# Incidence of myeloid neoplasms in Spain (2002-2013): a population-based study of the Spanish Network of Cancer Registries (REDECAN)

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Panel Session 2
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# Incidence of myeloid neoplasms in Spain (2002-2013): a population-based study of the Spanish Network of Cancer Registries (REDECAN)

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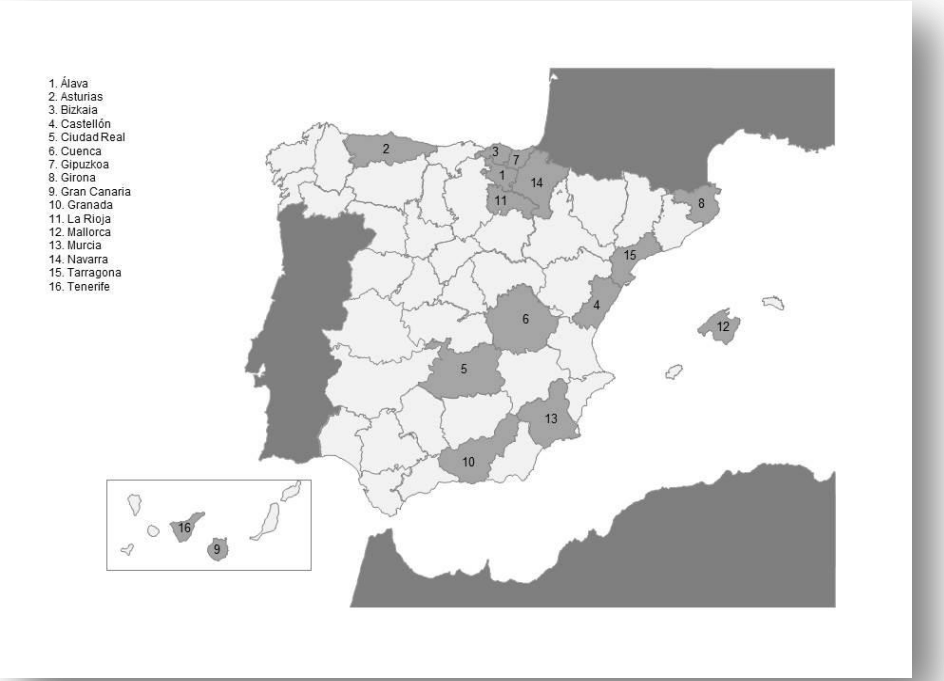
1-Registro de Cáncer de Girona; 2-Registro de Cáncer de Tarragona; 3-Registro de Cáncer de Euskadi; 4-Registro de Cáncer de Murcia; 5-Registro de Tumores del Principado de Asturias; 6-Registro Poblacional de Cáncer de la C.A. de Canarias; 7-Registro de Cáncer de Granada; 8-Registre de Càncer de Mallorca; 9-Registro de Cáncer de Navarra; 10-Registro de Tumores de Castellón; 11-Registro de Cáncer de La Rioja; 12-Registro de Cáncer de Ciudad Real; 13-Registro de Cáncer de Cuenca.

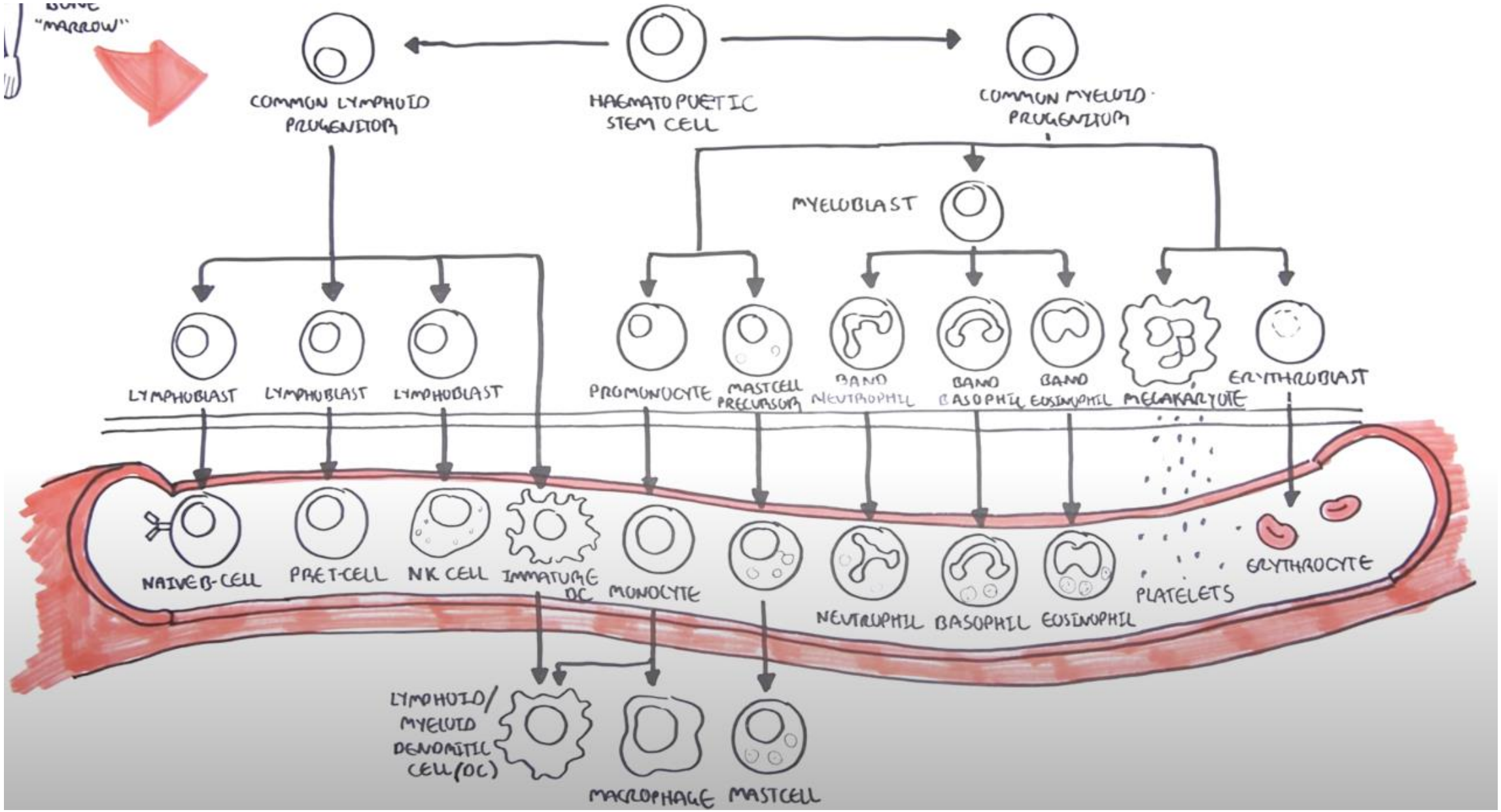
Red Española de Registros de Cáncer

REDECAN

REDECAN registries covers a ~26% of the total Spanish population



# Background

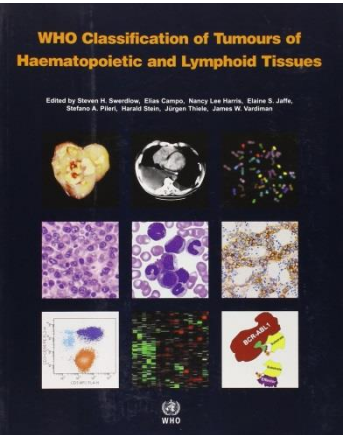

"MARROW"
COMMON LYMPHOID PROGENITOR
HAEMATOPOETIC STEM CELL
COMMON MYELOID PROGENITOR
MYELOBLAST
LYMPHOBLAST
LYMPHOBLAST
LYMPHOBLAST
PROMONOCYTE
MASTCELL PRECURSOR
BAND NEUTROPHIL
BAND BASOPHIL
BAND EOSINOPHIL
MEGAKARYOTE
ERYTHROBLAST
NAIVE B-CELL
PRE T-CELL
NK CELL
IMMATURE DC
MONOCYTE
NEUTROPHIL
BASOPHIL
EOSINOPHIL
PLATELETS
ERYTHROCYTE
LYMPHOID/ MYELOID DENDRITIC CELL (DC)
MACROPHAGE
MASTCELL

# Background – Myeloid neoplasms classification

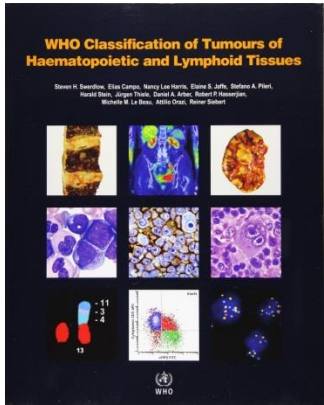
- WHO 2008
  - Myeloproliferative neoplasms
  - Myeloid and lymphoid neoplasms with eosinophilia and abnormalities of PDGFRA, PDGFRB or FGFR1
  - Myelodysplastic/myeloproliferative neoplasms
  - Myelodysplastic syndromes
  - Acute myeloid leukaemia and related precursor neoplasms
  - Acute leukaemias of ambiguous lineage

WHO 2017

- Myeloproliferative neoplasms
- Mastocytosis
- Myeloid/lymphoid neoplasms with eosinophilia and gene rearrangement
- Myelodysplastic/myeloproliferative neoplasms
- Myelodysplastic syndromes
- Acute myeloid leukaemia and related precursor neoplasms
- Acute leukaemias of ambiguous lineage




**Rapidly emerging genetic information**



# Objective

- To assess the incidence of MNs according different subtypes in Spain over the period 2002-2013.
- To describe incidence trends of MNs during study period.
- To estimate the number of MNs expected in Spain during 2021.

# Methods

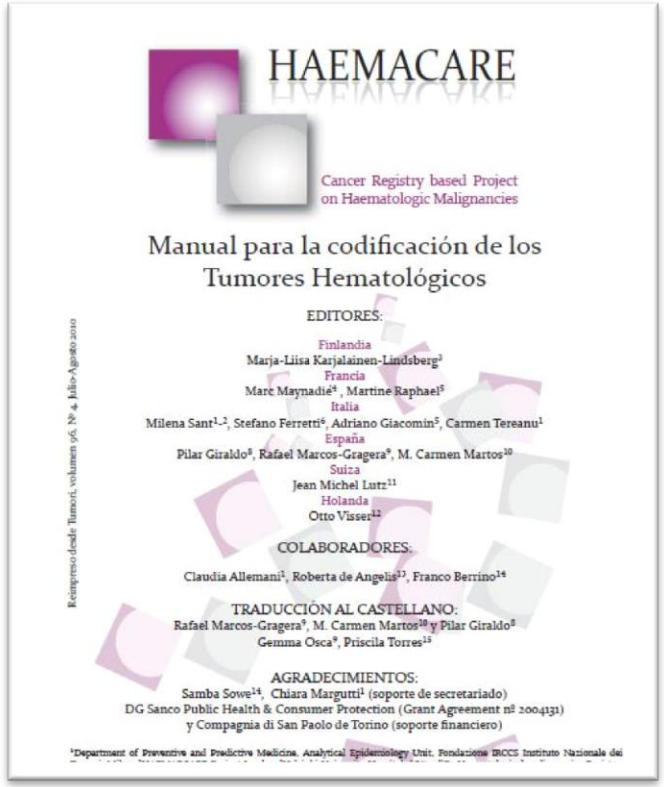
- Harmonized data from 16 Spanish population-based cancer registries
- Period of study: 2002-2013
- Quality indicators ✓

| Cancer registry | Period | N cases | Person-years | Quality indicators | | |
|---|---|---|---|---|---|---|
| | | | | MV (%) | NOS[1] (%) | DCOs (%) |
| Asturias | 2002-2010 | 1,238 | 9,603,522 | 95.0 | 3.9 | 0.0 |
| Canary Islands | | | | | | |
| Gran Canaria | 2002-2013 | 975 | 12,159,144 | 96.9 | 3.1 | 1.7 |
| Tenerife | 2002-2013 | 1,018 | 11,122,121 | 96.2 | 4.3 | 3.0 |
| Castellón | 2004-2013 | 763 | 5,721,562 | 99.2 | 2.54 | 0.8 |
| Ciudad Real | 2004-2011 | 527 | 4,087,571 | 98.9 | 5.1 | 0.9 |
| Cuenca | 2002-2011 | 452 | 2,093,316 | 93.8 | 6.4 | 3.3 |
| Euskadi | | | | | | |
| Álava | 2002-2013 | 649 | 3,683,786 | 97.5 | 2.9 | 0.8 |
| Guipuzkoa | 2002-2013 | 1,308 | 8,330,687 | 92.6 | 9.9 | 1.4 |
| Bizkaia | 2002-2013 | 2,380 | 13,707,586 | 97.9 | 2.8 | 1.7 |
| Girona | 2002-2013 | 1,573 | 8,233,631 | 96.6 | 1.3 | 2.9 |
| Granada | 2002-2013 | 1,105 | 10,598,249 | 96.1 | 2.2 | 3.9 |
| La Rioja | 2002-2013 | 612 | 3,678,906 | 96.7 | 1.5 | 2.0 |
| Mallorca | 2003-2012 | 1,180 | 10,101,043 | 97.5 | 2.7 | 2.1 |
| Murcia | 2002-2010 | 1,552 | 12,091,278 | 94.3 | 4.3 | 1.2 |
| Navarra | 2002-2012 | 842 | 6,635,158 | 95.6 | 1.4 | 1.5 |
| Tarragona | 2002-2013 | 1,308 | 8,854,188 | 96.7 | 4.0 | 3.0 |
| **Spain** | **2002-2013** | **17,522** | **130,701,748** | **96.3** | **3.6** | **1.9** |

MV, microscopically verified; NOS, not-otherwise specified; DCO, death certificate only
[1]NOS cases included the following ICD-O-3 codes: 9860, 9800

# Methods

- Incident MNs classified following the WHO 2008 classification and grouped according to the HAEMACARE scheme.



HAEMACARE

Cancer Registry based Project on Haematologic Malignancies

Manual para la codificación de los Tumores Hematológicos

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| Myeloid neoplasms | ICD-O-3 codes |
|---|---|
| **1) Myeloproliferative neoplasms** | |
| 1.1. Chronic myeloid leukemia | 9863, 9875 |
| 1.2. Polycythaemia vera | 9950 |
| 1.3. Primary myelofibrosis | 9961 |
| 1.4. Essential thrombocythemia | 9962 |
| 1.5. Chronic neutrophilic leukemia/Chronic eosinophilic | 9963-9964 |
| 1.6. Myeloproliferative neoplasm unclassifiable | 9960 |
| 1.7. Mastocytosis | 9740-9742 |
| **2) Myelodysplastic/myeloproliferative neoplasms** | |
| 2.1. Chronic myelomonocytic leukemia | 9945 |
| 2.2. Juvenile myelomonocytic leukemia | 9946 |
| 2.3. Atypical chronic myeloid leukemia | 9876 |
| 2.4. Myelodysplastic/myeloproliferative neoplasm, unclassifiable | 9975 |
| **3) Myelodysplastic syndromes** | |
| 3.1. Myelodysplastic syndrome with single lineage dysplasia | 9980, 9991 |
| 3.2. Myelodysplastic syndrome with ring sideroblasts and single lineage dysplasia | 9982 |
| 3.3. Myelodysplastic syndrome with excess of blasts | 9983 |
| 3.4. Myelodysplastic syndrome with multilineage dysplasia | 9985 |
| 3.5. MDS associated with isolated del(5q) | 9986 |
| 3.6. MDS unclassifiable | 9989 |
| **4) Acute myeloid leukemia and precursor related neoplasms** | |
| 4.1. AML with recurrent cytogenic abnormalities | 9896,9897, 9871, 9866 |
| 4.2. AML with multilineage dysplasia | 9895, 9984 |
| 4.3. Therapy-related myeloid neoplasms | 9920, 9987 |
| 4.4. AML NOC | 9872-9874, 9867, 9891, 9840, 9910, 9870, 9930, 9931 |
| 4.5. AML NOS | 9861 |
| **5) Acute leukemia of ambiguous lineage** | |
| 5.1. Acute leukemia, NOS | 9801 |
| 5.2. Biphenotypic acute leukemia | 9805, 9807-9809 |
| **6) Unknown myeloid neoplasms** | |
| 6.1. Myeloid leukemia, NOS | 9860 |
| 6.2. Leukemia, NOS | 9800 |

# Methods

- Statistical analysis
  - Crude incidence rates (CR)
  - Age-standardized incidence rates using the 2013 European standard population ($ASR_E$)
  - Sex-, age- and registry- specific incidence rates
  - Incidence trends – Annual percentage change (APC) using Poisson regression and Joinpoint regression
  - Predictions of new cases and age-specific rates of myeloid neoplasms in 2021 were obtained using the Spanish population projections of 2021, the age-specific rates for the years after the last five-year period of known incidence (2009-2013) and applying the APC.

# Results

## Myeloid neoplasms

In Spain, MNs accounted for 30.81% (n=17,522) of all hematologic malignancies (n=56,777)

Age: 73 (60-81 yrs)

55.1% men

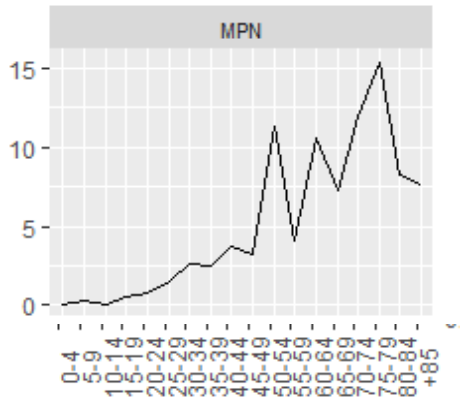
| | |
|---|---|
| Myeloproliferative neoplasms | 33.5 % |
| Myelodysplastic/myeloproliferative neoplasms | 5.2 % |
| Myelodysplastic syndromes | 29.8 % |
| Acute myeloid leukemia and precursor related neoplasms | 25.7 % |
| Acute leukemia of ambiguous lineage | 2.3 % |
| Unknown myeloid neoplasms | 3.6 % |

# Results – Myeloproliferative neoplams

Myeloproliferative neoplasms

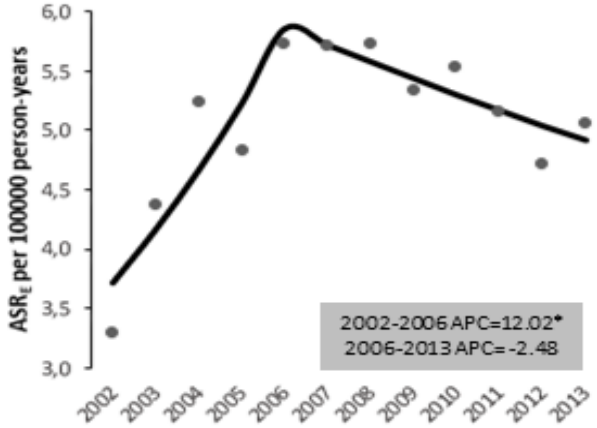
- CR: 4.7 (95%CI: 4.6;4.8)
- $ASR_E$:5.2 (95%CI:5.0;5.3)
- Sex ratio: 1.38

**Age-specific rate**




Median age (IQR):
69 (54-78) yrs

**Incidence trends**




**Expected cases in 2021, Spain: N=2,835**

**MOST FREQUENT**

Essential thrombocythemia
41% of cases

Chronic myeloid leukemia
23% of cases

**Higher rates in men were reported in all subtypes**

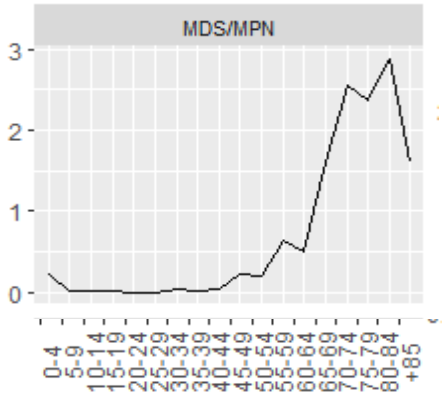
**The incidence increased until 2006, thereafter It stabilized**
**Overall APC=1.6 95%CI:0.8;2.4**

# Results – Myelodysplastic/myeloproliferative neoplasms

Myelodysplastic/myeloproliferative neoplasms

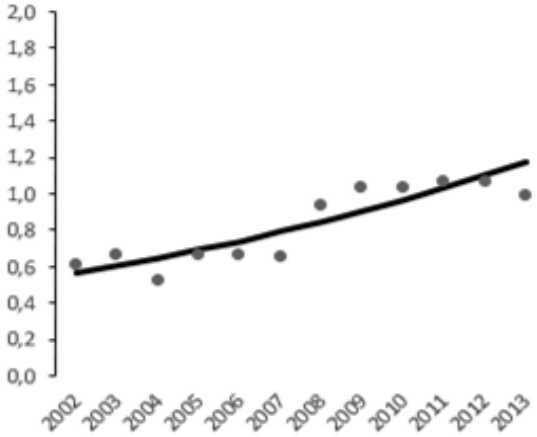
- CR: 0.73 (95%CI: 0.68;0.77)
- $ASR_E$:0.83 (95%CI:0.78;0.88)
- Sex ratio: 2.87

**Age-specific rate**




Median age (IQR):
77 (70-83) yrs

**Incidence trends**




**Expected cases in 2021, Spain: N=650**

**MOST FREQUENT**

Chronic myelomonocytic leukemia (84% of cases)

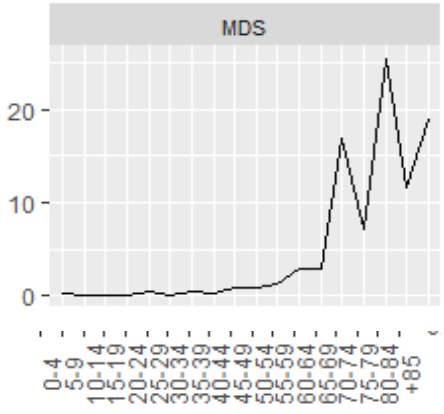
APC of 6.9% (95% CI: 4.8; 9.1)

# Results – Myelodysplastic syndromes

Myelodysplastic syndromes

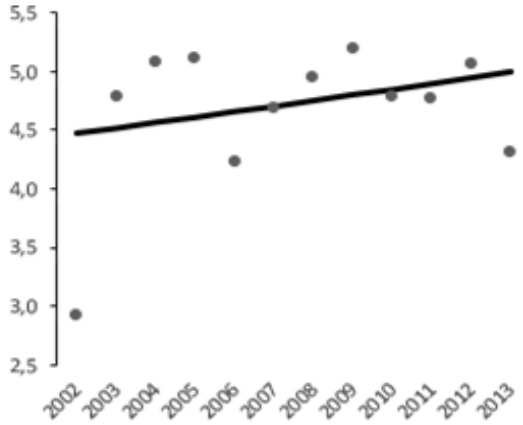
- CR: 4.16 (95%CI: 4.04;4.27)
- $ASR_E$:4.71 (95%CI:4.59;4.84)
- Sex ratio: 1.88

**Age-specific rate**




Median age (IQR):
78 (71-83) yrs

**Incidence trends**




**Expected cases in 2021, Spain: N=2,670**

**MOST FREQUENT**

Myelodysplastic syndrome with excess of blasts

MDS with multilineage dysplasia

**MDS associated with isolated del(5q) - Sex ratio =0.43**

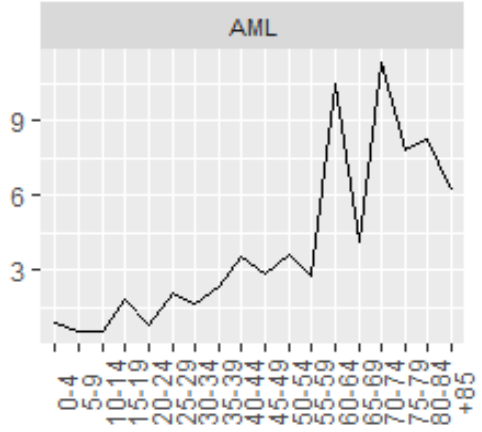
**APC=1.3%, 95% CI: 0.4; 2.1**

# Results – Acute myeloid leukemia and precursor related neoplasms

Acute myeloid leukemia and precursor related neoplasms

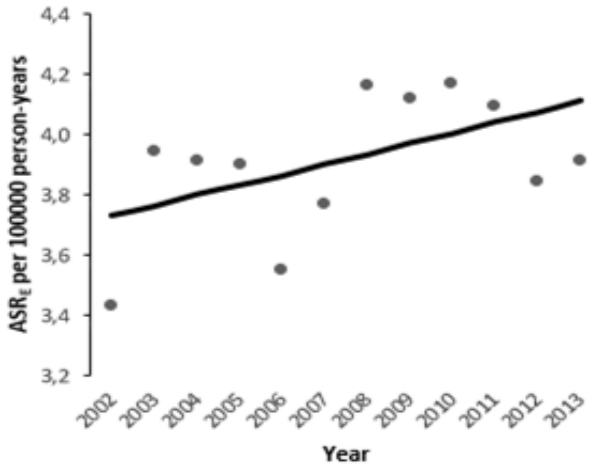
- CR: 3.59 (95%CI: 3.48;3.69)
- $ASR_E$:3.91 (95%CI:3.79;4.02)
- Sex ratio: 1.45

**Age-specific rate**




Median age (IQR):
68 (50-78) yrs

**Incidence trends**




**Expected cases in 2021, Spain: N=2,060**

**MOST FREQUENT**
47% were AML NOC,

AML with recurrent cytogenetic abnormalities (14%, n=608)

Most frequent subtype was AML with t(15;17)

AML and MDS therapy related - Sex ratio =0.83

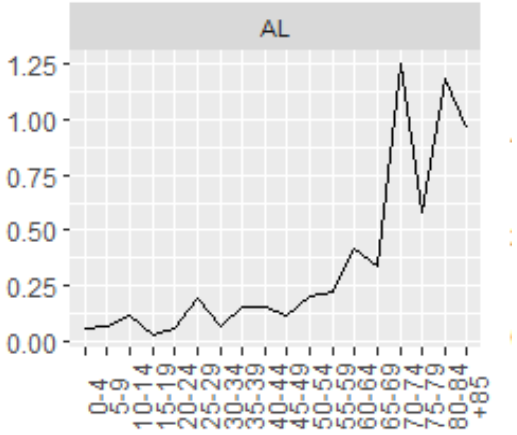
Relatively stable over time
APC=0.8 95%CI:-0.5;2.1

# Results – Acute leukemia of ambiguous lineage

Acute leukemia of ambiguous lineage

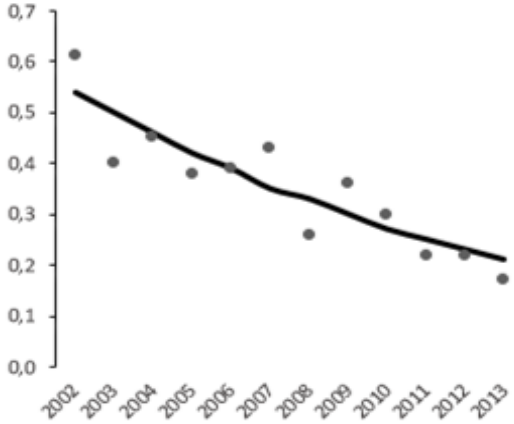
- CR: 0.32 (95%CI: 0.28;0.35)
- $ASR_E$:0.35 (95%CI:0.32;0.39)
- Sex ratio: 1.37

**Age-specific rate**




Median age (IQR):
75 (60-83) yrs

**Incidence trends**



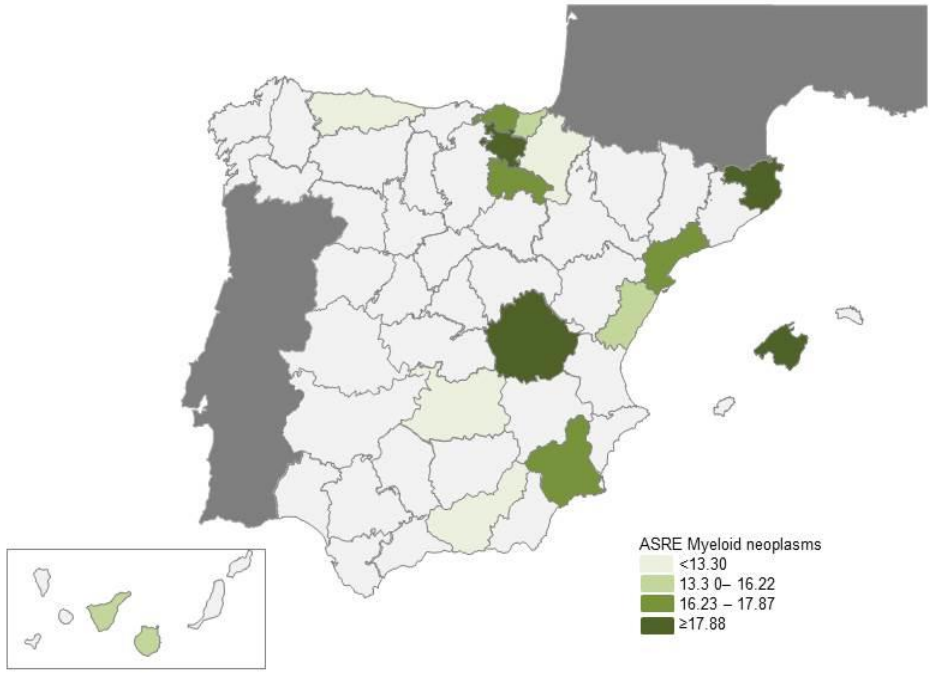

**Expected cases in 2021, Spain: N=106**

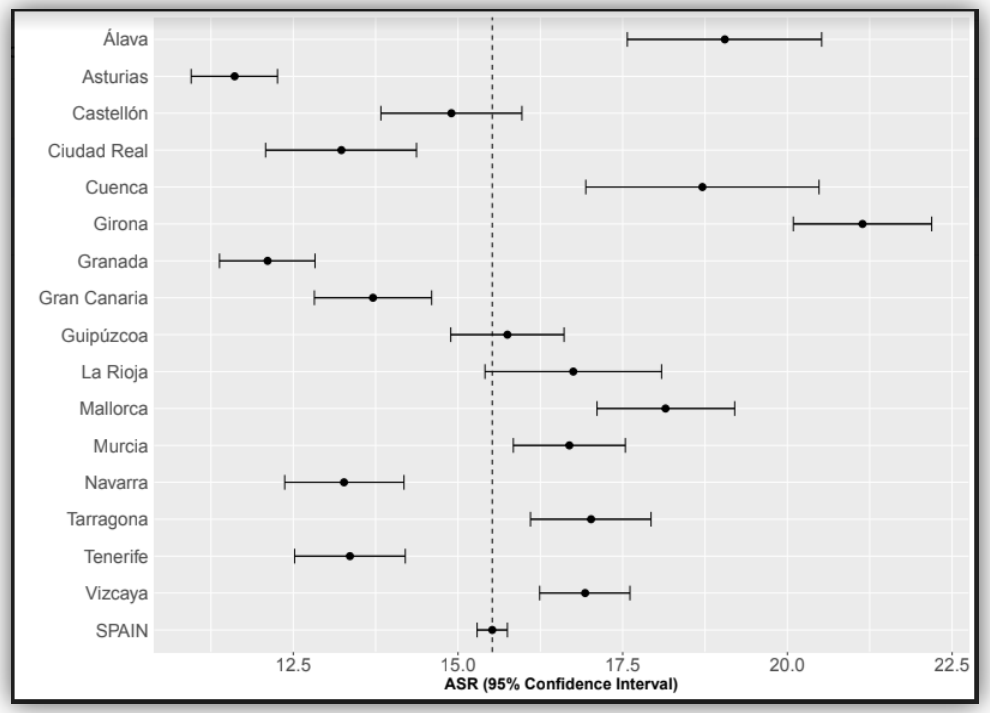
Rare entity

Negative incidence trend
APC=-9.2. 95% CI -12.0; -6.3

# Results

Age-standardized incidence rates (95%CI) of myeloid neoplasms in Spain, 2002-2013

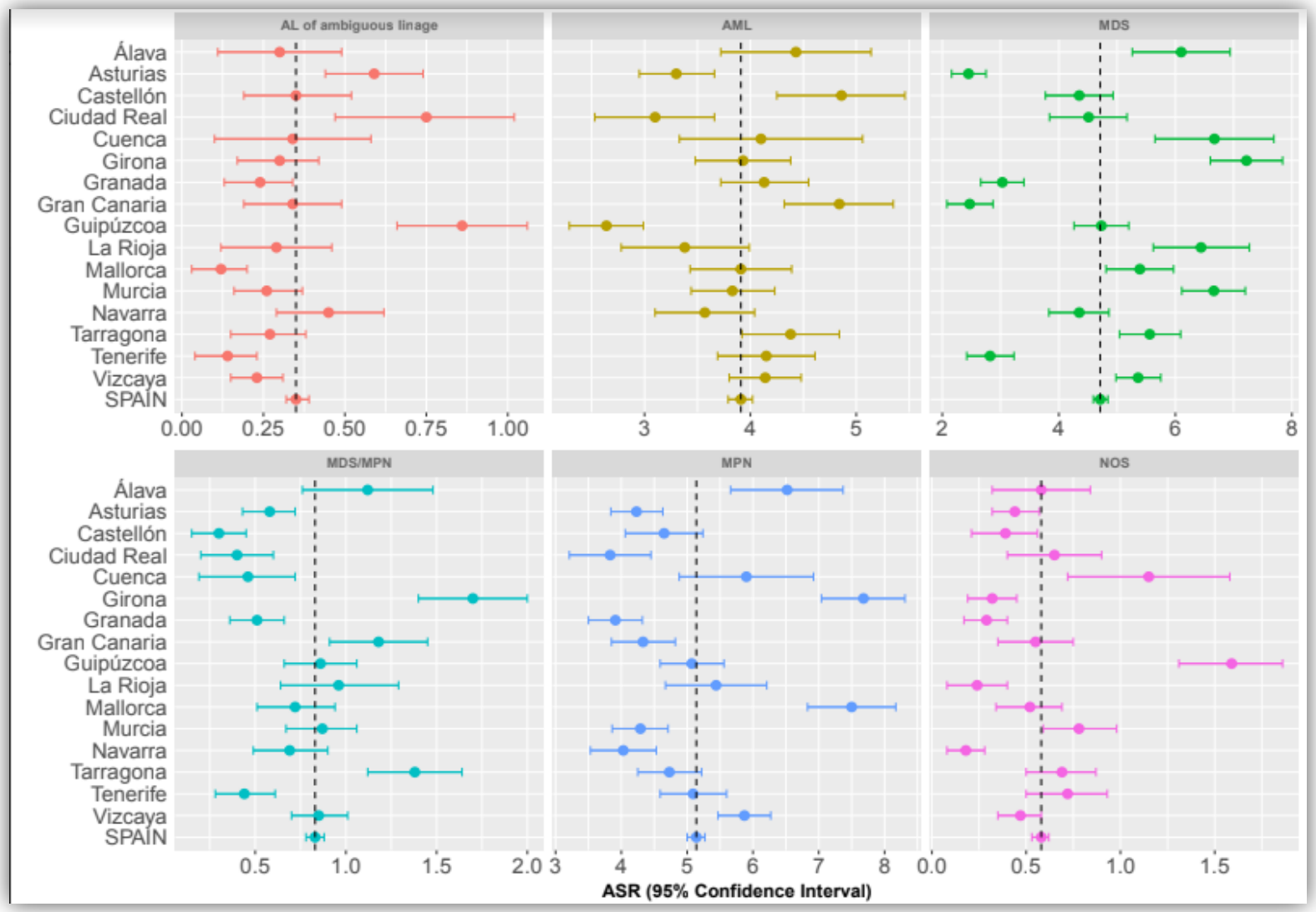



**Expected cases in 2021, Spain:**
**N=8,446**

# Results

Age-standardized incidence rates (95%CI) of myeloid neoplasms by region, 2002-2013



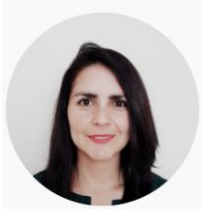
# Conclusions

- There is an increasing incidence of several subtypes during study period.
- There is a remarkable variation in the incidence rates (specially of MDS, MPN, and MDS/MPN) across provinces.
- The negative trend in the incidence of NOS cases evidences a more specific diagnostic and/or improvements in registration of these cases across the period of study.
- The number of expected cases of myeloid neoplasms depicts the burden of disease, although it should be taken with caution due to the probable impact of COVID-19 in this group of disease.

# Acknowledgments

- HEMATOREDECAN WORKING GROUP

RAFEL MARCOS GRAGERA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# Thank you very much for your attention