Clinical Scenario Evaluation

# General information

## Project information

This report was generated by Gautier Paux using the Mediana package version 1.0.6. For more information about the Mediana package, see http://gpaux.github.io/Mediana.

Project title: Case study 3

Description: Simulation report for case study 3 of the Clinical Trials with Multiple Objectives chapter

## Simulation parameters

Random seed: 42938001

Number of simulations: 1e+05

Number of cores: 4

Start time: 2017-12-27 19:15:05

End time: 2017-12-27 19:41:36

Duration: 26.52 mins

# Data model

## Sample size

Number of samples: 3

Number of sample size sets: 1

1. Sample size

| **Sample size set** | **Sample** | **Size** |
| --- | --- | --- |
| Sample size 1 | Placebo - E1, Placebo - E2 | 100 |
| Dose L - E1, Dose L - E2 | 200 |
| Dose H - E1, Dose H - E2 | 200 |

## Outcome distribution

Number of outcome parameter sets: 4

Outcome distribution: Multivariate Normal

1. Outcome parameter

| **Outcome parameter set** | **Sample** | **Parameter** |
| --- | --- | --- |
| Scenario 1 | {Placebo - E1}, {Placebo - E2} | {mean = -12, SD = 20}, {mean = -0.8, SD = 1}, corr = {1,0.5,0.5,1} |
| {Dose L - E1}, {Dose L - E2} | {mean = -18, SD = 20}, {mean = -1.1, SD = 1}, corr = {1,0.5,0.5,1} |
| {Dose H - E1}, {Dose H - E2} | {mean = -20, SD = 20}, {mean = -1.1, SD = 1}, corr = {1,0.5,0.5,1} |
| Scenario 2 | {Placebo - E1}, {Placebo - E2} | {mean = -12, SD = 20}, {mean = -0.8, SD = 1}, corr = {1,0.5,0.5,1} |
| {Dose L - E1}, {Dose L - E2} | {mean = -18, SD = 20}, {mean = -1.1, SD = 1}, corr = {1,0.5,0.5,1} |
| {Dose H - E1}, {Dose H - E2} | {mean = -18, SD = 20}, {mean = -1.1, SD = 1}, corr = {1,0.5,0.5,1} |
| Scenario 3 | {Placebo - E1}, {Placebo - E2} | {mean = -12, SD = 20}, {mean = -0.8, SD = 1}, corr = {1,0.5,0.5,1} |
| {Dose L - E1}, {Dose L - E2} | {mean = -18, SD = 20}, {mean = -1.2, SD = 1}, corr = {1,0.5,0.5,1} |
| {Dose H - E1}, {Dose H - E2} | {mean = -20, SD = 20}, {mean = -1.2, SD = 1}, corr = {1,0.5,0.5,1} |
| Scenario 4 | {Placebo - E1}, {Placebo - E2} | {mean = -12, SD = 20}, {mean = -1.2, SD = 1}, corr = {1,0.5,0.5,1} |
| {Dose L - E1}, {Dose L - E2} | {mean = -18, SD = 20}, {mean = -1.2, SD = 1}, corr = {1,0.5,0.5,1} |
| {Dose H - E1}, {Dose H - E2} | {mean = -18, SD = 20}, {mean = -1.2, SD = 1}, corr = {1,0.5,0.5,1} |

# Analysis model

## Tests

Number of tests/null hypotheses: 4

1. Tests

| **Test ID** | **Test type** | **Test parameters** | **Samples** |
| --- | --- | --- | --- |
| Placebo vs Dose H - E1 | Student's t-test |  | {Dose H - E1}, {Placebo - E1} |
| Placebo vs Dose L - E1 | Student's t-test |  | {Dose L - E1}, {Placebo - E1} |
| Placebo vs Dose H - E2 | Student's t-test |  | {Dose H - E2}, {Placebo - E2} |
| Placebo vs Dose L - E2 | Student's t-test |  | {Dose L - E2}, {Placebo - E2} |

## Multiplicity adjustment

Procedure: Multiple-sequence gatekeeping

Tests: {Placebo vs Dose H - E1, Placebo vs Dose L - E1, Placebo vs Dose H - E2, Placebo vs Dose L - E2}

1. Parameters:

| **Family** | **Tests** | **Component procedure** | **Truncation parameter** |
| --- | --- | --- | --- |
| 1 | {Placebo vs Dose H - E1, Placebo vs Dose L - E1} | HochbergAdj | 0.9 |
| 2 | {Placebo vs Dose H - E2, Placebo vs Dose L - E2} | HochbergAdj | 1.0 |

# Evaluation model

## Criteria

Number of criteria: 10

1. Criteria

| **Criterion ID** | **Criterion parameters** | **Tests** | **Statistics** | **Label** |
| --- | --- | --- | --- | --- |
| Marginal power | alpha = 0.025 | Placebo vs Dose H - E1 Placebo vs Dose L - E1 Placebo vs Dose H - E2 Placebo vs Dose L - E2 |  | Placebo vs Dose H - E1 Placebo vs Dose L - E1 Placebo vs Dose H - E2 Placebo vs Dose L - E2 |
| Disjunctive power | alpha = 0.025 | Placebo vs Dose H - E1 Placebo vs Dose L - E1 Placebo vs Dose H - E2 Placebo vs Dose L - E2 |  | Disjunctive power |
| Disjunctive power - Family 1 | alpha = 0.025 | Placebo vs Dose H - E1 Placebo vs Dose L - E1 |  | Disjunctive power |
| Disjunctive power - Family 2 | alpha = 0.025 | Placebo vs Dose H - E2 Placebo vs Dose L - E2 |  | Disjunctive power |
| Tradeoff-based disjunctive power (v1 = 0.5, v2 = 0.5) | alpha = 0.025 weight = c(0.5, 0.5) | Placebo vs Dose H - E1 Placebo vs Dose L - E1 Placebo vs Dose H - E2 Placebo vs Dose L - E2 |  | Tradeoff-based disjunctive power |
| Tradeoff-based disjunctive power (v1 = 0.8, v2 = 0.2) | alpha = 0.025 weight = c(0.8, 0.2) | Placebo vs Dose H - E1 Placebo vs Dose L - E1 Placebo vs Dose H - E2 Placebo vs Dose L - E2 |  | Tradeoff-based disjunctive power |
| Weighted power - Family 1 | alpha = 0.025 weight = c(0.5, 0.5) | Placebo vs Dose H - E1 Placebo vs Dose L - E1 |  | Weighted power |
| Weighted power - Family 2 | alpha = 0.025 weight = c(0.5, 0.5) | Placebo vs Dose H - E2 Placebo vs Dose L - E2 |  | Weighted power |
| Weighted power (v1 = 0.5, v2 = 0.5) | alpha = 0.025 weight = c(0.25, 0.25, 0.25, 0.25) | Placebo vs Dose H - E1 Placebo vs Dose L - E1 Placebo vs Dose H - E2 Placebo vs Dose L - E2 |  | Weighted power |
| Weighted power (v1 = 0.8, v2 = 0.2) | alpha = 0.025 weight = c(0.4, 0.4, 0.1, 0.1) | Placebo vs Dose H - E1 Placebo vs Dose L - E1 Placebo vs Dose H - E2 Placebo vs Dose L - E2 |  | Weighted power |

# Simulation results

## Outcome Parameter (Scenario 1)

1. Results summary

| **Sample Size** | **Multiplicity Adjustment** | **Criterion** | **Test/Statistic** | **Result** |
| --- | --- | --- | --- | --- |
| Sample size 1 | Procedure H | Marginal power | Placebo vs Dose H - E1 | 0.8613 |
| Marginal power | Placebo vs Dose L - E1 | 0.6684 |
| Marginal power | Placebo vs Dose H - E2 | 0.5262 |
| Marginal power | Placebo vs Dose L - E2 | 0.5003 |
| Disjunctive power | Disjunctive power | 0.8722 |
| Disjunctive power - Family 1 | Disjunctive power | 0.8722 |
| Disjunctive power - Family 2 | Disjunctive power | 0.5836 |
| Tradeoff-based disjunctive power (v1 = 0.5, v2 = 0.5) | Tradeoff-based disjunctive power | 0.7279 |
| Tradeoff-based disjunctive power (v1 = 0.8, v2 = 0.2) | Tradeoff-based disjunctive power | 0.8145 |
| Weighted power - Family 1 | Weighted power | 0.7648 |
| Weighted power - Family 2 | Weighted power | 0.5133 |
| Weighted power (v1 = 0.5, v2 = 0.5) | Weighted power | 0.6391 |
| Weighted power (v1 = 0.8, v2 = 0.2) | Weighted power | 0.7145 |

## Outcome Parameter (Scenario 2)

1. Results summary

| **Sample Size** | **Multiplicity Adjustment** | **Criterion** | **Test/Statistic** | **Result** |
| --- | --- | --- | --- | --- |
| Sample size 1 | Procedure H | Marginal power | Placebo vs Dose H - E1 | 0.6377 |
| Marginal power | Placebo vs Dose L - E1 | 0.6363 |
| Marginal power | Placebo vs Dose H - E2 | 0.4512 |
| Marginal power | Placebo vs Dose L - E2 | 0.4526 |
| Disjunctive power | Disjunctive power | 0.7205 |
| Disjunctive power - Family 1 | Disjunctive power | 0.7205 |
| Disjunctive power - Family 2 | Disjunctive power | 0.5133 |
| Tradeoff-based disjunctive power (v1 = 0.5, v2 = 0.5) | Tradeoff-based disjunctive power | 0.6169 |
| Tradeoff-based disjunctive power (v1 = 0.8, v2 = 0.2) | Tradeoff-based disjunctive power | 0.6790 |
| Weighted power - Family 1 | Weighted power | 0.6370 |
| Weighted power - Family 2 | Weighted power | 0.4519 |
| Weighted power (v1 = 0.5, v2 = 0.5) | Weighted power | 0.5444 |
| Weighted power (v1 = 0.8, v2 = 0.2) | Weighted power | 0.6000 |

## Outcome Parameter (Scenario 3)

1. Results summary

| **Sample Size** | **Multiplicity Adjustment** | **Criterion** | **Test/Statistic** | **Result** |
| --- | --- | --- | --- | --- |
| Sample size 1 | Procedure H | Marginal power | Placebo vs Dose H - E1 | 0.8613 |
| Marginal power | Placebo vs Dose L - E1 | 0.6685 |
| Marginal power | Placebo vs Dose H - E2 | 0.7243 |
| Marginal power | Placebo vs Dose L - E2 | 0.6293 |
| Disjunctive power | Disjunctive power | 0.8724 |
| Disjunctive power - Family 1 | Disjunctive power | 0.8724 |
| Disjunctive power - Family 2 | Disjunctive power | 0.7524 |
| Tradeoff-based disjunctive power (v1 = 0.5, v2 = 0.5) | Tradeoff-based disjunctive power | 0.8124 |
| Tradeoff-based disjunctive power (v1 = 0.8, v2 = 0.2) | Tradeoff-based disjunctive power | 0.8484 |
| Weighted power - Family 1 | Weighted power | 0.7649 |
| Weighted power - Family 2 | Weighted power | 0.6768 |
| Weighted power (v1 = 0.5, v2 = 0.5) | Weighted power | 0.7209 |
| Weighted power (v1 = 0.8, v2 = 0.2) | Weighted power | 0.7473 |

## Outcome Parameter (Scenario 4)

1. Results summary

| **Sample Size** | **Multiplicity Adjustment** | **Criterion** | **Test/Statistic** | **Result** |
| --- | --- | --- | --- | --- |
| Sample size 1 | Procedure H | Marginal power | Placebo vs Dose H - E1 | 0.6393 |
| Marginal power | Placebo vs Dose L - E1 | 0.6378 |
| Marginal power | Placebo vs Dose H - E2 | 0.0140 |
| Marginal power | Placebo vs Dose L - E2 | 0.0137 |
| Disjunctive power | Disjunctive power | 0.7213 |
| Disjunctive power - Family 1 | Disjunctive power | 0.7213 |
| Disjunctive power - Family 2 | Disjunctive power | 0.0206 |
| Tradeoff-based disjunctive power (v1 = 0.5, v2 = 0.5) | Tradeoff-based disjunctive power | 0.3710 |
| Tradeoff-based disjunctive power (v1 = 0.8, v2 = 0.2) | Tradeoff-based disjunctive power | 0.5811 |
| Weighted power - Family 1 | Weighted power | 0.6385 |
| Weighted power - Family 2 | Weighted power | 0.0139 |
| Weighted power (v1 = 0.5, v2 = 0.5) | Weighted power | 0.3262 |
| Weighted power (v1 = 0.8, v2 = 0.2) | Weighted power | 0.5136 |