

ICD-O-3 to ICD-10 conversion for hemato-oncological diseases following recent updates in both classifications



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BACKGROUND. The major update of WHO-ICD-10 classification introduced in 2010 resulted in substantial changes for hemato-oncological diseases by introducing a new 3-digit (C86) and several new 4-digit codes and terms. For a substantial number of codes an unambiguous (1:1) conversion within ICD-10 seemed impossible. Furthermore the conversion programs provided by IARC (ICD-O-3 to ICD-10) could no longer be used for these diagnoses.

METHODS. Main purpose was to ensure the best possible automated conversion of ICD-10 codes to the updated version for all hemato-oncological cases diagnosed until 2010, by making use of the typically more specific ICD-O-3 information. Therefore, we developed a new conversion table from ICD-O-3 to ICD-10 for ICD-O-3 morphology codes 9590/3 to 9989/3. Additionally, conversions for the new ICD-O-3 codes introduced in 2011 were provided. For the first draft of the conversion table, we used a systematic approach using a hierarchical structure of criteria, mainly based on synonym terms given in both classifications and additional information from the WHO Classification of tumours of Haematopoietic and Lymphoid Tissues. This draft was circulated among coding specialists in the registries, and finally all ambiguities were discussed with a clinical oncologist, member of the Topical Advisory Group for Neoplasm for the WHO (SWK).

Table 1: Criteria used to derive ICD-O-3 to ICD-10 conversion (applied in hierarchical order from A. to H.)

Letter	Criteria
A	Main title identical for both codes (applicable for 28 codes)
B	Main title for both codes are judged as synonym (40 codes)
C	Main title in ICD-O-3 is mentioned in the systematic directory of ICD-10 under this code (26 codes)
D	Synonym for the main title in ICD-O-3 is mentioned in the systematic directory of ICD-10 under this code (11 codes)
E	Main title in ICD-O-3 is used as a synonym or inclusive term under this code in the alphabetical directory of ICD-10 (7 codes)
F	Generic term in ICD-O-3 ICD-O-3 (widely) identical to main title ICD-10, lower level of differentiation in ICD-10 (35 codes)
G	Use of inclusive terms from both classifications (2 codes)
H	No equivalent terms in ICD-O-3/ICD-10. Conversion derived from WHO classification or expert decision (SK) (15 codes)

Table 2a: Codes for automated conversion from ICD-O-3 to ICD-10 (lymphoma, plasma cell neoplasm and immunoproliferative diseases)

ICD-O-3 Code	ICD-O-3 Morphology (Main title)	ICD-10 Code	ICD-10 Title
9590/3	Malignant lymphoma, NOS	C85.9	Non-Hodgkin lymphoma, unspecified
9591/3	Malignant lymphoma, non-Hodgkin, NOS	C85.9	Non-Hodgkin lymphoma, unspecified
9596/3	Composite Hodgkin and non-Hodgkin lymphoma	C85.7	Other specified types of non-Hodgkin lymphoma
9597/3	Primary cutaneous follicle centre lymphoma	C82.6	Cutaneous follicle centre lymphoma
9650/3	Hodgkin lymphoma, NOS	C81.9	Hodgkin lymphoma, unspecified
9651/3	Hodgkin lymphoma, lymphocyte-rich	C81.4	Lymphocyte-rich classical Hodgkin lymphoma
9652/3	Hodgkin lymphoma, mixed cellularity, NOS	C81.2	Mixed cellularity classical Hodgkin lymphoma
9653/3	Hodgkin lymphoma, lymphocyte depletion, NOS	C81.3	Lymphocyte depleted classical Hodgkin lymphoma
9654/3	Hodgkin lymphoma, lymphocyte depletion, diffuse fibrosis	C81.3	Lymphocyte depleted classical Hodgkin lymphoma
9655/3	Hodgkin lymphoma, lymphocyte depletion, reticular	C81.3	Lymphocyte depleted classical Hodgkin lymphoma
9659/3	Hodgkin lymphoma, nodular lymphocyte predominance	C81.0	Nodular lymphocyte predominant Hodgkin lymphoma
9661/3	Hodgkin granuloma	C81.9	Hodgkin lymphoma, unspecified
9662/3	Hodgkin sarcoma	C81.3	Lymphocyte depleted classical Hodgkin lymphoma
9663/3	Hodgkin lymphoma, nodular sclerosis, NOS	C81.1	Nodular sclerosis classical Hodgkin lymphoma
9664/3	Hodgkin lymphoma, nodular sclerosis, cellular phase	C81.1	Nodular sclerosis classical Hodgkin lymphoma
9665/3	Hodgkin lymphoma, nodular sclerosis, grade 1	C81.1	Nodular sclerosis classical Hodgkin lymphoma
9667/3	Hodgkin lymphoma, nodular sclerosis, grade 2	C81.1	Nodular sclerosis classical Hodgkin lymphoma
9670/3	Malignant lymphoma, small B lymphocytic, NOS	C83.0	Small cell B-cell lymphoma
9671/3	Malignant lymphoma, lymphoplasmacytic	C83.0	Small cell B-cell lymphoma
9673/3	Mantle cell lymphoma	C83.1	Mantle cell lymphoma
9675/3	Malignant lymphoma, mixed small and large cell, diffuse	C85.9	Non-Hodgkin lymphoma, unspecified
9678/3	Primary effusion lymphoma	C83.8	Other non-follicular lymphoma
9679/3	Mediastinal large B-cell lymphoma	C85.2	Mediastinal (thymic) large B-cell lymphoma
9680/3	Malignant lymphoma, large B-cell, diffuse, NOS	C83.3	Diffuse large B-cell lymphoma
9684/3	Malignant lymphoma, large B-cell, diffuse, immunoblastic, NOS	C83.3	Diffuse large B-cell lymphoma
9687/3	Burkitt lymphoma, NOS	C83.7	Burkitt lymphoma
9688/3	T-cell/histiocyte rich large B-cell lymphoma	C83.3	Diffuse large B-cell lymphoma
9689/3	Splenic marginal zone B-cell lymphoma	C83.0	Small cell B-cell lymphoma
9690/3	Follicular lymphoma, NOS	C82.9	Follicular lymphoma, unspecified
9691/3	Follicular lymphoma, grade 2	C82.1	Follicular lymphoma grade II
9695/3	Follicular lymphoma, grade 1	C82.0	Follicular lymphoma grade I
9698/3	Follicular lymphoma, grade 3	C82.2	Follicular lymphoma grade III, unspecified
9699/3	Marginal zone B-cell lymphoma, NOS*	C88.4	Extranodal marginal zone B-cell lymphoma of mucosa-associated lymphoid tissue
9699/3	Marginal zone B-cell lymphoma, NOS**	C83.0	Small cell B-cell lymphoma
9700/3	Mycosis fungoides	C84.0	Mycosis fungoides
9701/3	Sézary syndrome	C84.1	Sézary disease
9702/3	Mature T-cell lymphoma, NOS	C84.4	Peripheral T-cell lymphoma, not classified
9705/3	Angioimmunoblastic T-cell lymphoma	C86.5	Angioimmunoblastic T-cell lymphoma
9708/3	Subcutaneous panniculitis-like T-cell lymphoma	C86.3	Subcutaneous panniculitis-like T-cell lymphoma
9709/3	Cutaneous T-cell lymphoma, NOS	C84.8	Cutaneous T-cell lymphoma, unspecified
9712/3	Intravascular large B-cell lymphoma	C83.8	Other non-follicular lymphoma
9714/3	Anaplastic large cell lymphoma, T cell and Null cell type	C84.6	Anaplastic large cell lymphoma, ALK-positive
9716/3	Hepatosplenic (gamma-delta) cell lymphoma	C86.1	Hepatosplenic T-cell lymphoma
9717/3	Intestinal T-cell lymphoma	C86.2	Enteropathy-type (intestinal) T-cell lymphoma
9718/3	Primary cutaneous CD30+ T-cell lymphoproliferative disorder	C86.6	Primary cutaneous CD30-positive T-cell proliferations
9719/3	NK/T-cell lymphoma, nasal and nasal-type	C86.0	Extranodal NK/T-cell lymphoma, nasal type
9724/3	childhood	C84.5	Other mature T/NK-cell lymphomas
9725/3	Hydroa vacciniforme-like lymphoma	C84.5	Other mature T/NK-cell lymphomas
9726/3	Primary cutaneous gamma-delta T-cell lymphoma	C84.5	Other mature T/NK-cell lymphomas
9727/3	Precursor cell lymphoblastic lymphoma, NOS	C83.5	Lymphoblastic (diffuse) lymphoma
9728/3	Precursor B-cell lymphoblastic lymphoma	C83.5	Lymphoblastic (diffuse) lymphoma
9729/3	Precursor T-cell lymphoblastic lymphoma	C83.5	Lymphoblastic (diffuse) lymphoma
9731/3	Plasmacytoma, NOS	C90.0	Multiple myeloma***
9732/3	Multiple myeloma	C90.0	Multiple myeloma
9733/3	Plasma cell leukemia	C90.1	Plasma cell leukaemia
9734/3	Plasmacytoma, extramedullary (not occurring in bone)	C90.2	Extramedullary plasmacytoma
9735/3	Plasmablastic lymphoma	C83.3	Diffuse large B-cell lymphoma
9737/3	ALK positive large B-cell lymphoma	C83.3	Diffuse large B-cell lymphoma
9738/3	Large B-cell lymphoma arising in HHV8-associated multicentric Castleman disease	C83.3	Diffuse large B-cell lymphoma
9740/1	Mastocytoma, NOS	D47.0	Histiocytic and mast cell tumours of uncertain and unknown behaviour
9740/3	Mast cell sarcoma	C96.2	Malignant mast cell tumour
9741/1	Indolent systemic mastocytosis	D47.0	Histiocytic and mast cell tumours of uncertain and unknown behaviour
9741/3	Malignant mastocytosis	C96.2	Malignant mast cell tumour
9742/3	Mast cell leukemia	C94.3	Mast cell leukaemia
9750/3	Malignant histiocytosis	C96.8	Histiocytic sarcoma
9751/1	Langerhans cell histiocytosis, NOS	C96.6	Unifocal Langerhans-cell histiocytosis
9751/3	Langerhans cell histiocytosis, NOS	C96.6	Unifocal Langerhans-cell histiocytosis
9752/1	Langerhans cell histiocytosis, unifocal	C96.6	Unifocal Langerhans-cell histiocytosis
9753/1	Langerhans cell histiocytosis, multifocal	C96.5	Multifocal and unsystemic Langerhans-cell histiocytosis
9754/3	Langerhans cell histiocytosis, disseminated	C96.0	Multifocal and multisystemic (disseminated) Langerhans-cell histiocytosis
9755/3	Histiocytic sarcoma	C96.8	Histiocytic sarcoma
9756/3	Langerhans cell sarcoma	C96.4	Sarcoma of dendritic cells (accessory cells)
9757/3	Interdigitating dendritic cell sarcoma	C96.4	Sarcoma of dendritic cells (accessory cells)
9758/3	Follicular dendritic cell sarcoma	C96.4	Sarcoma of dendritic cells (accessory cells)
9759/3	Fibroblastic reticular cell tumor	C96.4	Sarcoma of dendritic cells (accessory cells)
9760/3	Immunoproliferative disease, NOS	C88.9	Malignant immunoproliferative disease, unspecified
9761/3	Waldenström macroglobulinemia	C88.0	Waldenström macroglobulinemia
9762/3	Heavy chain disease, NOS	C88.2	Other heavy chain disease
9764/3	Immunoproliferative small intestinal disease	C88.3	Immunoproliferative small intestinal disease
9765/1	Monoclonal gammopathy of undetermined significance	D47.2	Monoclonal gammopathy of undetermined significance (MGUS)
9766/1	Angiocentric immunoproliferative lesion	C86.0	Extranodal NK/T-cell lymphoma, nasal type
9767/1	Angioimmunoblastic lymphadenopathy (AIC)	C86.5	Angioimmunoblastic T-cell lymphoma
9768/1	T-gamma lymphoproliferative disease	C91.7	Other lymphoid leukaemia
9769/1	Immunoglobulin deposition disease	D47.7	Other specified neoplasms of uncertain/unknown behaviour of lymphoid, haematopoietic and related tissue

*Topography codes C00-C41, C42.2, C43-C76, C80. **Topography codes C42.0, C42.1, C42.3, C42.4, C77. *** For international use, C90.3 (Solitary plasmacytoma) might be considered

RESULTS. All conversions are given in table 2. When applied to the pooled data of German cancer registries (2006-2010), 18% of hemato-oncological cases ICD-10 codes changed on the 4-digit, and 6% on the 3-digit level. Changes between major diagnostic groups (1.3%) or between C- and D-codes (0.2%) were rare. Nearly half of the 3-digit changes originated from the conversion of 9699/3 (marginal zone-B-cell-lymphoma n.o.s.) to C83.0 or C88.4 (depending on localization) instead of C82.7.

DISCUSSION. For a number of ICD-O-3 codes, no 1:1 conversion to ICD-10 was possible, and while we supply a reasonable solution for automated conversion, more accurate ICD-10 codes could be found when going back to diagnostic/pathologic reports. Some diagnostic terms are only used either in ICD-10 or ICD-O-3, which made conversion difficult and sometimes required arbitrary decisions. For Myeloma, the conversion was done with respect to common practice in Germany where 'Plasmacytoma' is often used as the more generic term (instead of Myeloma).

CONCLUSIONS. Despite limited impact on the data, we suggest the use of our conversion table (ICD-O-3 to ICD-10) for hemato-oncological diseases in population based cancer registries, especially for analyzing time trends according to ICD-10. The complete conversion table in electronic form can be ordered from our website (comments and suggestions welcome). For the future (ICD-11), an improved coordination between ICD and ICD-O working groups regarding hemato-oncological diseases is highly desirable.

Table 2b: Codes for automated conversion from ICD-O-3 to ICD-10 (leukemia and myelodysplastic/myeloproliferative diseases)

ICD-O-3 Code	ICD-O-3 Morphology (Main title)	ICD-10 Code	ICD-10 Title
9800/3	Leukemia, NOS	C95.9	Leukaemia, unspecified
9801/3	Acute leukemia, NOS	C95.0	Acute leukaemia of unspecified cell type
9805/3	Acute biphenotypic leukemia	C95.0	Acute leukaemia of unspecified cell type
9806/3	Mixed phenotype acute leukemia with t(9;22)(q34;q11.2); BCR-ABL1	C95.0	Acute leukaemia of unspecified cell type
9807/3	Mixed phenotype acute leukemia with t(11;12)(p15;p11); MLL rearranged	C95.0	Acute leukaemia of unspecified cell type
9808/3	Mixed phenotype acute leukemia, B/myeloid, NOS	C95.0	Acute leukaemia of unspecified cell type
9809/3	Mixed phenotype acute leukemia, T/myeloid, NOS	C95.0	Acute leukaemia of unspecified cell type
9811/3	B-lymphoblastic leukemia/lymphoma, NOS	C91.0	Acute lymphoblastic leukaemia [ALL]
9812/3	B-lymphoblastic leukemia/lymphoma with t(9;22)(q34;q11.2); BCR-ABL1	C91.0	Acute lymphoblastic leukaemia [ALL]
9813/3	B-lymphoblastic leukemia/lymphoma with t(11;12)(p15;p11); MLL rearranged	C91.0	Acute lymphoblastic leukaemia [ALL]
9814/3	B-lymphoblastic leukemia/lymphoma with t(12;21)(p13;q22); TEL-AML1 (ETV6-RUNX1)	C91.0	Acute lymphoblastic leukaemia [ALL]
9815/3	B-lymphoblastic leukemia/lymphoma with hyperdiploidy	C91.0	Acute lymphoblastic leukaemia [ALL]
9816/3	B-lymphoblastic leukemia/lymphoma with hypodiploidy (Hypodiploid ALL)	C91.0	Acute lymphoblastic leukaemia [ALL]
9817/3	B-lymphoblastic leukemia/lymphoma with t(5;14)(q31;q32); IL3-IGH	C91.0	Acute lymphoblastic leukaemia [ALL]
9818/3	B-lymphoblastic leukemia/lymphoma with t(11;9)(q23;p13.3); E2A-PBX1 (TCF3-PBX1)	C91.0	Acute lymphoblastic leukaemia [ALL]
9820/3	Lymphoid leukemia, NOS	C91.9	Lymphoid leukaemia, unspecified
9823/3	B-cell chronic lymphocytic leukemia/small lymphocytic lymphoma	C91.1	Chronic lymphocytic leukaemia of B-cell type
9826/3	Burkitt cell leukemia	C91.8	Mature B-cell leukaemia Burkitt-type
9827/3	Adult T-cell leukemia/lymphoma (HTLV-1 positive)	C91.5	Adult T-cell lymphoma/leukaemia (HTLV-1-associated)
9831/1	T-cell large granular lymphocytic leukemia	C91.7	Other lymphoid leukaemia
9831/3	T-cell large granular lymphocytic leukemia	C91.7	Other lymphoid leukaemia
9832/3	Prolymphocytic leukemia, NOS	C91.3	Prolymphocytic leukaemia of B-cell type
9833/3	Prolymphocytic leukemia, B-cell type	C91.3	Prolymphocytic leukaemia of B-cell type
9834/3	Prolymphocytic leukemia, T-cell type	C91.6	Prolymphocytic leukaemia of T-cell type
9835/3	Precursor cell lymphoblastic leukemia, NOS	C91.0	Acute lymphoblastic leukaemia [ALL]
9836/3	Precursor B-cell lymphoblastic leukemia	C91.0	Acute lymphoblastic leukaemia [ALL]
9837/3	Precursor T-cell lymphoblastic leukemia	C91.0	Acute lymphoblastic leukaemia [ALL]
9840/3	Acute myeloid leukemia, M6 type	C94.0	Acute erythroid leukaemia
9860/3	Myeloid leukemia, NOS	C92.9	Myeloid leukaemia, unspecified
9861/3	Acute myeloid leukemia, NOS	C92.0	Acute myeloblastic leukaemia [AML]
9863/3	Chronic myeloid leukemia, NOS	C92.1	Chronic myeloid leukaemia [CML], BCR/ABL-positive
9865/3	Acute myeloid leukemia with t(6;9)(p23;q34); DEK-NUP214	C92.0	Acute myeloblastic leukaemia [AML]
9866/3	Acute myeloid leukemia	C92.4	Acute promyelocytic leukaemia [PMML]
9867/3	Acute myelomonocytic leukemia	C92.5	Acute myelomonocytic leukaemia
9869/3	Acute myeloid leukemia with inv(3)(q21q26.2) or t(3;3)(q21;q26.2); RPN1-EV11	C92.0	Acute myeloblastic leukaemia [AML]
9870/3	Acute basophilic leukemia	C94.7	Other specified leukaemias
9871/3	Acute myeloid leukemia with abnormal marrow eosinophils	C92.5	Acute myelomonocytic leukaemia
9872/3	Acute myeloid leukemia, minimal differentiation	C92.0	Acute myeloblastic leukaemia [AML]
9873/3	Acute myeloid leukemia without maturation	C92.0	Acute myeloblastic leukaemia [AML]
9874/3	Acute myeloid leukemia with maturation	C92.0	Acute myeloblastic leukaemia [AML]
9875/3	Chronic myelogenous leukemia, BCR/ABL positive	C92.1	Chronic myeloid leukaemia [CML], BCR/ABL-positive
9876/3	Atypical chronic myeloid leukemia, BCR/ABL negative	C92.2	Atypical chronic myeloid leukaemia, BCR/ABL- negative
9891/3	Acute monocytic leukemia	C93.0	Acute monocytic/monocytic leukaemia
9895/3	Acute myeloid leukemia with multilineage dysplasia	C92.8	Acute myeloid leukaemia with multilineage dysplasia
9896/3	Acute myeloid leukemia, t(8;21)(q22;q22)	C92.0	Acute myeloblastic leukaemia [AML]
9897/3	Acute myeloid leukemia, t(11q23) abnormalities	C92.6	Acute myeloid leukaemia with 11q23-abnormality
9898/1	Transient abnormal myelopoiesis	D47.7	Other specified neoplasms of uncertain or unknown behaviour of lymphoid, haematopoietic and related tissue
9898/3	Myeloid leukemia associated with Down Syndrome	C92.0	Acute myeloblastic leukaemia [AML]
9910/3	Acute megakaryoblastic leukemia	C94.2	Acute megakaryoblastic leukaemia
9911/3	Acute myeloid leukemia (megakaryoblastic) with t(1;12)(p13;q13); RBM15-MKL1	C94.2	Acute megakaryoblastic leukaemia
9920/3	Therapy-related acute myeloid leukemia, NOS	C92.0	Acute myeloblastic leukaemia [AML]
9930/3	Myeloid sarcoma	C92.3	Myeloid sarcoma
9931/3	Acute panmyelosis with myelofibrosis	C94.4	Acute panmyelosis with myelofibrosis
9940/3	Hairy cell leukemia	C91.4	Hairy-cell leukaemia
9945/3	Chronic myelomonocytic leukemia, NOS	C93.1	Chronic myelomonocytic leukaemia
9946/3	Juvenile myelomonocytic leukemia	C93.3	Juvenile myelomonocytic leukaemia
9948/3	Aggressive NK-cell leukemia	C94.7	Other specified leukaemias
9950/3	Polycythemia vera	D45	Polycythemia vera
9960/3	Chronic myeloproliferative disease, NOS	D47.1	Chronic myeloproliferative disease
9961/3	Myelofibrosis with myeloid metaplasia	D47.4	Osteomyelofibrosis
9962/3	Essential thrombocythemia	D47.3	Essential (haemorrhagic) thrombocythemia
9963/3	Chronic neutrophilic leukemia	D47.1	Chronic myeloproliferative disease
9964/3	Hyperesoinophilic syndrome	D47.5	Chronic eosinophilic leukaemia [hyperesoinophilic syndrome]
9965/3	Myeloid and lymphoid neoplasms with PDCFR rearrangement	D47.1	Chronic myeloproliferative disease
9966/3	Myeloid neoplasms with PDGFRB rearrangement	D47.1	Chronic myeloproliferative disease
9967/3	Myeloid and lymphoid neoplasms with FGFR1 abnormalities	D47.1	Chronic myeloproliferative disease
9970/1	Lymphoproliferative disorder, NOS	D47.9	Neoplasm of uncertain or unknown behaviour of lymphoid, haematopoietic and related tissue, unspecified
9971/1	Post transplant lymphoproliferative disorder, NOS	D47.7	Other specified neoplasms of uncertain or unknown behaviour of lymphoid, haematopoietic and related tissue
9971/3	Polymorphic post transplant lymphoproliferative disorder	C88.7	Other malignant immunoproliferative diseases
9975/1	Myeloproliferative disease, NOS	D47.1	Chronic myeloproliferative disease
9975/3	Myeloproliferative neoplasm, NOS	D47.1	Chronic myeloproliferative disease
9980/3	Refractory anemia	D46.4	Refractory anaemia, unspecified
9982/3	Refractory anemia with sideroblasts	D46.1	Refractory anaemia with ringed sideroblasts
9983/3	Refractory anemia with excess blasts	D46.2	Refractory anaemia with excess of blasts
9984/3	Refractory anemia with excess blasts in transformation	C92.0	Acute myeloblastic leukaemia [AML]
9985/3	Refractory cytopenia with multilineage dysplasia	D46.5	Refractory anaemia with multi-lineage dysplasia
9986/3	Myelodysplastic syndrome with 5q deletion (5q-) syndrome	D46.6	Myelodysplastic syndrome with isolated del(5q) chromosomal abnormality
9987/3	Therapy-related myelodysplastic syndrome, NOS	D46.9	Myelodysplastic syndrome, unspecified
9989/3	Myelodysplastic syndrome, NOS	D46.9	Myelodysplastic syndrome, unspecified
9991/3	Refractory neutropenia	D46.7	Other myelodysplastic syndromes
9992/3	Refractory thrombocytopenia	D46.7	Other myelodysplastic syndromes