

Supplementary Table 1

| NCIt Biological Process Concept | # Role Types | Error |
|--|---------------------|---|
| Excision Repair | 1 | Missing the role Biological_Process_Has_Associated_Location with the target concept Chromosome |
| Expiration | 1 | Missing the role Biological_Process_Has_Associated_Location with the target concept Lung |
| Homologous Recombination | 1 | Missing the role Biological_Process_Has_Associated_Location with the target concept Chromosome |
| Mismatch Repair | 1 | Missing the role Biological_Process_Has_Associated_Location with the target concept Chromosome |
| Oncogene Activation Process | 1 | Missing the role Biological_Process_Has_Associated_Location with the target concept Chromosome |
| Recombination Repair | 1 | Missing the role Biological_Process_Has_Associated_Location with the target concept Chromosome |
| Tumor Immunity | 1 | The target of the role Biological_Process_Has_Result_Biological_Process Cancer Progression is incorrect |
| Epithelial Cell Proliferation | 2 | Missing the role Biological_Process_Has_Result_Anatomy with the target concept Epithelial Cell |
| Nervous System Development | 2 | Missing the role Biological_Process_Has_Associated_Location with the target concept Nervous System |
| Telomere Recombination | 2 | Missing the role Biological_Process_Has_Associated_Location with the target concept Chromosome |
| Erythrocyte Differentiation | 3 | Missing the role Biological_Process_Has_Associated_Location with the target concept Bone Marrow |
| Leukocyte Differentiation | 3 | Missing the role Biological_Process_Has_Associated_Location with the target concept Bone Marrow |
| Leukopoiesis | 3 | Missing the role Biological_Process_Has_Associated_Location with the target concept Bone Marrow |
| Megakaryocyte Differentiation | 3 | Missing the role Biological_Process_Has_Associated_Location with the target concept Bone Marrow |
| Megakaryopoiesis | 3 | Missing the role Biological_Process_Has_Associated_Location with the target concept Bone Marrow Missing the role Biological_Process_Has_Result_Anatomy with the target Megakaryocyte |
| Myeloid Cell Differentiation | 3 | Missing the role Biological_Process_Has_Associated_Location with the target concept Bone Marrow Missing the role Biological_Process_Has_Result_Anatomy with the target Megakaryocyte |
| Myelopoiesis | 3 | Missing the role Biological_Process_Has_Result_Anatomy with the target concept myelocyte |

| NCIt Biological Process Concept | # Role Types | Error |
|--|---------------------|--|
| T-Cell Activation | 3 | Missing the role Biological_Process_Has_Result_Biological_Process with the target concept T Cell Proliferation |
| Thrombocyte Differentiation | 3 | Missing the role Biological_Process_Has_Associated_Location with the target concept Bone Marrow |
| Anaphase | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Antigen Presentation | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Immune Response Process is incorrect |
| Cell Cycle Regulation Process | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Chromosome Segregation | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Cytokinesis | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Metaphase Process | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Mitosis | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Mitotic Chromosomal Process | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Mitotic Sister Chromatid Cohesion | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Negative Regulation of G0 to G1 Transition | 4 | Missing the role Biological_Process_Has_Result_Biological_Process with the target concept G1 Phase Process The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Negative Regulation of G1 Phase | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept G1 Phase Process is incorrect |
| Negative Regulation of G2 Phase | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Negative Regulation of Mitosis | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Negative Regulation of S Phase | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Nuclear Division | 4 | Missing the role Biological_Process_Has_Associated_Location with the target concept Nucleus |

| NCIt Biological Process Concept | # Role Types | Error |
|---|---------------------|--|
| Positive Regulation of Mitosis | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Prophase Process | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| S Phase Process | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Sister Chromatid Exchange Process | 4 | The role Biological_Process_Is_Part_Of_Process with the target concept Cell Cycle Process is incorrect |
| Negative Regulation of G1 to S Transition | 5 | The role Biological_Process_Is_Part_Of_Process with the target concept G1 to S Transition Process is incorrect |
| Negative Regulation of G2 to M Transition | 5 | The role Biological_Process_Is_Part_Of_Process with the target concept G2 to M Transition Process is incorrect |

Supplementary Table 2

| NCIt Neoplasm Concept | Error |
|------------------------------------|--|
| Benign Adrenal Medulla Neoplasm | Missing the role Disease_Has_Finding with the target Indolent Clinical Course |
| Benign Epithelial Neoplasm | Missing the role Disease_Has_Finding with the target Benign Cellular Infiltrate |
| Gangliocytoma | Missing the role Disease_Excludes_Finding with the target Poorly Differentiated Lesion |
| Intramuscular Myxoma | Missing the role Disease_Has_Finding with the target Hypocellular Tissue |
| Lymphoplasmacyte-Rich Meningioma | Missing the role Disease_Has_Primary_Anatomic_Site with the target Meninges |
| Anal Canal Neuroendocrine Tumor | Missing the role Disease_Has_Normal_Tissue_Origin with the target Neuroendocrine Tissue |
| Benign Urethral Neoplasm | Missing the role Disease_Has_Normal_Tissue_Origin with the target Connective and Soft Tissue |
| Cutaneous Glomangioma | Missing the role Disease_Excludes_Abnormal_Cell with the target Malignant Cell |
| Cervical Intraepithelial Neoplasia | Missing an IS-A link to the concept Premalignant Neoplasm |

| NCIt Neoplasm Concept | Error |
|--|---|
| Fibromatosis | Missing the role Disease_Has_Primary_Anatomic_Site with the target Connective and Soft Tissue |
| Hemolymphangioma | Missing the role Disease_Has_Associated_Anatomic_Site with the target Lymphatic Vessel |
| High Grade Esophageal Squamous Intraepithelial Neoplasia | Missing the role Disease_Has_Finding with the target High Grade Lesion |
| Malignant Exocrine Pancreas Neoplasm | Missing the role Disease_Excludes_Finding with the target concept Favorable Clinical Outcome |
| Ampullary Noninvasive Pancreatobiliary Papillary Neoplasm with Low Grade Dysplasia | Missing the role Disease_Has_Finding with the target Low Grade Lesion |
| Benign Iris Neoplasm | Missing the role Disease_Has_Finding with the target Benign Cellular Infiltrate |
| Borderline Ovarian Clear Cell Adenofibroma | Missing the role Disease_Mapped_To_Gene with the target ARID1A Gene |
| Breast Carcinoma with Osseous Metaplasia | Missing the role Disease_Has_Finding with the target Mixed Cellular Population |
| Grade 2 Immature Ovarian Teratoma | Missing the role Disease_Has_Normal_Cell_Origin with the target Neuroepithelial Cell |
| High Grade Vaginal Intraepithelial Neoplasia | Missing the role Disease_Has_Primary_Anatomic_Site with the target Vagina |
| Invasive Hydatidiform Mole | Missing the role Disease_Has_Primary_Anatomic_Site with the target Uterus |
| Breast Tubular Adenoma | Missing an IS-A link to the concept Tubular Adenoma |
| Gonadoblastoma | Missing an IS-A link to the concept Neoplasm, Uncertain Whether Benign or Malignant |
| Jugulotympanic Paraganglioma | Missing an IS-A link to the concept Neoplasm, Uncertain Whether Benign or Malignant |
| Adenocarcinoma in Multiple Adenomatous Polyps | Missing the role Disease_Has_Associated_Disease with the target Polyposis |
| Anterior Tongue Adenoid Cystic Carcinoma | Missing the role Disease_Has_Finding with the target Slow Growing Mass |
| BCLC Stage B Hepatocellular Carcinoma | Missing the role Disease_Has_Finding with the target Solid Growth Pattern |

| NCIt Neoplasm Concept | Error |
|--|--|
| BCLC Stage C Hepatocellular Carcinoma | Missing the role Disease_Has_Finding with the target Solid Growth Pattern |
| Granulosa Cell Tumor | Missing the role Disease_Has_Normal_Cell_Origin with the target Granulosa Cell |
| Hemangioendothelioma | Missing an IS-A link to the concept Neoplasm, Uncertain Whether Benign or Malignant |
| Acantholytic Squamous Cell Skin Carcinoma | Missing the role Disease_Excludes_Abnormal_Cell with the target Malignant Basaloid Cell |
| Alveolar Rhabdomyosarcoma | Missing the role Disease_Excludes_Primary_Anatomic_Site with the target Bone |
| Amelanotic Melanoma | Missing the role Disease_Excludes_Finding with the target Favorable Clinical Outcome |
| Benign Cecum Neoplasm | Missing the role Disease_Has_Finding with the target Indolent Clinical Course |
| Clear Cell Squamous Cell Skin Carcinoma | Missing an IS-A link to the concept Primary Malignant Neoplasm |
| Colon Carcinoma by AJCC v7 Stage | Missing the role Disease_Excludes_Finding with the target Favorable Clinical Outcome |
| High Grade Prostatic Intraepithelial Neoplasia | Missing the role Disease_Has_Finding with the target High Grade Lesion |
| High Grade Prostatic Intraepithelial Neoplasia, Inverted Variant | Missing the role Disease_Has_Finding with the target High Grade Lesion |
| Benign Buccal Mucosa Neoplasm | Missing the role Disease_Has_Finding with the target Indolent Clinical Course |
| Benign Floor of the Mouth Neoplasm | Missing the role Disease_Has_Normal_Tissue_Origin with the target Connective and Soft Tissue |
| Benign Hard Palate Neoplasm | Missing the role Disease_Has_Finding with the target Benign Cellular Infiltrate |
| Benign Posterior Tongue Neoplasm | Missing an IS-A link to the concept Benign Soft Tissue Neoplasm |
| Colorectal Carcinoma by AJCC v7 Stage | Missing the role Disease_Excludes_Finding with the target Favorable Clinical Outcome |
| Colorectal Signet Ring Cell Carcinoma | Missing the role Disease_Excludes_Finding with the target Favorable Clinical Outcome |

| NCIt Neoplasm Concept | Error |
|--|---|
| Elastofibroma | Missing the role Disease_Has_Primary_Anatomic_Site with the target Elastic Fiber |
| Fibrous Hamartoma of Infancy | Missing the role Disease_Has_Finding with the target Dermal Involvement |
| Invasive Micropapillary Breast Carcinoma | Missing the role Disease_Has_Finding with the target Aggressive Clinical Course |
| Appendix Tubular Carcinoid | Missing the role Disease_Has_Normal_Tissue_Origin with the target Neuroendocrine Tissue |
| Benign Cerebellar Neoplasm | Missing the role Disease_Has_Finding with the target Benign Cellular Infiltrate |
| Benign Cerebral Neoplasm | Missing the role Disease_Has_Finding with the target Benign Cellular Infiltrate |
| Benign Skeletal Muscle Neoplasm | Missing the role Disease_Has_Associated_Anatomic_Site with the target Skeletal Muscle Tissue |
| Benign Supratentorial Neoplasm | Missing the role Disease_Excludes_Primary_Anatomic_Site with the target Infratentorial Brain |
| Bone Marrow Neoplasm | Missing the role Disease_Has_Primary_Anatomic_Site with the target Bone Marrow |
| Clear Cell Adenoma | Missing the role Disease_Excludes_Abnormal_Cell with the target Malignant Cell |
| Intraductal Papilloma | Missing the role Disease_Excludes_Finding with the target concept Invasive Lesion |
| Malignant Childhood Hemangiopericytoma | Missing the role Disease_Has_associated_Anatomic_Site with the target concept Vascular System |
| Malignant Esophageal Neoplasm by Anatomic Region | The semantic type Neoplastic Process is wrong |
| Acute Erythroid Leukemia | Missing the role Disease_Excludes_Primary_Anatomic_Site with the target Lymphatic System |
| Acute Myelomonocytic Leukemia | Missing the role Disease_Excludes_Primary_Anatomic_Site with the target Lymphatic System |
| Benign Fallopian Tube Neoplasm | Missing the role Disease_Has_Finding with the target Benign Cellular Infiltrate |

| NCIt Neoplasm Concept | Error |
|---|--|
| Colon Adenocarcinoma | Missing the role Disease_Has_Finding with the target Favorable Clinical Outcome |
| Colon Adenoma | Missing the role Disease_Has_Finding with the target Favorable Clinical Outcome |
| Colorectal Adenoma with Moderate Dysplasia | Missing the role Disease_Excludes_Abnormal_Cell with the target Malignant Cell |
| Colorectal Adenoma with Severe Dysplasia | Missing the role Disease_Excludes_Abnormal_Cell with the target Malignant Cell |
| Human Papillomavirus-Related Malignant Neoplasm in AIDS Patient | Missing the role Disease_Has_Associated_Disease with the target Acquired Immunodeficiency Syndrome |
| Intraductal Breast Neoplasm | Missing the role Disease_Has_Finding with the target Intraductal Lesion |
| Iris Spindle Cell Melanoma | Missing the role Disease_Has_Finding with the target Melanin Pigment Present |
| Lobular Neoplasia | Missing an IS-A link to the concept Neoplasm, Uncertain Whether Benign or Malignant |
| Intraventricular Brain Neoplasm | Missing a child concept Glioblastoma |
| Gallbladder Mucinous Cystic Neoplasm | Missing the role Disease_Has_Primary_Anatomic_Site with the target Digestive System |
| Gallbladder Sarcoma | Missing the role Disease_Has_Primary_Anatomic_Site with the target Digestive System |
| Adenocarcinoma with Spindle Cell Metaplasia | Missing the role Disease_Has_Abnormal_Cell with the target Malignant Spindle Cell |
| Combined Carcinoid and Adenocarcinoma | Missing an IS-A relationship to the concept Carcinoid tumor |
| Malignant Endometrial Neoplasm | Missing the role Disease_Excludes_Abnormal_Cell with the target Neoplastic Smooth Muscle Cell |
| Reproductive Endocrine Neoplasm | Missing an IS-A relationship to the concept Endocrine Neoplasm |
| Tonsillar Carcinoma | Missing the role Disease_Has_Associated_Anatomic_Site with the target Throat |
| Skull Neoplasm | Missing an IS-A relationship to the concept Bone Neoplasm |