Analysis of treatment sequences from the French national SNIIRAM database: case study of incident people living with HIV in 2013

Objectives
The purpose of the study was to describe the changes and discontinuations of antiretroviral combination therapy (cART) (number of treatments, occurrence, duration) over the cohort of incident people living with HIV (PLWHIV) in 2013, included in the SNIIRAM database. It also aims to experiment data mining methods to study treatment sequences.

Methods
From the SNIIRAM, we extracted PLWHIV affiliated to the general insurance scheme (n=96,423) through specific chronic diseases status and/or reimbursement of HIV laboratory tests and/or HIV-related hospitalizations and/or reimbursements of antiretroviral drugs in 2013. Incident patients (N=3,373) were followed for 2 years to identify their cART, categorized as single, double, triple or quadruple+ combination therapies. The treatment sequences were arranged according to a similarity criterion. It was performed by an Agglomerative Clustering algorithm configured with the Hamming distance and the Ward linkage method. The result is a graph containing one discretized timeline per patient. The lines were put in order above the other and follow the 2-year follow-up. Finally, a smoothing was applied to the image to homogenize and highlight distinctive patterns.

The combination of Agglomerative Clustering and image processing forms an innovative methodology called TAK*: Time-sequence Analysis through K-clustering.

Results
Over the 3,373 incident patients,
- 77% started a cART in the 8 months; for most of them it was a triple therapy (70% of the whole cohort).
- 50% initiated a triple therapy that was maintained over the two years follow-up (without window >6 months).
- 11% received no antiretroviral drugs during the 2-year follow-up, 11% were only treated after 6 months and 8% stopped cART at least one period during follow-up.

Conclusions
In 2013, a triple therapy was the reference treatment and 30% of the patients had a 6-month period without any cART. This study validates the relevance of combining clustering methods with image processing to visualize the treatment sequences of a cohort in a clear and synthetic way.