

# Package ‘IcTemporalPatternDiscovery’

February 6, 2015

**Type** Package

**Title** Population-level estimation method that estimates risk by combining a self-controlled and cohort design.

**Version** 1.0.0

**Date** 2014-12-22

**Author** Tomas Bergvall

**Maintainer** Tomas Bergvall <tomas.bergvall@who-umc.org>

**Description** HOMEWORK- add more

**Depends** DatabaseConnector

**Imports** SqlRender,  
plyr

**License** Apache License 2.0

## R topics documented:

appendToIctpdAnalysisList . . . . .	1
calculateStatisticsIc . . . . .	2
createIctpdAnalysis . . . . .	3
getDbIctpdData . . . . .	5
loadIctpdAnalysisList . . . . .	6
runIctpd . . . . .	7
runIctpdAnalyses . . . . .	9
writeIctpdAnalysisList . . . . .	11

<b>Index</b>	<b>13</b>
--------------	-----------

---

appendToIctpdAnalysisList  
*Append to list of ictpdAnalysis*

---

## Description

appendToIctpdAnalysisList adds an object of type ictpdAnalysis to a list.

## Usage

```
appendToIctpdAnalysisList(ictpdAnalysis, ictpdAnalysisList = NULL)
```

**Arguments**

`ictpdAnalysis`    Object to append to the list.  
`ictpdAnalysisList`  
                     The list to add the object to. If not provided, a new list will be created.

**Value**

A list of objects of type `ictpdAnalysis`.

**Examples**

```
## Not run:
#Constructing a list of analyses:
analysisList <- NULL

analysis <- createIctpdAnalysis(analysisId = 1, censor = TRUE)
analysisList <- appendToIctpdAnalysisList(analysis)

analysis <- createIctpdAnalysis(analysisId = 2, censor = FALSE)
analysisList <- appendToIctpdAnalysisList(analysis, analysisList)

#You can store the list:
writeIctpdAnalysisListToFile(analysisList, "ictpdAnalysisList.csv")

#And load it back later:
analysisList <- loadIctpdAnalysisList("ictpdAnalysisList.csv")

#You can run all analyses across a set of exposure-outcome pairs with one command:
connectionDetails <- createConnectionDetails(dbms="sql server", server="server_ip")
exposureOutcomePairs = data.frame(outcomeConceptId = c(196794, 196794, 312648),
                                   exposureConceptId = c(1501700, 1545958, 1551803))

results <- runIctpdAnalyses(connectionDetails,
                           cdmDatabaseSchema = "cdm_schema.dbo",
                           resultsDatabaseSchema = "results.dbo",
                           exposureOutcomePairs = exposureOutcomePairs),
                           ictpdAnalysisList = ictpdAnalysisList)

## End(Not run)
```

---

`calculateStatisticsIc`    *compute the IC statistics*

---

**Description**

compute the IC statistics

**Usage**

```
calculateStatisticsIc(ictpdData, multipleControlPeriods = "110",
  multipleRiskPeriods = "10000", shrinkage = 0.5, icPercentile = 0.025,
  metric = "IC025")
```

**Arguments**

ictpdData	An object containing the counts, as created using the <a href="#">getDbIctpdData</a> function.
multipleControlPeriods	Defines the control periods to use where 100 means the control period defined by controlPeriodStart/End, 010 means the period -30 to -1 day before prescription and 001 means the control period on the day of prescription
multipleRiskPeriods	Defines the risk periods to use 10000 is 1-30 days, 01000 is 1 to 360 days, 00100 is 31 to 90 days, 00010 is 91 to 180 and 00001 is 721 to 1080 days after prescription default is '10000'
shrinkage	Shrinkage used in IRR calculations, required >0 to deal with 0 case counts, but larger number means more shrinkage. default is 0.5
icPercentile	The lower bound of the credibility interval for the IC values (IClow). default is 0.025,
metric	Defines whether the output will contain the point estimate or the lower bound. Available input is 'IC and 'IC025' default is 'IC025'

**Value**

An object of type ictpdResults containing the results.

**Examples**

```
## Not run:
connectionDetails <- createConnectionDetails(dbms="sql server", server="server_ip")
exposureOutcomePairs = data.frame(outcomeConceptId = c(196794, 196794, 312648),
                                   exposureConceptId = c(1501700, 1545958, 1551803))
ictpdData <- getDbIctpdData(connectionDetails,
                           cdmDatabaseSchema = "cdm_schema.dbo",
                           resultsDatabaseSchema = "results.dbo",
                           exposureOutcomePairs = exposureOutcomePairs)
ictpdResults <- calculateStatisticsIC(ictpdData)
ictpdResults

## End(Not run)
```

---

createIctpdAnalysis      *createSccAnalysisDetails*

---

**Description**

createIctpdAnalysis generates an object specifying one set of analysis choices for the IC Temporal Pattern Discovery method.

**Usage**

```
createIctpdAnalysis(analysisId = 1, controlPeriodStart = -1080,
                    controlPeriodEnd = -361, riskPeriodStart = 1, riskPeriodEnd = 30,
                    censor = FALSE, multipleControlPeriods = "110",
                    multipleRiskPeriods = "10000", shrinkage = 0.5, icPercentile = 0.025,
                    metric = "IC025")
```

## Arguments

analysisId	A unique identifier that can later be used to identify the results of this analysis
controlPeriodStart	start of the control period - can be set between -99999 and 0, default is -1080.
controlPeriodEnd	end of the control period - can be set between -99999 and 0, default is -361.
riskPeriodStart	start of the risk period - can be set between 0 and 99999, default is 1.
riskPeriodEnd	end of the risk period - can be set between 0 and 99999, default is 30.
censor	a flag indicating whether the method should censor the observation period at the end of exposure or not. Available input is 0 or 1 with default = 0.
multipleControlPeriods	Defines the control periods to use where 100 means the control period defined by controlPeriodStart/End, 010 means the period -30 to -1 day before prescription and 001 means the control period on the day of prescription
multipleRiskPeriods	Defines the risk periods to use 10000 is 1-30 days, 01000 is 1 to 360 days, 00100 is 31 to 90 days, 00010 is 91 to 180 and 00001 is 721 to 1080 days after prescription default is '10000'
shrinkage	Shrinkage used in IRR calculations, required >0 to deal with 0 case counts, but larger number means more shrinkage. default is 0.5
icPercentile	The lower bound of the credibility interval for the IC values (IClow). default is 0.025,
metric	Defines whether the output will contain the point estimate or the lower bound. Available input is 'IC' and 'IC025' default is 'IC025'

## Examples

```
## Not run:
#Constructing a list of analyses:
analysisList <- NULL

analysis <- createIctpdAnalysis(analysisId = 1, censor = TRUE)
analysisList <- appendToIctpdAnalysisList(analysis)

analysis <- createIctpdAnalysis(analysisId = 2, censor = FALSE)
analysisList <- appendToIctpdAnalysisList(analysis, analysisList)

#You can store the list:
writeIctpdAnalysisListToFile(analysisList,"ictpdAnalysisList.csv")

#And load it back later:
analysisList <- loadIctpdAnalysisList("ictpdAnalysisList.csv")

#You can run all analyses across a set of exposure-outcome pairs with one command:
connectionDetails <- createConnectionDetails(dbms="sql server", server="server_ip")
exposureOutcomePairs = data.frame(outcomeConceptId = c(196794, 196794, 312648),
                                   exposureConceptId = c(1501700, 1545958, 1551803))

results <- runIctpdAnalyses(connectionDetails,
                           cdmDatabaseSchema = "cdm_schema.dbo",
                           resultsDatabaseSchema = "results.dbo",
```

```

        exposureOutcomePairs = exposureOutcomePairs)),
        ictpdAnalysisList = ictpdAnalysisList)

## End(Not run)

```

getDbIctpdData

*Get ICTPD counts from database*

## Description

This function is used to load the counts needed to compute the ICTPD from a database in OMOP CDM format.

## Usage

```

getDbIctpdData(connectionDetails, cdmDatabaseSchema, resultsDatabaseSchema,
  exposureOutcomePairs, exposureDatabaseSchema = cdmDatabaseSchema,
  exposureTable = "drug_era", outcomeDatabaseSchema = cdmDatabaseSchema,
  outcomeTable = "condition_era", drugTypeConceptIdList = c(38000182),
  conditionTypeConceptIdList = c(38000247), controlPeriodStart = -1080,
  controlPeriodEnd = -361, riskPeriodStart = 1, riskPeriodEnd = 30,
  censor = FALSE)

```

## Arguments

connectionDetails

An R object of type ConnectionDetails created using the function createConnectionDetails in the DatabaseConnector package.

cdmDatabaseSchema

Name of database schema that contains OMOP CDM and vocabulary.

resultsDatabaseSchema

Name of database schema that we can write results to.

exposureOutcomePairs

A data frame with at least two columns:

- "exposureConceptId" containing the drug\_concept\_ID or cohort\_concept\_id of the exposure variable
- "outcomeConceptId" containing the condition\_concept\_ID or cohort\_concept\_id of the outcome variable

exposureDatabaseSchema

The name of the database schema that is the location where the exposure data is available. If exposureTable = DRUG\_ERA, exposureSchema is not used by assumed to be cdmSchema. Requires read permissions to this database.

exposureTable

The tablename that contains the exposure cohorts. If exposureTable <> DRUG\_ERA, then expectation is exposureTable has format of COHORT table: COHORT\_DEFINITION\_ID, SUBJECT\_ID, COHORT\_START\_DATE, COHORT\_END\_DATE.

outcomeDatabaseSchema

The name of the database schema that is the location where the data used to define the outcome cohorts is available. If exposureTable = CONDITION\_ERA, exposureSchema is not used by assumed to be cdmSchema. Requires read permissions to this database.

**outcomeTable** The tablename that contains the outcome cohorts. If outcomeTable <> CONDITION\_OCCURRENCE, then expectation is outcomeTable has format of COHORT table: COHORT\_DEFINITION\_ID, SUBJECT\_ID, COHORT\_START\_DATE, COHORT\_END\_DATE.

**drugTypeConceptIdList** Which drug\_type to use: generally only use 1 value (ex: 30d era).

**conditionTypeConceptIdList** Which condition\_type to use: generally only use 1 value (ex: 30d era).

**controlPeriodStart** start of the control period - can be set between -99999 and 0, default is -1080.

**controlPeriodEnd** end of the control period - can be set between -99999 and 0, default is -361.

**riskPeriodStart** start of the risk period - can be set between 0 and 99999, default is 1.

**riskPeriodEnd** end of the risk period - can be set between 0 and 99999, default is 30.

**censor** a flag indicating whether the method should censor the observation period at the end of exposure or not. Available input is 0 or 1 with default = 0.

### Value

An object of type `ictpdData` containing counts that can be used in the [calculateStatisticsIC](#) function.

### Examples

```
## Not run:
connectionDetails <- createConnectionDetails(dbms="sql server", server="server_ip")
exposureOutcomePairs = data.frame(outcomeConceptId = c(196794, 196794, 312648),
                                   exposureConceptId = c(1501700, 1545958, 1551803))
ictpdData <- getDbIctpdData(connectionDetails,
                           cdmDatabaseSchema = "cdm_schema.dbo",
                           resultsDatabaseSchema = "results.dbo",
                           exposureOutcomePairs = exposureOutcomePairs)
ictpdResults <- calculateStatisticsIC(ictpdData)
ictpdResults

## End(Not run)
```

---

`loadIctpdAnalysisList` *Load a list of Ictpd analysis from file*

---

### Description

`loadIctpdAnalysisList` reads a list of objects of type `ictpdAnalysis` from a CSV file

### Usage

```
loadIctpdAnalysisList(file)
```

### Arguments

**file** the name of the file to be loaded

**Value**

A list of objects of type ictpdAnalysis

**Examples**

```
## Not run:
#Constructing a list of analyses:
analysisList <- NULL

analysis <- createIctpdAnalysis(analysisId = 1, censor = TRUE)
analysisList <- appendToIctpdAnalysisList(analysis)

analysis <- createIctpdAnalysis(analysisId = 2, censor = FALSE)
analysisList <- appendToIctpdAnalysisList(analysis, analysisList)

#You can store the list:
writeIctpdAnalysisListToFile(analysisList,"ictpdAnalysisList.csv")

#And load it back later:
analysisList <- loadIctpdAnalysisList("ictpdAnalysisList.csv")

#You can run all analyses across a set of exposure-outcome pairs with one command:
connectionDetails <- createConnectionDetails(dbms="sql server", server="server_ip")
exposureOutcomePairs = data.frame(outcomeConceptId = c(196794, 196794, 312648),
                                   exposureConceptId = c(1501700, 1545958, 1551803))

results <- runIctpdAnalyses(connectionDetails,
                           cdmDatabaseSchema = "cdm_schema.dbo",
                           resultsDatabaseSchema = "results.dbo",
                           exposureOutcomePairs = exposureOutcomePairs),
                           ictpdAnalysisList = ictpdAnalysisList)

## End(Not run)
```

---

runIctpd

*IC temporal pattern discovery*


---

**Description**

Ictpd generates population-level estimation from OMOP CDMv4 instance by combining a self-controlled design with a cohort design.

**Usage**

```
runIctpd(connectionDetails, cdmDatabaseSchema, resultsDatabaseSchema,
         exposureOutcomePairs, exposureDatabaseSchema = cdmDatabaseSchema,
         exposureTable = "drug_era", outcomeDatabaseSchema = cdmDatabaseSchema,
         outcomeTable = "condition_era", drugTypeConceptIdList = c(38000182),
         conditionTypeConceptIdList = c(38000247), storeResultsInDatabase = FALSE,
         createOutputTables = TRUE, outputTablePrefix = "ictpd", analysisId = 1,
         controlPeriodStart = -1080, controlPeriodEnd = -361,
         riskPeriodStart = 1, riskPeriodEnd = 30, censor = FALSE,
         multipleControlPeriods = "110", multipleRiskPeriods = "10000",
         shrinkage = 0.5, icPercentile = 0.025, metric = "IC025")
```

## Arguments

connectionDetails	An R object of type ConnectionDetails created using the function createConnectionDetails in the DatabaseConnector package.
cdmDatabaseSchema	Name of database schema that contains OMOP CDM and vocabulary.
resultsDatabaseSchema	Name of database schema that we can write results to.
exposureOutcomePairs	A data frame with at least two columns: <ul style="list-style-type: none"> <li>• "exposureConceptId" containing the drug_concept_ID or cohort_concept_id of the exposure variable</li> <li>• "outcomeConceptId" containing the condition_concept_ID or cohort_concept_id of the outcome variable</li> </ul>
exposureDatabaseSchema	The name of the database schema that is the location where the exposure data is available. If exposureTable = DRUG_ERA, exposureSchema is not used by assumed to be cdmSchema. Requires read permissions to this database.
exposureTable	The tablename that contains the exposure cohorts. If exposureTable <> DRUG_ERA, then expectation is exposureTable has format of COHORT table: COHORT_DEFINITION_ID, SUBJECT_ID, COHORT_START_DATE, COHORT_END_DATE.
outcomeDatabaseSchema	The name of the database schema that is the location where the data used to define the outcome cohorts is available. If exposureTable = CONDITION_ERA, exposureSchema is not used by assumed to be cdmSchema. Requires read permissions to this database.
outcomeTable	The tablename that contains the outcome cohorts. If outcomeTable <> CONDITION_OCCURRENCE, then expectation is outcomeTable has format of COHORT table: COHORT_DEFINITION_ID, SUBJECT_ID, COHORT_START_DATE, COHORT_END_DATE.
drugTypeConceptIdList	Which drug_type to use: generally only use 1 value (ex: 30d era).
conditionTypeConceptIdList	Which condition_type to use: generally only use 1 value (ex: 30d era).
storeResultsInDatabase	Should the results be stored in the database?
createOutputTables	Should the output tables be created? If not, they are assumed to exist and data will be appended. If the value is true and the tables exist they will be overwritten.
outputTablePrefix	Prefix used for the result tables in the resultsDatabaseSchema.
analysisId	A unique identifier that can later be used to identify the results of this analysis.
controlPeriodStart	start of the control period - can be set between -99999 and 0, default is -1080.
controlPeriodEnd	end of the control period - can be set between -99999 and 0, default is -361.
riskPeriodStart	start of the risk period - can be set between 0 and 99999, default is 1.



riskPeriodEnd	end of the risk period - can be set between 0 and 99999, default is 30.
censor	a flag indicating whether the method should censor the observation period at the end of exposure or not. Available input is 0 or 1 with default = 0.
multipleControlPeriods	Defines the control periods to use where 100 means the control period defined by controlPeriodStart/End, 010 means the period -30 to -1 day before prescription and 001 means the control period on the day of prescription
multipleRiskPeriods	Defines the risk periods to use 10000 is 1-30 days, 01000 is 1 to 360 days, 00100 is 31 to 90 days, 00010 is 91 to 180 and 00001 is 721 to 1080 days after prescription default is '10000'
shrinkage	Shrinkage used in IRR calculations, required >0 to deal with 0 case counts, but larger number means more shrinkage. default is 0.5
icPercentile	The lower bound of the credibility interval for the IC values (IClow). default is 0.025,
metric	Defines whether the output will contain the point estimate or the lower bound. Available input is 'IC' and 'IC025' default is 'IC025'

## Details

Population-level estimation method that estimates risk by combining a self-controlled and cohort design. This function will call both the [getDbIctpdData](#) and [calculateStatisticsIc](#) functions.

## Value

An object of type `ictpdResults` containing the results.

## References

Noren GN, Bate A, Hopstadius J, Star K, Edwards IR. Temporal Pattern Discovery for Trends and Transient Effect: Its Application to Patient Records. by combining a self-controlled design with a cohort design In: Proceedings of the fourteenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD'08).ACM Press, New York, pp 963-971

## Examples

```
## Not run:
connectionDetails <- createConnectionDetails(dbms="sql server", server="server_ip")
ictpdResults <- runIctpd(connectionDetails, cdmDatabaseSchema, resultsDatabaseSchema, exposureOutcomePairs)
ictpdResults

## End(Not run)
```

---

runIctpdAnalyses	<i>run ICTPD on a list of analysis</i>
------------------	--

---

## Description

This function will run the different ICTPD variations specified in the analysis list on all the exposure-outcome pairs.

## Usage

```
runIctpdAnalyses(connectionDetails, cdmDatabaseSchema, resultsDatabaseSchema,
  exposureOutcomePairs, exposureDatabaseSchema = cdmDatabaseSchema,
  exposureTable = "drug_era", outcomeDatabaseSchema = cdmDatabaseSchema,
  outcomeTable = "condition_era", drugTypeConceptIdList = c(38000182),
  conditionTypeConceptIdList = c(38000247), storeResultsInDatabase = FALSE,
  createOutputTables = TRUE, outputTablePrefix = "ictpd", ictpdAnalysisList)
```

## Arguments

**connectionDetails**

An R object of type `ConnectionDetails` created using the function `createConnectionDetails` in the `DatabaseConnector` package.

**cdmDatabaseSchema**

Name of database schema that contains OMOP CDM and vocabulary.

**resultsDatabaseSchema**

Name of database schema that we can write results to.

**exposureOutcomePairs**

A data frame with at least two columns:

- "exposureConceptId" containing the `drug_concept_ID` or `cohort_concept_id` of the exposure variable
- "outcomeConceptId" containing the `condition_concept_ID` or `cohort_concept_id` of the outcome variable

**exposureDatabaseSchema**

The name of the database schema that is the location where the exposure data is available. If `exposureTable = DRUG_ERA`, `exposureSchema` is not used by assumed to be `cdmSchema`. Requires read permissions to this database.

**exposureTable**

The tablename that contains the exposure cohorts. If `exposureTable <> DRUG_ERA`, then expectation is `exposureTable` has format of COHORT table: `COHORT_DEFINITION_ID`, `SUBJECT_ID`, `COHORT_START_DATE`, `COHORT_END_DATE`.

**outcomeDatabaseSchema**

The name of the database schema that is the location where the data used to define the outcome cohorts is available. If `exposureTable = CONDITION_ERA`, `exposureSchema` is not used by assumed to be `cdmSchema`. Requires read permissions to this database.

**outcomeTable**

The tablename that contains the outcome cohorts. If `outcomeTable <> CONDITION_OCCURRENCE`, then expectation is `outcomeTable` has format of COHORT table: `COHORT_DEFINITION_ID`, `SUBJECT_ID`, `COHORT_START_DATE`, `COHORT_END_DATE`.

**drugTypeConceptIdList**

Which `drug_type` to use: generally only use 1 value (ex: 30d era).

**conditionTypeConceptIdList**

Which `condition_type` to use: generally only use 1 value (ex: 30d era).

**storeResultsInDatabase**

Should the results be stored in the database?

**createOutputTables**

Should the output tables be created? If not, they are assumed to exist and data will be appended. If the value is true and the tables exist they will be overwritten.

**outputTablePrefix**

Prefix used for the result tables in the `resultsDatabaseSchema`.

**ictpdAnalysisList**

A list of objects of type `ictpdAnalysis`.

**Details**

Population-level estimation method that estimates risk by combining a self-controlled and cohort design. This function will call both the [getDbIctpdData](#) and [calculateStatisticsIc](#) functions.

**Value**

An object of type `ictpdResults` containing the results.

**References**

Noren GN, Bate A, Hopstadius J, Star K, Edwards IR. Temporal Pattern Discovery for Trends and Transient Effect: Its Application to Patient Records by combining a self-controlled design with a cohort design In: Proceedings of the fourteenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD'08). ACM Press, New York, pp 963-971

**Examples**

```
## Not run:
#Constructing a list of analyses:
analysisList <- NULL

analysis <- createIctpdAnalysis(analysisId = 1, censor = TRUE)
analysisList <- appendToIctpdAnalysisList(analysis)

analysis <- createIctpdAnalysis(analysisId = 2, censor = FALSE)
analysisList <- appendToIctpdAnalysisList(analysis, analysisList)

#You can store the list:
writeIctpdAnalysisListToFile(analysisList,"ictpdAnalysisList.csv")

#And load it back later:
analysisList <- loadIctpdAnalysisList("ictpdAnalysisList.csv")

#You can run all analyses across a set of exposure-outcome pairs with one command:
connectionDetails <- createConnectionDetails(dbms="sql server", server="server_ip")
exposureOutcomePairs = data.frame(outcomeConceptId = c(196794, 196794, 312648),
                                   exposureConceptId = c(1501700, 1545958, 1551803))

results <- runIctpdAnalyses(connectionDetails,
                           cdmDatabaseSchema = "cdm_schema.dbo",
                           resultsDatabaseSchema = "results.dbo",
                           exposureOutcomePairs = exposureOutcomePairs),
                           ictpdAnalysisList = ictpdAnalysisList)

## End(Not run)
```

---

```
writeIctpdAnalysisList
```

```
writeIctpdAnalysisListToFile
```

---

**Description**

`writeIctpdAnalysisListToFile` writes an object of type `IctpdAnalysisList` to a CSV file

**Usage**

```
writeIctpdAnalysisList(ictpdAnalysisList, file)
```

**Arguments**

```
ictpdAnalysisList      the ictpdAnalysisList to be written to file
file                   the name of the file where the results will be written
```

**Examples**

```
## Not run:
#Constructing a list of analyses:
analysisList <- NULL

analysis <- createIctpdAnalysis(analysisId = 1, censor = TRUE)
analysisList <- appendToIctpdAnalysisList(analysis)

analysis <- createIctpdAnalysis(analysisId = 2, censor = FALSE)
analysisList <- appendToIctpdAnalysisList(analysis, analysisList)

#You can store the list:
writeIctpdAnalysisListToFile(analysisList,"ictpdAnalysisList.csv")

#And load it back later:
analysisList <- loadIctpdAnalysisList("ictpdAnalysisList.csv")

#You can run all analyses across a set of exposure-outcome pairs with one command:
connectionDetails <- createConnectionDetails(dbms="sql server", server="server_ip")
exposureOutcomePairs = data.frame(outcomeConceptId = c(196794, 196794, 312648),
                                   exposureConceptId = c(1501700, 1545958, 1551803))

results <- runIctpdAnalyses(connectionDetails,
                           cdmDatabaseSchema = "cdm_schema.dbo",
                           resultsDatabaseSchema = "results.dbo",
                           exposureOutcomePairs = exposureOutcomePairs)),
                           ictpdAnalysisList = ictpdAnalysisList)

## End(Not run)
```

# Index

`appendToIctpdAnalysisList`, [1](#)  
`calculateStatisticsIc`, [2](#), [6](#), [9](#), [11](#)  
`createIctpdAnalysis`, [3](#)  
`getDbIctpdData`, [3](#), [5](#), [9](#), [11](#)  
`loadIctpdAnalysisList`, [6](#)  
`runIctpd`, [7](#)  
`runIctpdAnalyses`, [9](#)  
`writeIctpdAnalysisList`, [11](#)