instead of a large abdominal incision, a laparoscopic repair involves several small incisions in the abdominal cavity. Clinical trials have found favorable outcomes for both patients and surgeons, including lower recurrence rates, lower post-operative pain rates and a decreased recovery time. This transition is significant to medical device manufacturers because it affects the types of meshes that surgeons will be using in the future. This means that certain mesh products from a company's portfolio will become less utilized in favor of other products that are more applicable to the needs of minimally invasive surgery. As more players enter the market and operations become international, it is increasingly imperative that companies understand how to properly adapt to growing trends in order to succeed. This report examines the implications of this transition and discusses how medical device companies can capitalize on it to gain market share.

## Appendix

### 11.7 About MediPoint

MediPoint is the flagship product for GlobalData's Medical team. Each MediPoint report is built from the ground up by our team of healthcare analysts in the US and UK. Each report includes input from experienced physicians and leading Key Opinion Leaders (KOL). Running throughout each report in the series, "What Physicians Think" quotes provide a unique insight into how healthcare professionals are reacting to events within the industry, and what their responses could mean for industry strategists.

### 11.8 About GlobalData

GlobalData is a leading global provider of business intelligence in the Healthcare industry. GlobalData provides its clients with up-to-date information and analysis on the latest developments in drug research, disease analysis, and clinical research and development. Our integrated business intelligence solutions include a range of interactive online databases, analytical tools, reports and forecasts. Our analysis is supported by a 24/7 client support and analyst team. GlobalData has offices in New York, Boston, London, India and Singapore.

### 11.9 Disclaimer

All Rights Reserved.

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the publisher, GlobalData.