

# Modeling the cumulative incidence function of clustered competing risk data: computational and numerical aspects of a multinomial GLMM approach



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Context: clustered competing risk data

Idea: causes competing by the occurrence of an event such the

confiability analysis

failure of an industrial or  
electronic component

survival analysis

failure or progress of a patient  
or some biological process



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A typical data set consists of

Group	ID	Cause 1	Cause 2	Censorship	Time	Feature
1	1	1	0	0	10	A
1	2	0	0	1	8	A
2	1	0	0	1	7	B
2	2	0	1	0	5	A



## What we do?

We model the **risk** of each competing cause along the time and taking into account the possible **within-group dependence**

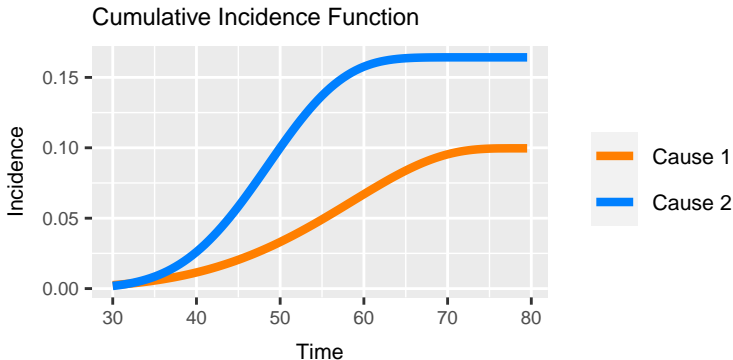
... all this in terms of a



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Main focus application: cancer incidence in twins



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↳ Family studies

↳ **Twins data**



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↳ **Twins data**

- » Taking into account the within-family dependence may reflect both disease **heritability** and the impact of shared **environmental effects**
- » A complication is that we have little information to track that **dependence** since each 'family' consists of only a pair of twins



## Challenges

Besides the small size groups, the data is very simple ...

- » we just know if the event occurred (1 or 0) and the time
  - » with this, we have to be able to construct the **cumulative incidence curves**
- » and we have to accommodate the **within-family dependency**
  - » that can happen in different ways and with different intensities

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to accomplish all this a powerful modeling framework is made necessary  
... with this,  
computational and numerical challenges has also to be overcome





Thank you



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