

## EXECUTIVE SUMMARY • Key findings

### The growing interest in rare diseases • Summary

- Introduction
- What is a rare disease?
- Why target rare diseases?

### Characterization of rare diseases • Summary

- Overview
- Rare diseases
- Very rare diseases
- Ultra rare diseases
- Useful resources

### Orphan drug status • Summary

- Introduction
- Legislative distinctions
  - US
  - Europe
  - Japan
  - Other markets
- Tax benefits
- Patient population subsetting
- Similarity
- Summary of key considerations

### Choosing rare diseases to target • Summary

- Introduction
- Key issues
- Commercial potential
  - Prevalence
  - Geographic distribution
  - Disease understanding
  - Available experts
  - Current treatments
  - What is similar?
- Conclusion

### Preclinical development • Summary

- Introduction
- Screen or repurpose?
  - Repurposed
  - Directed approaches
  - Taking advantage of orphan drug status
- Other issues
  - Small molecule or biological?
  - Biological test models
  - Requirements of a clinical candidate

- Conclusions

Clinical issues•Summary

- Introduction
- Clinical trial design
- Access to patients◦Geographic distribution
- Identifying patients

- Conclusions

Commercial considerations•Summary

- Introduction
- Identifying commercially promising opportunities◦Prevalence
- Current treatments
- Competitive position

- Case studies◦(Untitled sub-section)

- Gaucher disease

- Conclusions

Conclusions•Summary

- Introduction
- Checklist to consider
- Corporate strategies
- Conclusions

Appendix•Scope

- Methodology
- Glossary/abbreviations
- Bibliography/references

TABLES•Table: Timeline of international orphan drug legislation, 1983–2008

- Table: Comparison of orphan drug legislation in the US, Europe, and Japan
- Table: The FDA's definitions of similarity

FIGURES•Figure: US FDA orphan approvals, 2001–11 (part 1)

- Figure: US FDA orphan approvals, 2001–11 (part 2)
- Figure: Rare diseases, medical need, and disease prevalence
- Figure: Distribution of US orphan drug approvals by disease prevalence (to 2010)
- Figure: European orphan drug approvals by disease prevalence (to 2010)
- Figure: Exploiting knowledge resources for rare disease research
- Figure: The organizational relationships within the EMA pertaining to orphan drugs
- Figure: Schematic relationship between rare disease prevalence and commercial returns
- Figure: Identifying suitable patients for clinical studies
- Figure: The influence of prevalence on research strategy
- Figure: Current exploitation of rare disease space
- Figure: "Similar" approved BCR-ABL inhibitors with orphan drug status

- Figure: Similar approved endothelin receptor antagonists with orphan drug status
- Figure: Selecting a rare disease to target
- Figure: Alternative strategies to identifying new treatments for rare diseases
- Figure: Strategic pathways for identifying development candidates
- Figure: Comparison of duration and size of clinical studies in developing drugs to treat major diseases (a), and rare diseases (b)
- Figure: Number of participants in European orphan drug clinical trials
- Figure: Comparing commercial opportunities
- Figure: Strategic options for developing drugs for already targeted rare diseases
- Figure: Different approaches to treating cystic fibrosis
- Figure: GlaxoSmithKline and Pfizer; exploiting internal and external resources in rare disease research