SYSTEMIC LUPUS ERYTHEMATOSUS AND LUPUS NEPHRITIS – GLOBAL DRUG FORECAST AND MARKET ANALYSIS TO 2022 - EVENT-DRIVEN UPDATE
### Systemic Lupus Erythematosus (SLE) Key Metrics

<table>
<thead>
<tr>
<th>2012 Epidemiology</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalent Population</td>
<td>452,053</td>
</tr>
<tr>
<td>Treated Population</td>
<td>349,412</td>
</tr>
<tr>
<td>2012 Market Sales</td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>$362.6m</td>
</tr>
<tr>
<td>5EU</td>
<td>$39.2m</td>
</tr>
<tr>
<td>Japan</td>
<td>$69.7m</td>
</tr>
<tr>
<td>Total 7MM</td>
<td>$471.5m</td>
</tr>
</tbody>
</table>

### Pipeline Assessment

- Number of drugs in Phase IIb–III: 11
- Number of first-in-class drugs: 8

### Most Promising Pipeline Drugs

- **Epratuzumab**: $180.6m
- **Blisibimod**: $109.7m

### Key Events (2012–2022)

- Launch of GSK’s Benlysta in Japan in 2016: ↑↑
- Launch of UCB/Immunomedics’ epratuzumab in US (2017), 5EU (2018), and Japan (2019): ↑↑
- Roche/Biogen Idec’s Rituxan patent expiry in 5EU (2018) and US (2019): ↓↓
- Launch of Anthera/Amgen/Zenyaku Kogyo’s blisibimod in US (2019), 5EU (2020), and Japan (2021): ↑↑

### 2022 Market Sales

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
</tr>
<tr>
<td>5EU</td>
</tr>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>Total 7MM</td>
</tr>
</tbody>
</table>

### Lupus Nephritis (LN) Key Metrics

<table>
<thead>
<tr>
<th>2012 Epidemiology</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalent Population</td>
<td>82,992</td>
</tr>
<tr>
<td>Treated Population</td>
<td>68,096</td>
</tr>
<tr>
<td>2012 Market Sales</td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>$154.2m</td>
</tr>
<tr>
<td>5EU</td>
<td>$14.2m</td>
</tr>
<tr>
<td>Japan</td>
<td>$44.5m</td>
</tr>
<tr>
<td>Total 7MM</td>
<td>$216.6m</td>
</tr>
</tbody>
</table>

### Pipeline Assessment

- Number of drugs in Phase IIb–III: 4
- Number of first-in-class drugs: 3

### Most Promising Pipeline Drugs

- **Benlysta**: $145.0m
- **Orencia**: $37.0m

### Key Events (2012–2022)

- Roche/Biogen Idec’s Rituxan patent expiry in 5EU (2018) and US (2019): ↓↓
- Label expansion of GSK’s Benlysta for LN in US and 5EU (2020): ↑↑
- Label expansion of BMS/Ono/Repligen’s Orencia for LN in US (2021) and 5EU (2022): ↑↑

### 2022 Market Sales

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
</tr>
<tr>
<td>5EU</td>
</tr>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: GlobalData.

*7MM = US, France, Germany, Italy, Spain, UK and Japan; 5EU = France, Germany, Italy, Spain, UK.*
Executive Summary

Sales for SLE and LN by Region, 2012–2022

GlobalData estimates 2012 Systemic Lupus Erythematosus (SLE) drug sales were over $470m across the seven major markets covered in this report: US, France, Germany, Italy, Spain, UK, and Japan. By the end of the forecast period in 2022, sales will grow to over $1.5 billion with a CAGR of 12.39%.

Focusing on Lupus Nephritis (LN), GlobalData estimates 2012 drug sales were over $212m across the seven major markets covered in this report. By the end of the forecast period in 2022, sales will grow to over $520m with a CAGR of 9.35%.

The growth in the SLE and LN therapeutics will be driven by:

- Increasing uptake of biologics, including GlaxoSmithKline’s Benlysta (belimumab), the only approved biologic for SLE, and off-label use of Roche/Biogen Idec’s Rituxan
- The launch of Benlysta in Japan in 2016
- The launch of new biologic drugs during the second half of the forecast period
- The increasing number of prevalent cases of SLE and LN

GlobalData estimates the uptake of new biologic drugs that will enter the SLE and LN markets will be initially low. Biologic drugs will primarily target lupus patients with high disease activity (approximately 10%–15% of all SLE patients) and therefore, currently marketed biologic drugs and new entrants will compete for a small segment of the total SLE patient population. This view is based on the available clinical trial data to date for Benlysta, the clinical trial design for current pipeline products and GlobalData’s primary research.
Executive Summary

Figure below presents the sales for SLE and LN by region in the seven major markets during the forecast period.

### Sales for SLE and LN by Region, 2012–2022

**2012**
- **SLE**: $471.5m
  - US: 77%
  - EU: 15%
  - Japan: 8%
- **LN**: $212.8m
  - US: 72%
  - EU: 21%
  - Japan: 7%

**2022**
- **SLE**: $1,516.6m
  - US: 83%
  - EU: 9%
  - Japan: 8%
- **LN**: $520.2m
  - US: 83%
  - EU: 12%
  - Japan: 5%

Source: GlobalData
Executive Summary

R&D and Corporate Strategies

- Development of me-too and first-in-class therapies: Companies will be focused on the development of me-too and potential first-in-class products during the 10-year forecast period. Anthera and Merck Serono are developing me-too anti-BLyS biologic products, which will directly compete with GlaxoSmithKline (GSK)'s marketed anti-BLyS therapy, Benlysta. In contrast, UCB, Bristol-Myers Squibb (BMS), ImmuPharma, AstraZeneca, Pfizer, and Biogen Idec are pursuing the development of products with novel mechanisms of action (MOAs).

- Partnerships and acquisitions: GSK entered the lupus market with the complete acquisition of Human Genome Sciences, the company that initially developed Benlysta. An additional example is the partnership between UCB and Immunomedics for the development of epratuzumab, where UCB with its global capabilities and focus on the immunology therapy area is leading the development of this agent for lupus. On the other hand, pharmaceutical companies with limited financial resources and capabilities, such as Anthera and ImmuPharma, are actively looking to enter into agreements and partnerships with other market players in order to develop their products.

- Focusing on LN: GSK’s Benlysta and BMS/Ono/Repligen’s Orencia are being developed for the treatment of LN. Benlysta is already indicated for the treatment of SLE, while Orencia initially failed clinical trials for SLE, but BMS is now focusing its efforts on the LN market because patients with LN generally have high disease activity, and therefore Orencia is more likely to demonstrate clinical efficacy in this patient population pool. On this basis and with the majority of pipeline products being initially developed for the treatment of SLE, GlobalData believes that a corporate strategy for emerging developers within this market is to pursue product development for the treatment of LN to either lead to label expansion for an existing SLE-approved therapy or rescue potential pipeline products following unsuccessful clinical trials in patients with general lupus.
Executive Summary

Figure below provides an analysis of the company portfolio gap analysis in SLE and LN during the forecast period.

Company Portfolio Gap Analysis in SLE and LN, 2012–2022

<table>
<thead>
<tr>
<th>Strength of Pipeline</th>
<th>Current Players</th>
<th>Current and Future Players</th>
<th>Future Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Unmet Needs in SLE and LN

The lupus therapeutics market is characterized by significant unmet needs. The most pressing unmet need is the development of new therapies that will offer potent clinical benefits, have a positive safety profile and increase the available treatment options for patients. Patients with LN are greatly underserved with currently available treatments, which consist mainly of immunosuppressives and steroids, are ineffective in a large number of patients and expose them to enormous treatment toxicity. The mortality of lupus patients remains high when compared with the general population. There are also no available pharmacotherapies to effectively ameliorate symptoms such as fatigue, fibromyalgia (widespread generalized pain) and cognitive dysfunction, which are commonly experienced by lupus patients and have a negative impact on their quality of life.

New Entrant Opportunities and Future Landscape

GlobalData foresees that seven products could potentially enter the lupus market during the 2012-2022 forecast period. Anthera/Amgen/Zenyaku Kogyo’s blisibimod, and Merck Serono’s atacicept have anti-BLyS properties and will directly compete with the only approved biologic, GSK’s Benlysta. These products will have the opportunity to offer new treatment options for patients who do not respond to or cannot tolerate Benlysta, as well as offer the option of being administered subcutaneously, which is a more convenient route of administration when compared with the intravenous dosing of Benlysta. However, the chance to be first to offer a more patient-friendly drug delivery will be hindered with the expected launch of Benlysta’s subcutaneous formulation in 2016 in the US and EU, which is prior to the expected launch of blisibimod, and atacicept in the same markets.
Executive Summary

UCB/Immunomedics’ epratuzumab, ImmuPharma’s Lupuzor, AstraZeneca/BMS’s sifalimumab and Pfizer’s PF-04236921 are first-in-class therapies and have the potential to offer new treatment options that could be more effective and improve clinical outcomes to a larger patient population with lupus, and as such will have the opportunity to effectively compete with anti-BLyS therapies and benefit from the uptake of lupus patients with less active disease.

BMS/Ono/Repligen’s Orencia, an anti-CD80/CD86 biologic and first-in-class therapy, is targeting patients with LN and has the opportunity to enter a segment of the lupus market where a high percentage of patients, approximately 30%, do not respond to available treatments.

The launch of new biologic drugs will increase treatment options, improve treatment management, and drive growth in the SLE and LN markets. Although the need for safe and effective new treatments is paramount for patients with lupus, products in the pipeline are expected to face many challenges in gaining patient share following their entry into the lupus market. New entrants will be required to demonstrate their clinical benefits to gain physicians’ and patients’ confidence for their use, overcome reimbursement challenges, and will face increasing competition from competing biologic products and inexpensive, potent immunosuppressive and steroid therapies.

Figure below provides a competitive assessment of late-stage pipeline agents in SLE and LN.

What Do the Physicians Think?

Physicians think that GSK’s Benlysta is not a breakthrough therapy for the treatment of lupus, but they recognize that they need to gain more experience in using Benlysta in the clinic and that this product has a place in the management of patients with lupus.
Executive Summary

“I think it [Benlysta] works for some patients. I think it mostly works in patients who have musculoskeletal or lupus cutaneous manifestations and is most helpful in patients who do not respond to more conventional therapies. I think that is probably its role and we will know in the future whether to use [Benlysta] in patients for the maintenance phase of nephritis and whether it works in other manifestations; that is, cardiovascular, pericardial, etc. We just need more time to use it and build some experience about it.”

[US] Key Opinion Leader

The unsuccessful clinical trials of Roche/Biogen Idec’s Rituxan in patients with lupus have not discouraged physicians from using this drug off-label, and they will continue to use it for the treatment of SLE and LN in the future.

“The trials are negative, but our own experiences have been good and we will continue to use it.”

[OUS] Key Opinion Leader

The development of new drugs that are more efficacious and safer than currently available treatments remains the most pressing unmet need for the management of patients with SLE and LN.

“We need drugs that are safe, drugs that are more effective, drugs that will put patients into remission.”

[US] Key Opinion Leader

With high R&D activity in lupus therapeutics, physicians are looking forward to pipeline products becoming available in the market, which will enable them to improve patients’ treatment.

“We are hopefully at the edge of getting new drugs available for treating our lupus patients and hopefully this will become true not only in the pipeline, but also in reality, and then we need to identify the best strategies on how we put all these available drugs in clinical practice.”

[OUS] Key Opinion Leader

UCB/Immunomedics’ epratuzumab is the most promising drug in the pipeline for patients with lupus.

“That [epratuzumab] is the one that has most excitement going on and certainly I hope it delivers. Everybody in the world is very excited about this one.”

[US] Key Opinion Leader
# Table of Contents

1 **Table of Contents** ....................................................................................................................... 9

1.1 List of Tables .................................................................................................................... 18

1.2 List of Figures ................................................................................................................... 24

2 **Introduction** ....................................................................................................................... 26

2.1 Catalyst............................................................................................................................. 26

2.2 Related Reports ................................................................................................................ 26

2.3 Upcoming Related Reports ............................................................................................... 27

3 **Disease Overview** ............................................................................................................. 28

3.1 Etiology and Pathophysiology ........................................................................................... 28

3.1.1 Etiology ......................................................................................................................... 28

3.1.2 Pathophysiology ............................................................................................................ 30

3.2 Prognosis .......................................................................................................................... 31

3.3 Quality of Life .................................................................................................................... 31

3.4 Symptoms .......................................................................................................................... 32

4 **Epidemiology** .................................................................................................................... 33

4.1 Risk Factors and Comorbidities ......................................................................................... 33

4.1.1 Women are at a higher risk of developing SLE than men .............................................. 33

4.1.2 Caucasians are at lower risk of developing SLE than other ethnicities ...................... 34

4.1.3 Familial history has been associated with an increased risk of developing SLE .......... 35

4.1.4 Certain occupational and environmental exposures trigger SLE .............................. 36

4.2 Global Trends ...................................................................................................................... 37
# Table of Contents

4.2.1 US ........................................................................................................................................ 38
4.2.2 5EU .................................................................................................................................... 39
4.2.3 Japan ............................................................................................................................... 42
4.3 Forecast Methodology ......................................................................................................... 42
4.4 Sources Used ..................................................................................................................... 44
4.4.1 US .................................................................................................................................... 44
4.4.2 France ............................................................................................................................... 46
4.4.3 Germany .......................................................................................................................... 46
4.4.4 Italy ................................................................................................................................... 46
4.4.5 Spain .................................................................................................................................. 47
4.4.6 UK ..................................................................................................................................... 47
4.4.7 Japan .................................................................................................................................. 48
4.5 Sources Not Used ................................................................................................................ 49
4.5.1 US .................................................................................................................................... 49
4.5.2 5EU .................................................................................................................................... 49
4.5.3 Japan .................................................................................................................................. 50
4.6 Forecast Assumptions and Methods .................................................................................. 50
4.6.1 US .................................................................................................................................... 51
4.6.2 5EU .................................................................................................................................... 51
4.6.3 Japan .................................................................................................................................. 54
4.7 Epidemiological Forecast of SLE (2012–2022) ...................................................................... 55
4.7.1 Diagnosed Prevalent Cases of SLE .................................................................................. 55
4.7.2 Age-Specific Prevalent Cases of SLE .............................................................................. 57
4.7.3  Sex-Specific Prevalent Cases of Diagnosed SLE .......................................................... 59
4.7.4  Age-Standardized Prevalence of SLE ........................................................................ 60
4.7.5  Diagnosed Prevalent Cases of LN ......................................................................... 61
4.7.6  Prevalent Cases of LN, Segmented by Class ............................................................ 63
4.8  Discussion ....................................................................................................................... 65
4.8.1  Conclusions on Epidemiology Trends ..................................................................... 65
4.8.2  Limitations of the Analysis ....................................................................................... 66
4.8.3  Strengths of the Analysis ......................................................................................... 67
5  Disease Management ......................................................................................................... 69
5.1  Diagnosis Overview ..................................................................................................... 69
5.1.1  SLE Diagnosis ........................................................................................................ 69
5.1.2  LN Diagnosis .......................................................................................................... 72
5.2  Treatment Overview ................................................................................................... 74
5.3  US ................................................................................................................................. 78
5.3.1  Diagnosis ................................................................................................................ 78
5.3.2  Clinical Practice ...................................................................................................... 79
5.4  France ......................................................................................................................... 81
5.4.1  Diagnosis ................................................................................................................ 81
5.4.2  Clinical Practice ...................................................................................................... 81
5.5  Germany ....................................................................................................................... 82
5.5.1  Diagnosis ................................................................................................................ 82
5.5.2  Clinical Practice ...................................................................................................... 83
5.6  Italy ............................................................................................................................... 85
# Table of Contents

5.6.1 Diagnosis ...................................................................................................................... 85  
5.6.2 Clinical Practice............................................................................................................... 85  
5.7 Spain ................................................................................................................................ 86  
5.7.1 Diagnosis ...................................................................................................................... 86  
5.7.2 Clinical Practice............................................................................................................... 87  
5.8 UK..................................................................................................................................... 88  
5.8.1 Diagnosis ...................................................................................................................... 88  
5.8.2 Clinical Practice............................................................................................................... 89  
5.9 Japan ................................................................................................................................ 90  
5.9.1 Diagnosis ...................................................................................................................... 90  
5.9.2 Clinical Practice............................................................................................................... 91  
6 Competitive Assessment .......................................................................................................... 93  
6.1 Overview ........................................................................................................................... 93  
6.2 Strategic Competitor Assessment ..................................................................................... 93  
6.3 Product Profiles – Major Brands .................................................................................... 94  
6.3.1 Antimalarial Therapy (numerous brand names) .......................................................... 94  
6.3.2 Steroids (numerous brand names) .............................................................................. 100  
6.3.3 Methotrexate (numerous brand names) .................................................................... 105  
6.3.4 Mycophenolate Mofetil (numerous brand names) ..................................................... 109  
6.3.5 Cyclophosphamide (numerous brand names) .............................................................. 114  
6.3.6 Azathioprine (numerous brand names) ...................................................................... 119  
6.3.7 Calcineurin Inhibitors (numerous brand names) ........................................................ 123  
6.3.8 Benlysta (belimumab) ............................................................................................... 128
# Table of Contents

6.3.9 Rituxan (rituximab) ...................................................................................................... 137  
6.3.10 Minor Therapeutic Classes .................................................................................. 142  

7  Opportunity and Unmet Need .................................................................................. 144  

7.1 Overview ......................................................................................................................... 144  
7.2 Unmet Needs ................................................................................................................... 145  
    7.2.1 Efficacious Treatments with Reduced Side Effects ...................................................... 145  
    7.2.2 Management of LN ..................................................................................................... 146  
    7.2.3 Improvement in Patients' Mortality ............................................................................. 147  
    7.2.4 Management of Lupus Comorbidities ...................................................................... 148  
    7.2.5 Sensitive and Reliable Biomarkers ........................................................................... 149  
    7.2.6 Physicians’ Education and Public Awareness of SLE .................................................. 149  
    7.2.7 Unmet Needs Gap Analysis ...................................................................................... 150  
7.3 Opportunities ................................................................................................................. 151  
    7.3.1 Efficacious and Safe Therapies ............................................................................... 151  
    7.3.2 Therapies Targeting LN Patients ............................................................................. 152  
    7.3.3 Treatments for Common Lupus Comorbidities ............................................................ 153  
    7.3.4 Discovery of Biomarkers ........................................................................................... 153  

8  Pipeline Assessment ........................................................................................................... 154  

8.1 Overview ......................................................................................................................... 154  
8.2 Clinical Trial Mapping ..................................................................................................... 154  
    8.2.1 Clinical Trials by Therapy Type ................................................................................. 154  
8.3 Promising Drugs in Clinical Development .................................................................... 155  
    8.3.1 Blisibimod (A-623) ................................................................................................... 156
# Table of Contents

8.3.2 Atacicept ................................................................. 164
8.3.3 Epratuzumab ........................................................... 171
8.3.4 Lupuzor (rigerimod) ................................................. 179
8.3.5 Orencia (abatacept) ................................................. 185
8.3.6 Sifalimumab (MEDI-545) ......................................... 192
8.3.7 PF-04236921 ............................................................ 198
8.3.8 Anifrolumab (MEDI-546) ......................................... 204
8.3.9 Lulizumab Pegol (BMS-931699) ................................. 206
8.3.10 BIIB023 ................................................................. 208
8.3.11 Voclosporin ............................................................ 210
8.4 Other Drugs in Development ....................................... 213

9 Current and Future Players ............................................. 214
9.1 Overview ................................................................. 214
9.2 Trends in Corporate Strategy ....................................... 216
9.3 Company Profiles ..................................................... 217
  9.3.1 GlaxoSmithKline .................................................. 217
  9.3.2 Roche ................................................................. 219
  9.3.3 UCB ................................................................. 222
  9.3.4 Bristol-Myers Squibb .............................................. 223
  9.3.5 Anthera .............................................................. 225
  9.3.6 ImmuPharma ....................................................... 227
  9.3.7 Merck Serono ...................................................... 228
  9.3.8 AstraZeneca ........................................................ 230
## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.3.9</td>
<td>Pfizer</td>
<td>232</td>
</tr>
<tr>
<td>10</td>
<td>Market Outlook</td>
<td>234</td>
</tr>
<tr>
<td>10.1</td>
<td>Global Markets</td>
<td>234</td>
</tr>
<tr>
<td>10.1.1</td>
<td>Forecast</td>
<td>234</td>
</tr>
<tr>
<td>10.1.2</td>
<td>Drivers and Barriers – Global Issues</td>
<td>242</td>
</tr>
<tr>
<td>10.2</td>
<td>US</td>
<td>244</td>
</tr>
<tr>
<td>10.2.1</td>
<td>Forecast</td>
<td>244</td>
</tr>
<tr>
<td>10.2.2</td>
<td>Key Events</td>
<td>249</td>
</tr>
<tr>
<td>10.2.3</td>
<td>Drivers and Barriers</td>
<td>249</td>
</tr>
<tr>
<td>10.3</td>
<td>France</td>
<td>251</td>
</tr>
<tr>
<td>10.3.1</td>
<td>Forecast</td>
<td>251</td>
</tr>
<tr>
<td>10.3.2</td>
<td>Key Events</td>
<td>256</td>
</tr>
<tr>
<td>10.3.3</td>
<td>Drivers and Barriers</td>
<td>256</td>
</tr>
<tr>
<td>10.4</td>
<td>Germany</td>
<td>258</td>
</tr>
<tr>
<td>10.4.1</td>
<td>Forecast</td>
<td>258</td>
</tr>
<tr>
<td>10.4.2</td>
<td>Key Events</td>
<td>262</td>
</tr>
<tr>
<td>10.4.3</td>
<td>Drivers and Barriers</td>
<td>262</td>
</tr>
<tr>
<td>10.5</td>
<td>Italy</td>
<td>263</td>
</tr>
<tr>
<td>10.5.1</td>
<td>Forecast</td>
<td>263</td>
</tr>
<tr>
<td>10.5.2</td>
<td>Key Events</td>
<td>268</td>
</tr>
<tr>
<td>10.5.3</td>
<td>Drivers and Barriers</td>
<td>268</td>
</tr>
<tr>
<td>10.6</td>
<td>Spain</td>
<td>269</td>
</tr>
<tr>
<td>10.6.1</td>
<td>Forecast</td>
<td>269</td>
</tr>
</tbody>
</table>
# Table of Contents

10.6.2 Key Events.................................................................................................................. 274  
10.6.3 Drivers and Barriers.................................................................................................. 274  
10.7 UK................................................................................................................................... 275  
10.7.1 Forecast...................................................................................................................... 275  
10.7.2 Key Events.................................................................................................................. 280  
10.7.3 Drivers and Barriers.................................................................................................... 280  
10.8 Japan.............................................................................................................................. 281  
10.8.1 Forecast...................................................................................................................... 281  
10.8.2 Key Events.................................................................................................................. 286  
10.8.3 Drivers and Barriers.................................................................................................... 286  
11 Appendix................................................................................................................................. 288  
11.1 Bibliography .................................................................................................................... 288  
11.2 Abbreviations .................................................................................................................. 306  
11.3 Methodology ................................................................................................................... 311  
11.4 Forecasting Methodology................................................................................................ 311  
11.4.1 Diagnosed SLE and LN Patients ................................................................................. 311  
11.4.2 Percent Drug-Treated Patients .................................................................................... 312  
11.4.3 Drugs Included in Each Therapeutic Class................................................................. 312  
11.4.4 Launch and Patent Expiry Dates ............................................................................... 312  
11.4.5 General Pricing Assumptions ..................................................................................... 313  
11.4.6 Individual Drug Assumptions .................................................................................... 314  
11.4.7 Generic Erosion ......................................................................................................... 317  
11.4.8 Pricing of Pipeline Agents........................................................................................... 318
## Table of Contents

11.5 Physicians and Specialists Included in this Study ........................................................... 319
11.6 Primary Research – Prescriber Survey ........................................................................... 321
11.7 About the Authors ........................................................................................................... 322
  11.7.1 Analysts ...................................................................................................................... 322
  11.7.2 Epidemiologist ............................................................................................................. 323
  11.7.3 Global Head of Healthcare .......................................................................................... 323
11.8 About GlobalData ............................................................................................................ 324
11.9 Disclaimer ....................................................................................................................... 324
Table of Contents

1.1 List of Tables

Table 1: Symptoms of SLE .......................................................................................................................... 32
Table 2: Risk Factors Associated with SLE .................................................................................................. 33
Table 3: World Health Organization Morphologic Classification of Lupus Nephritis (Modified in 1982) ....... 43
Table 4: Sources of Prevalence Data Used in this Analysis........................................................................ 44
Table 5: 7MM, Prevalent Cases of Diagnosed SLE, All Ages, Both Sexes, N, Select Years 2012–2022 ........... 56
Table 6: 7MM, Prevalent Cases of Diagnosed SLE, by Age, Both Sexes, N, Row (%), 2012 ......................... 58
Table 7: 7MM, Prevalent Cases of Diagnosed SLE, All Ages, by Sex, N, Row (%), 2012 ........................... 59
Table 8: 7MM, Prevalent Cases of Diagnosed LN, All Ages, Both Sexes, N, Select Years 2012–2022 ............ 62
Table 9: 6MM, Prevalent Cases in the Different Classes of LN, All Age, Both Sexes, N, Row (%), 2012 ......... 64
Table 10: 1997 Updated ACR Criteria for Classification of SLE ................................................................. 70
Table 11: The SLICC Clinical and Immunologic Criteria for Classification of SLE ................................. 71
Table 12: WHO and ISN/RPS classifications of LN ................................................................................... 73
Table 13: Treatment Guidelines for SLE and LN ....................................................................................... 76
Table 14: Most Prescribed Drugs for SLE and LN by Class in the Global Markets ................................... 77
Table 15: Leading Treatments for SLE and LN, 2015 .................................................................................. 94
Table 16: Product Profile – Hydroxychloroquine ...................................................................................... 96
Table 17: Antimalarial Therapy SWOT Analysis, 2015 ............................................................................ 98
Table 18: Global SLE Sales Forecasts ($m) for Antimalarial Therapy, 2012–2022 ...................................... 99
Table 19: Global LN Sales Forecasts ($m) for Antimalarial Therapy, 2012–2022 ....................................... 99
Table 20: Product Profile – Steroids .......................................................................................................... 102
Table 21: Steroids SWOT Analysis, 2015 ................................................................................................... 103
Table 22: Global SLE Sales Forecasts ($m) for Steroid Therapy, 2012–2022 .............................................. 104
Table 23: Global LN Sales Forecasts ($m) for Steroid Therapy, 2012–2022 .............................................. 104
Table of Contents

1. Introduction ................................................................................................................................................................................. 1
2. Systemic Lupus Erythematosus and Lupus Nephritis Overview .................................................................................................................. 2
   2.1. Pathophysiology ........................................................................................................................................................................... 2
   2.2. Diagnosis and Classification ......................................................................................................................................................... 3
   2.3. Treatment ....................................................................................................................................................................................... 4
3. Drug Forecast and Market Analysis to 2022 ....................................................................................................................................... 8
4. Methotrexate .................................................................................................................................................................................... 9
   4.1. Product Profile .............................................................................................................................................................................. 9
   4.2. Methotrexate SWOT Analysis, 2015 ......................................................................................................................................... 10
   4.3. Global SLE Sales Forecasts ($m) for MTX, 2012–2022 .............................................................................................................. 11
   4.4. Global LN Sales Forecasts ($m) for MTX, 2012–2022 ................................................................................................................ 11
5. Mycophenolate Mofetil ....................................................................................................................................................................... 12
   5.1. Product Profile ............................................................................................................................................................................... 12
   5.2. Mycophenolate Mofetil SWOT Analysis, 2015 ......................................................................................................................... 13
   5.3. Global SLE Sales Forecasts ($m) for MMF, 2012–2022 .............................................................................................................. 14
   5.4. Global LN Sales Forecasts ($m) for MMF, 2012–2022 ............................................................................................................... 14
6. Cyclophosphamide ........................................................................................................................................................................... 15
   6.1. Product Profile ............................................................................................................................................................................ 15
   6.2. Cyclophosphamide SWOT Analysis, 2015 .............................................................................................................................. 16
   6.3. Global SLE Sales Forecasts ($m) for CYC, 2012–2022 ............................................................................................................. 17
   6.4. Global LN Sales Forecasts ($m) for CYC, 2012–2022 ................................................................................................................ 17
7. Azathioprine .................................................................................................................................................................................. 18
   7.1. Product Profile .......................................................................................................................................................................... 18
   7.2. Azathioprine SWOT Analysis, 2015 ...................................................................................................................................... 19
   7.3. Global SLE Sales Forecasts ($m) for AZA, 2012–2022 ............................................................................................................ 20
   7.4. Global LN Sales Forecasts ($m) for AZA, 2012–2022 .............................................................................................................. 20
8. Calcineurin Inhibitors ...................................................................................................................................................................... 21
   8.1. Product Profile ............................................................................................................................................................................ 21
   8.2. Calcineurin Inhibitors SWOT Analysis, 2015 .......................................................................................................................... 22
   8.3. Global SLE Sales Forecasts ($m) for Calcineurin Inhibitors, 2012–2022 ............................................................................ 23
   8.4. Global LN Sales Forecasts ($m) for Calcineurin Inhibitors, 2012–2022 ............................................................................ 23
9. Benlysta ....................................................................................................................................................................................... 24
   9.1. Product Profile .......................................................................................................................................................................... 24
   9.2. Benlysta SWOT Analysis, 2015 ............................................................................................................................................. 25
   9.3. Global SLE Sales Forecasts ($m) for Benlysta, 2012–2022 ............................................................................................... 26
   9.4. Global LN Sales Forecasts ($m) for Benlysta, 2012–2022 ............................................................................................... 26

© GlobalData. This report is a licensed product and is not to be copied, reproduced, shared or resold in any form.
Table of Contents

Table 48: Product Profile – Rituxan................................................................. 138
Table 49: Rituxan SWOT Analysis, 2015 ...................................................... 140
Table 50: Global SLE Sales Forecasts ($m) for Rituxan, 2012–2022 ............. 141
Table 51: Global LN Sales Forecasts ($m) for Rituxan, 2012–2022 ............... 142
Table 52: Summary of Minor Therapeutic Classes in SLE and LN, 2015 ....... 143
Table 53: Overall Unmet Needs in SLE and LN – Current Level of Attainment 145
Table 54: Clinical Unmet Needs in SLE and LN – Gap Analysis, 2015 .......... 151
Table 55: Drugs in Late-Stage Clinical Development for SLE and LN, 2015 .. 156
Table 56: Product Profile – Blisibimod ......................................................... 157
Table 57: Blisibimod SWOT Analysis, 2015 .................................................. 162
Table 58: Global SLE Sales Forecasts ($m) for Blisibimod, 2012–2022 ......... 163
Table 59: Global LN Sales Forecasts ($m) for Blisibimod, 2012–2022 ........... 164
Table 60: Product Profile – Atacicept ......................................................... 166
Table 61: Atacicept SWOT Analysis, 2015 ................................................... 169
Table 62: Global SLE Sales Forecasts ($m) for Atacicept, 2012–2022 .......... 170
Table 63: Global LN Sales Forecasts ($m) for Atacicept, 2012–2022 ............. 171
Table 64: Product Profile – Epratuzumab ..................................................... 173
Table 65: Epratuzumab SWOT Analysis, 2015 ............................................. 177
Table 66: Global SLE Sales Forecasts ($m) for Epratuzumab, 2012–2022 ...... 178
Table 67: Global LN Sales Forecasts ($m) for Epratuzumab, 2012–2022 ...... 179
Table 68: Product Profile – Lupuzor .............................................................. 180
Table 69: Lupuzor SWOT Analysis, 2015 ..................................................... 183
Table 70: Global SLE Sales Forecasts ($m) for Lupuzor, 2012–2022 .......... 184
Table 71: Global LN Sales Forecasts ($m) for Lupuzor, 2012–2022 ............. 185
Table of Contents

Table 72: Product Profile – Orencia ................................ ................................ ................................ ............. 186
Table 73: Orencia SWOT Analysis, 2015........................................................................................................ 190
Table 74: Global SLE Sales Forecasts ($m) for Orencia, 2012–2022 .............................................................. 191
Table 75: Global LN Sales Forecasts ($m) for Orencia, 2012–2022 ............................................................. 191
Table 76: Product Profile – Sifalimumab ........................................................................................................ 193
Table 77: Sifalimumab SWOT Analysis, 2015 .............................................................................................. 196
Table 78: Global SLE Sales Forecasts ($m) for Sifalimumab, 2012–2022 ...................................................... 197
Table 79: Global LN Sales Forecasts ($m) for Sifalimumab, 2012–2022 ...................................................... 198
Table 80: Product Profile – PF-04236921 ...................................................................................................... 199
Table 81: PF-04236921 SWOT Analysis, 2015 ........................................................................................... 202
Table 82: Global SLE Sales Forecasts ($m) for PF-04236921, 2012–2022 .................................................... 203
Table 83: Global LN Sales Forecasts ($m) for PF-04236921, 2012–2022 .................................................... 203
Table 84: Product Profile – Anifrolumab ....................................................................................................... 205
Table 85: Anifrolumab SWOT Analysis, 2015............................................................................................. 206
Table 86: Product Profile – Lulizumab Pegol ................................................................................................. 207
Table 87: Lulizumab Pegol SWOT Analysis, 2015....................................................................................... 208
Table 88: Product Profile – BIIB023 .............................................................................................................. 209
Table 89: BIIB023 SWOT Analysis, 2015..................................................................................................... 210
Table 90: Product Profile – Voclosporin ....................................................................................................... 211
Table 91: Voclosporin SWOT Analysis, 2015.............................................................................................. 212
Table 92: Drugs in Early-stage Clinical Development for SLE and LN, 2015............................................... 213
Table 93: Key Companies in the SLE and LN Market, 2015 ...................................................................... 215
Table 94: GSK’s SLE and LN Portfolio Assessment, 2015 ........................................................................ 219
Table 95: GlaxoSmithKline SWOT Analysis, 2015.................................................................................... 219
Table of Contents

Table 96: Roche’s SLE and LN Portfolio Assessment, 2015 ................................................................. 221
Table 97: Roche SWOT Analysis, 2015 ...................................................................................................... 221
Table 98: UCB’s SLE and LN Portfolio Assessment, 2015 .................................................................... 223
Table 99: UCB SWOT Analysis, 2015 ..................................................................................................... 223
Table 100: BMS’s SLE and LN Portfolio Assessment, 2015 .............................................................. 224
Table 101: BMS SWOT Analysis, 2015 .................................................................................................. 225
Table 102: Anthera’s SLE and LN Portfolio Assessment, 2015 ............................................................ 226
Table 103: Anthera SWOT Analysis, 2015 .......................................................................................... 226
Table 104: ImmuPharma’s SLE and LN Portfolio Assessment, 2015 .................................................. 228
Table 105: ImmuPharma SWOT Analysis, 2015 ................................................................................... 228
Table 106: Merck Serono’s SLE and LN Portfolio Assessment, 2015 ..................................................... 229
Table 107: Merck Serono SWOT Analysis, 2015 ................................................................................ 230
Table 108: AstraZeneca’s SLE and LN Portfolio Assessment, 2015 ..................................................... 231
Table 109: AstraZeneca SWOT Analysis, 2015 .................................................................................. 231
Table 110: Pfizer’s SLE and LN Portfolio Assessment, 2015 .............................................................. 232
Table 111: Pfizer SWOT Analysis, 2015 .............................................................................................. 233
Table 112: Global Sales Forecasts ($m) for SLE, 2012–2022 ................................................................ 236
Table 113: Global Sales Forecasts ($m) for LN, 2012–2022 ............................................................... 237
Table 114: SLE and LN Market – Global Drivers and Barriers, 2012–2022 .......................................... 242
Table 115: Sales Forecasts ($m) for SLE in the US, 2012–2022 .......................................................... 246
Table 116: Sales Forecasts ($m) for LN in the US, 2012–2022 ............................................................ 247
Table 117: Key Events Impacting Sales for SLE and LN in the US, 2012–2022 ................................. 249
Table 118: SLE and LN Market in the US – Drivers and Barriers, 2012–2022 ................................. 249
Table 119: Sales Forecasts ($m) for SLE in France, 2012–2022 .......................................................... 253
Table of Contents

Table 120: Sales Forecasts ($m) for LN in France, 2012–2022 ................................................................. 254
Table 121: Key Events Impacting Sales for SLE and LN in France, 2012–2022 ............................................. 256
Table 122: SLE and LN Market in France – Drivers and Barriers, 2012–2022 .............................................. 256
Table 123: Sales Forecasts ($m) for SLE in Germany, 2012–2022 ............................................................ 259
Table 124: Sales Forecasts ($m) for LN in Germany, 2012–2022 ............................................................ 260
Table 125: Key Events Impacting Sales for SLE and LN in Germany, 2012–2022 ......................................... 262
Table 126: SLE and LN Market in Germany – Drivers and Barriers, 2012–2022 ........................................... 262
Table 127: Sales Forecasts ($m) for SLE in Italy, 2012–2022 ................................................................. 265
Table 128: Sales Forecasts ($m) for LN in Italy, 2012–2022 ................................................................. 266
Table 129: Key Events Impacting Sales for SLE and LN in Italy, 2012–2022 ................................................ 268
Table 130: SLE and LN Market in Italy – Drivers and Barriers, 2012–2022 .................................................. 268
Table 131: Sales Forecasts ($m) for SLE in Spain, 2012–2022 ................................................................. 271
Table 132: Sales Forecasts ($m) for LN in Spain, 2012–2022 ................................................................. 272
Table 133: Key Events Impacting Sales for SLE and LN in Spain, 2012–2022 ............................................. 274
Table 134: SLE and LN Market in Spain – Drivers and Barriers, 2012–2022 ............................................... 274
Table 135: Sales Forecasts ($m) for SLE in the UK, 2012–2022 ............................................................... 277
Table 136: Sales Forecasts ($m) for LN in the UK, 2012–2022 ............................................................... 278
Table 137: Key Events Impacting Sales for SLE and LN in the UK, 2012–2022 .......................................... 280
Table 138: SLE and LN Market in the UK – Drivers and Barriers, 2012–2022 ............................................. 280
Table 139: Sales Forecasts ($m) for SLE in Japan, 2012–2022 ............................................................... 283
Table 140: Sales Forecasts ($m) for LN in Japan, 2012–2022 ............................................................... 284
Table 141: Key Events Impacting Sales for SLE and LN in Japan, 2012–2022 ............................................ 286
Table 142: SLE and LN Market in Japan – Drivers and Barriers, 2012–2022 .............................................. 286
Table 143: Key Launch Dates ..................................................................................................................... 312
Table of Contents

Table 144: Key Patent Expiries ................................................................. 312
Table 145: Number of Physicians Surveyed by Country .............................................. 321

1.2 List of Figures

Figure 1: Overview of the Etiology and Pathogenesis of SLE ......................................................... 29
Figure 2: Overview of the BAFF/APRIL Ligand and Receptor System ............................................. 31
Figure 3: 7MM, Prevalent Cases of Diagnosed SLE, All Ages, Both Sexes, N, 2012–2022 .................... 56
Figure 4: 7MM, Prevalent Cases of Diagnosed SLE, by Age, Both Sexes, N, Row (%), 2012 ................... 58
Figure 5: 7MM, Prevalent Cases of Diagnosed SLE, All Ages, Both Sexes, 2012 ................................. 60
Figure 6: 7MM, Age-Standardized Prevalence (%) of Diagnosed SLE, All Ages, by Sex, 2012 ............. 61
Figure 7: 7MM, Prevalent Cases of Diagnosed LN, All Ages, Both Sexes, N, 2012–2022 .................... 63
Figure 8: 6MM, Prevalent Cases of LN, by Class, All Ages, Both Sexes, 2012 ................................. 64
Figure 9: Overview of the Treatment Management of SLE ................................................................. 74
Figure 10: SLE and LN Therapeutics – Clinical Trials by Type of Therapy and Development Stage, January 2015 .......................................................... 154
Figure 11: Competitive Assessment of Late-Stage Pipeline Agents in SLE and LN, 2012–2022 .......... 155
Figure 12: Company Portfolio Gap Analysis in SLE and LN, 2012–2022 ........................................... 216
Figure 13: Global Sales for SLE and LN by Region, 2012–2022 ...................................................... 238
Figure 14: Sales for SLE in the Seven Major Markets by Drug Class According to Market Value and Volume, 2012–2022 .......................................................... 240
Figure 15: Sales for LN in the Seven Major Markets by Drug Class According to Market Value and Volume, 2012–2022 .......................................................... 241
Figure 16: Sales for SLE and LN in the US by Drug Class, 2012–2022 .............................................. 248
Figure 17: Sales for SLE and LN in France by Drug Class, 2012–2022 .............................................. 255
Figure 18: Sales for SLE and LN in Germany by Drug Class, 2012–2022 ........................................... 261
# Table of Contents

Figure 19: Sales for SLE and LN in Italy by Drug Class, 2012–2022 ................................................................. 267
Figure 20: Sales for SLE and LN in Spain by Drug Class, 2012–2022 ................................................................. 273
Figure 21: Sales for SLE and LN in the UK by Drug Class, 2012–2022 ................................................................. 279
Figure 22: Sales for SLE and LN in Japan by Drug Class, 2012–2022 ................................................................. 285
2 Introduction

2.1 Catalyst

The approval of GSK’s Benlysta in 2011, the first product to gain marketing approval for patients with SLE in more than 50 years, has paved the way for the introduction of new disease-modifying therapies and reignited the interest of pharmaceutical developers in this therapy area. The catalysts for this report update are:

- Eli Lilly’s October 2, 2014 announcement that the company will discontinue the development of tabalumab due to the efficacy results of its Phase III lupus clinical trials
- The announcement of positive Phase IIb clinical trial results for AstraZeneca/BMS’s sifalimumab and Pfizer’s PF-04236921 at the 2014 American College of Rheumatology (ACR) annual meeting, held from November 14-19
- To assess the clinical stage pipeline for SLE and LN including late-stage entrants, such as AstraZeneca/BMS’s anifrolumab, BMS’s lulizumab pegol, Biogen Idec’s BIIB023, and Aurinia/Vifor/Paladin/3SBio’s voclosporin
- To re-assess the impact GSK’s Benlysta has had on the lupus therapeutics market following its approval in 2011 and re-evaluate its future outlook within this market
- To re-examine the impact that Roche/Biogen Idec’s off-label Rituxan will have on the lupus market during the 10-year forecast period from 2012–2022
- To re-evaluate the significance of late-phase pipeline products and how their launch will shape the future treatment landscape in SLE and LN
- To identify the significant unmet needs in the lupus market
- To highlight the remaining opportunities in the lupus market

2.2 Related Reports

- GlobalData (2014). PharmaPoint: Rheumatoid Arthritis - Global Drug Forecast and Market Analysis to 2023, GDHC93PIDR
2.3 Upcoming Related Reports

- GlobalData (2015). PharmaPoint: Atopic Dermatitis - Global Drug Forecast and Market Analysis to 2024, GDHC008EPIDR
Appendix

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.