nicer
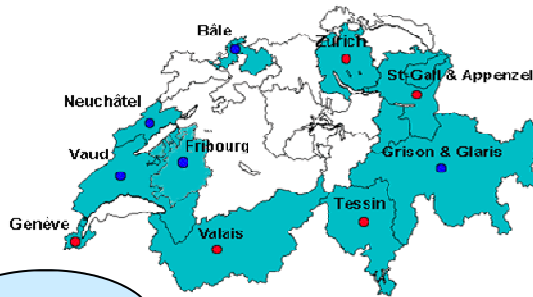### National Institute for Cancer Epidemiology and Registration

NATIONAL PREVALENCE FOR BREAST AND COLORECTAL CANCER IN SWITZERLAND ESTIMATED FROM REGIONAL CANCER REGISTRIES USING MIAMOD-PIAMOD METHOD

Jean-Michel Lutz, Pierre Pury, Matthias Lorez, Nicole Probst-Hensch and the Swiss Cancer Registries Network

Swiss Cancer Registries cover 60% of the population, provide incidence rates for 14 of the 26 cantons and estimate national incidence rates. The last estimation of prevalence has been published within the EUROPREVAL study in 2002, giving figures for prevalence in 1992. We chose to use PIAMOD method (Prevalence and Incidence Analysis Model) to update these figures.

Registries *(Start year)*	Population (Thousands)
Geneva *(1970)*	438
Neuchatel *(1974)*	170
Vaud *(1974)*	672
St-Gall & Appenzell *(1980)*	534
Zurich *(1980)*	1'307
Basle City & Land *(1981)*	454
Valais *(1989)*	299
Grisons & Glarus *(1989)*	227
Ticino *(1996)*	329
Fribourg *(2006)*	263
Total :	**4'693**

62% of the Swiss population

Methods

from A. Verdecchia et al.

The MIAMOD/PIAMOD Model

- Two independent functions : $\begin{cases} P = \text{function}(I,S) \\ M = \text{function}(I,P,S) \end{cases}$
- relating four quantities : Mortality, Prevalence, Incidence and Survival

PIAMOD : (Incidence, Survival) ⟶ (Prevalence, Mortality)

MIAMOD : (Mortality, Survival) ⟶ (Incidence, Prevalence)

SIAMOD : (Incidence, Mortality) ⟶ (Survival, Prevalence)

Regressing Incidence models

- Incidence
  - is modeled with Age Period Cohort (APC) models
  - whose parameters are estimated by regressing:
    - Incidence data → PIAMOD [1] (**P**revalence and **I**ncidence **A**nalysis **MOD**el)
    - Mortality data (back-calculation) → MIAMOD [2] (**M**ortality and **I**ncidence **A**nalysis **MOD**el)
- Survival is modeled/extrapolated from CR data

MIAMOD/PIAMOD estimates

PIAMOD regression / MIAMOD regression

Fit on cancer incidence data / Fit on cancer mortality data

Data : Population, incidence and mortality 1980-2004 : **a)** Pool of the seven Cancer Registries (7CRs) participating in EUROCARE 4 : Basle, Geneva, St-Gall & Appenzell, Grisons & Glarus, Ticino, Valais, Zurich. **b)** Observations and estimations of incidence and mortality for Switzerland 1980-2004. **c)** Survival : Model based survival (cure-models), cf. EUROCARE.

Validation steps
1. Comparison of model based survival trends by period of diagnosis and age against the observed figures (using the Survival Plot utilities of MIAMOD interface). **2.** PIAMOD application on 7CRs data and comparison with observed mortality trends + prevalence in 1992 from EUROPREVAL (based on Basle and Geneva only).
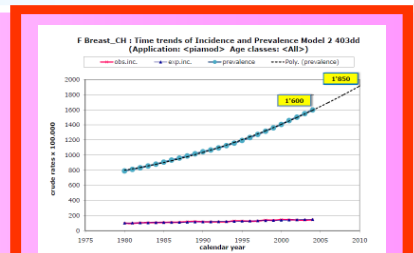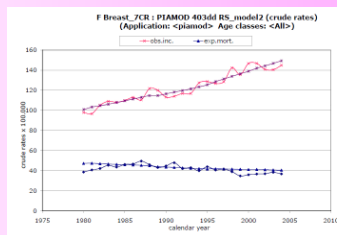
National results estimation.
PIAMOD application on Swiss data to derive prevalence in 2004 by using the same survival model validated in the previous step, comparing with Swiss observed mortality ; MIAMOD application on Swiss data to derive prevalence in 2004 by using the same survival model validated in the previous step, comparing with Swiss estimated incidence.

Results

Breast
Good fit and validation with observed mortality with PIAMOD on 7CRs ; the survival model is acceptable. Also the prevalence in 1992 is close to the EUROPREVAL value (1170.6). **Estimated crude rate is 1'600/100'000 for year 2004 and is expected to be 1'850/100'000 in 2010, i.e. about 72'000 women for whole Switzerland.**

F Breast_7CR : PIAMOD 403dd RS_model2 (crude rates) (Application: <piamod> Age classes: <All>)

F Breast_CH : Time trends of Incidence and Prevalence Model 2 403dd (Application: <piamod> Age classes: <All>)

Colon Rectum
Two characteristics :
1. Differences in trends for incidence between Males and Females
2. Fit with observed mortality data is not completely satisfactory, especially for males. Explanation could associate an underestimation of survival model based on 7CR (mortality was overestimated in PIAMOD application and incidence is underestimated in MIAMOD). This is true particularly for males while the validation step on women's data was more acceptable.
Prevalence validation in 1992 was good for both sexes, thus suggesting no dramatic effects on prevalence. **Estimated crude rates for 100'000 persons per year are 386 for females and 400 for males for year 2004 and expected to be 405 and 450 respectively for year 2010, i.e. about 15'700 women and 16'800 men for whole Switzerland.**

F_CLR_7CR : PIAMOD 302dd RS_model2 (crude rates) (Application: <piamod> Age classes: <All>)

M_CLR_7CR : PIAMOD 303dd RS_model 2 (crude rates) (Application: <piamod> Age classes: <All>)

F_CLR_CH : Time trends of incidence and prevalence (crude rates) PIAMOD 302dd model2 (Application: <piamod> Age classes: <All>)

M_CLR_CH : Time trends of incidence and prevalence (crude rates) PIAMOD 303 dd model 2 (Application: <piamod> Age classes: <All>)

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