

| Misidentified Cell Line | Claimed Species | Claimed Cell Type | Contaminating Cell Line | Actual Species | Actual Cell Type | Misidentification Reported By | Reference PubMed ID |
|------------------------------------|-----------------|---|-------------------------|----------------|--|--|---------------------|
| Hu1734 | Human | Bladder, non-malignant urothelial cells | HCV-29 | Human | Bladder, non-malignant urothelial cells | Christensen et al, 1993 | 7905254 |
| Hu456 | Human | Bladder, tumorigenic urothelial cells | T-24 | Human | Bladder carcinoma | Christensen et al, 1993 | 8105864 |
| Hu549 | Human | Bladder, tumorigenic urothelial cells | T-24 | Human | Bladder carcinoma | Christensen et al, 1993 | 8105864 |
| Hu609 | Human | Bladder, non-malignant urothelial cells | J82 | Human | Bladder carcinoma | Christensen et al, 1993; Masters et al, 2001 | 7905254, 11416159 |
| Hu609Tmv (Hu609 derivative) | Human | Bladder, tumorigenic urothelial cells | T-24 | Human | Bladder carcinoma | Christensen et al, 1993 | 8105864 |
| Hu961a, Hu961t (Hu961 derivatives) | Human | Bladder, tumorigenic urothelial cells | T-24 | Human | Bladder carcinoma | Christensen et al, 1993; Masters et al, 2001 | 8105864, 11416159 |
| HuK ³⁹ | Human | Kidney, normal renal cells | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| HuL-1 | Human | Liver, hepatocellular carcinoma | HeLa | Human | Cervical adenocarcinoma | JCRB website | No PMID |
| Hut | Human | Not specified | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| IMC-2 | Human | Maxillary carcinoma | HeLa | Human | Cervical adenocarcinoma | MacLeod et al, 1999 | 10508494 |
| IMC-3 | Human | Maxillary carcinoma | HeLa | Human | Cervical adenocarcinoma | Masters et al, 2001 | 11416159 |
| IMC-4 | Human | Maxillary carcinoma | HeLa | Human | Cervical adenocarcinoma | RIKEN website | No PMID |
| Intestine 407 (Int-407, HEI) | Human | Intestinal cells (jejunum/ileum), embryonic | HeLa | Human | Cervical adenocarcinoma | Lavappa, 1978; Nelson-Rees et al, 1981 | 566722, 6451928 |
| IPDDC-A2 | Human | Astrocytoma | Unknown | Rat | Unknown | ECACC website | No PMID |
| IPRB | Human | Glioblastoma | Unknown | Rat | Unknown | Higgins et al, 2010 | 20951163 |
| IPTP/98 | Human | Glioblastoma | Unknown | Rat | Unknown | ECACC website | No PMID |
| IST-1 | Human | Placenta | SK-OV-3 | Human | Ovarian carcinoma | ATCC FAQ #1068 | No PMID |
| J-111 | Human | Leukemia, acute myeloid, M5 | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981; Drexler et al, 2003 | 6451928, 12592342 |
| J96 | Human | Leukemia | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| JCA-1 | Human | Prostate carcinoma | T-24 | Human | Bladder carcinoma | van Bokhoven et al, 2001 | 11522622 |
| JHC | Human | Placenta | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| JHU012 | Human | Oral squamous cell carcinoma (lymph node) | JHU022 | Human | Laryngeal squamous cell carcinoma (lymph node) | Zhao et al, 2011 | 21868764 |
| JHU013 (JHU012 derivative) | Human | Oral squamous cell carcinoma (lymph node) | FaDu | Human | Hypopharyngeal squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| JHU019 | Human | Oropharyngeal squamous cell carcinoma | PC-3 | Human | Prostate carcinoma | Zhao et al, 2011 | 21868764 |
| JHU028 | Human | Oral squamous cell carcinoma | A549 | Human | Lung carcinoma | Zhao et al, 2011 | 21868764 |
| JHT (JHC derivative) | Human | Placenta | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| JMAR (Tu-167 derivative) | Human | Oral squamous cell carcinoma | UM-SCC-1 | Human | Oral squamous cell carcinoma (recurrence) | Zhao et al, 2011 | 21868764 |
| JOSK-I | Human | Leukemia, acute myeloid, M4 | U-937 | Human | Lymphoma, histiocytic | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| JOSK-K | Human | Leukemia, acute myeloid, M5 | U-937 | Human | Lymphoma, histiocytic | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| JOSK-M | Human | Leukemia, chronic myeloid, blast crisis | U-937 | Human | Lymphoma, histiocytic | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| JOSK-S | Human | Leukemia, acute myeloid, M5 | U-937 | Human | Lymphoma, histiocytic | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| JTC-17 | Human | Skin | HeLa | Human | Cervical adenocarcinoma | Honma et al, 1992; JCRB website | 1730567 |
| JTC-3 | Human | Not specified | HeLa | Human | Cervical adenocarcinoma | Ogura et al, 1997 | 9556756 |
| K051 | Human | Leukemia, acute myeloid, M2 | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Drexler et al, 2003 | 12592342 |

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|---|--|---|-------------------------|---|---|---|---------------------------|
| K1 | Human | Thyroid, papillary carcinoma | GLAG-66 | Human | Thyroid, papillary carcinoma | Ribeiro et al, 2008; Schweppe et al, 2008 | 19087340, 18713817 |
| K2 | Human | Thyroid, papillary carcinoma | GLAG-66 | Human | Thyroid, papillary carcinoma | Ribeiro et al, 2008; Schweppe et al, 2008 | 19087340, 18713817 |
| KAK1 | Human | Thyroid, follicular adenoma | HT-29 | Human | Colon carcinoma | van Staveren et al, 2007; Schweppe et al, 2008 | 17804723, 18713817 |
| KAT10 | Human | Thyroid, papillary carcinoma | HT-29 | Human | Colon carcinoma | van Staveren et al, 2007; Schweppe et al, 2008 | 17804723, 18713817 |
| KAT4 | Human | Thyroid, anaplastic carcinoma | HT-29 | Human | Colon carcinoma | van Staveren et al, 2007; Schweppe et al, 2008 | 17804723, 18713817 |
| KAT5 | Human | Thyroid, papillary carcinoma | HT-29 | Human | Colon carcinoma | Schweppe et al, 2008 | 18713817 |
| KAT50 | Human | Thyroid, differentiated cells | HT-29 | Human | Colon carcinoma | Schweppe et al, 2008 | 18713817 |
| KAT7 | Human | Thyroid, benign follicular hyperplasia | HT-29 | Human | Colon carcinoma | Schweppe et al, 2008 | 18713817 |
| KB | Human | Oral carcinoma | HeLa | Human | Cervical adenocarcinoma | Gartler, 1967; Lavappa et al, 1976; Nelson-Rees et al, 1981 | 4864103, 1250349, 6451928 |
| KB-3-1 | Human | Oral carcinoma | HeLa | Human | Cervical adenocarcinoma | DSMZ website | No PMID |
| KB-V1 | Human | Oral carcinoma | HeLa | Human | Cervical adenocarcinoma | DSMZ website | No PMID |
| KCI-MOH1 | Human | Pancreatic carcinoma | HPAC | Human | Pancreatic carcinoma | DSMZ website | No PMID |
| KM-3 | Human | Leukemia, acute lymphoblastic, B cell precursor | REH | Human | Leukemia, acute lymphoblastic, B cell precursor | Drexler et al, 2003 | 12592342 |
| KM3 | Human | Melanoma | Unknown | Rat | Not specified | Moseley et al, 2003 | 12740908 |
| KMS-21-BM | Human | Myeloma | Unknown | Human | Unknown | Drexler et al, 2003 | 12592342 |
| KMT-2 | Human | Umbilical cord blood | KG-1 | Human | Leukemia | Yoshino et al, 2006 | 16643607 |
| KNS-89 | Human | Gliosarcoma | U-251 MG | Human | Glioblastoma | JCRB website | No PMID |
| KOSC-3 | Human | Oral carcinoma | Ca9-22 | Human | Oral carcinoma | JCRB website | No PMID |
| KP-1N | Human | Pancreatic carcinoma | PANC-1 | Human | Pancreatic carcinoma | JCRB website | No PMID |
| KPB-M15 | Human | Leukemia, chronic myeloid, blast crisis | KYO-1 | Human | Leukemia, chronic myeloid, blast crisis | Drexler et al, 2003 | 12592342 |
| KPL-1 | Human | Breast carcinoma | MCF-7 | Human | Breast carcinoma | DSMZ website | No PMID |
| KP-P1 | Human | Prostate carcinoma | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| KSY-1 | Human | Sarcoma (Kaposi) | T-24 | Human | Bladder carcinoma | ATCC FAQ #1061 | No PMID |
| KU-YS | Human | Neuroblastoma | KU-SN | Human | Neuroectodermal tumor | RIKEN website | No PMID |
| L-132 | Human | Lung cells, embryonic | HeLa | Human | Cervical adenocarcinoma | Lavappa, 1978; Nelson-Rees et al, 1981 | 566722, 6451928 |
| L-41 (J96 derivative) | Human | Leukemia, bone marrow | HeLa | Human | Cervical adenocarcinoma | ECACC website | No PMID |
| LED-Ti | Human | Cervical carcinoma | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| LLC-15MB | Human | Breast carcinoma | M14 | Human | Melanoma | Thompson et al, 2004 | 15679051 |
| LR10.6 | Human | Leukemia, acute lymphoblastic, B cell precursor | NALM-6 | Human | Leukemia, acute lymphoblastic, B cell precursor | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| LT-1 | Frog, grass | Kidney, renal adenocarcinoma | TH and FHM | TH = box turtle; FHM = fathead minnow | TH = heart; FHM = unspecified | Nelson-Rees et al, 1981 | 6451928 |
| LU | Human | Lung cells, fetal | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| LU 106 | Human | Lung cells, embryonic | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| Lu-130 | Human | Lung carcinoma | Lu-134A, B | Human | Lung carcinoma | Yoshino et al, 2006 | 16643607 |
| M10T | Human | Synovial cell | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| M4A4 and derivatives (MDA-MB-435 derivatives) | Human | Breast carcinoma | M14 | Human | Melanoma | ATCC website | No PMID |
| MA-104 | Monkey, Rhesus (<i>Macaca mulatta</i>) | Kidney, embryonic renal cells | Vero? | Monkey, African green (<i>Cercopithecus aethiops</i>) | Kidney, normal renal cells | Milanesi et al, 2003; ATCC FAQ #1067 | 14505435 |

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| MA-111 | Rabbit | Kidney, newborn | Vero? | Monkey, African green (<i>Cercopithecus aethiops</i>) | Kidney, normal renal cells | Nelson-Rees et al, 1981 | 6451928 |
| MA-160 | Human | Prostate adenoma | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees, 1977; Nelson-Rees et al, 1981 | 562836, 6451928 |
| MaTu | Human | Breast carcinoma | HeLa | Human | Cervical adenocarcinoma | MacLeod et al, 1999 | 10508494 |
| MC-4000 | Human | Breast carcinoma | HeLa | Human | Cervical adenocarcinoma | MacLeod et al, 1999 | 10508494 |
| McCoy | Human | Not specified | Strain L | Mouse | Connective tissue | Nelson-Rees et al, 1981 | 6451928 |
| MCF-7/AdrR (NCI/ADR-RES) | Human | Breast carcinoma | OVCAR-8 | Human | Ovarian carcinoma | Liscovitch and Ravid, 2007 | 16504380 |
| MDA-MB-435 | Human | Breast carcinoma | M14 | Human | Melanoma | Ellison et al, 2002; Christgen et al, 2007; Rae et al, 2007 | 12354931, 17786032, 17004106 |
| MDA-N (MDA-MB-435 derivative) | Human | Breast carcinoma, HER2/ERBB2-transfected | M14 | Human | Melanoma | Lorenzi et al, 2009 | 19372543 |
| MDS | Human | Leukemia, chronic myelomonocytic | JURKAT | Human | Leukemia, acute lymphoblastic, T cell | Drexler et al, 2003 | 12592342 |
| MEL-HO | Human | Melanoma | Unknown, does not match other cell line from same donor | Human | Unknown | MacLeod et al, 1999 | 10508494 |
| ME-WE1 | Human | Melanoma | Unknown, does not match other cell line from same donor | Human | Unknown | MacLeod et al, 1999 | 10508494 |
| MGH-U1 (EJ) | Human | Bladder carcinoma | T-24 | Human | Bladder carcinoma | O'Toole et al, 1983; Lin et al, 1985 | 6823318, 4027986 |
| MGH-U2 (HM) | Human | Bladder carcinoma | T-24 | Human | Bladder carcinoma | O'Toole et al, 1983; Lin et al, 1985 | 6823318, 4027986 |
| MHH-225 | Human | Leukemia, acute myeloid, M7 | JURKAT | Human | Leukemia, acute lymphoblastic, T cell | Drexler et al, 2003 | 12592342 |
| Minnesota EE | Human | Esophageal epithelium | HeLa | Human | Cervical adenocarcinoma | Lavappa, 1978; Nelson-Rees et al, 1981 | 566722, 6451928 |
| MKB-1 | Human | Leukemia, acute myeloid | CCRF-CEM | Human | Leukemia, acute lymphoblastic, T cell | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| MKN28 | Human | Gastric carcinoma | MKN74 | Human | Gastric carcinoma | JCRB website | No PMID |
| MKN-7 | Human | Gastric carcinoma | Unknown | Human | Lymphoblastoid cells | Suzuki and Sekiguchi, 1999 | No PMID (book chapter) |
| MMAc | Human | Melanoma | Mash-1 | Human | Schwannoma | Yoshino et al, 2006 | 16643607 |
| MOBS-1 | Human | Leukemia, acute myeloid, M5 | U-937 | Human | Lymphoma, histiocytic | Drexler et al, 2003 | 12592342 |
| MOLT-15 | Human | Leukemia, acute lymphoblastic, T cell | CTV-1 | Human | Leukemia, acute myeloid, M5 | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| MPanc-96 | Human | Pancreatic carcinoma | AsPC-1 | Human | Pancreatic carcinoma | ATCC website | No PMID |
| MRO87-1 | Human | Thyroid, follicular carcinoma | HT-29 | Human | Colon carcinoma | Schweppe et al, 2008 | 18713817 |
| MS (Monkey Stable) | Monkey | Kidney, normal renal cells | HeLa | Human | Cervical adenocarcinoma | Milanesi et al, 2003 | 14505435 |
| MT-1 | Human | Breast carcinoma | HeLa | Human | Cervical adenocarcinoma | MacLeod et al, 1999 | 10508494 |
| MUTZ-1 | Human | Leukemia, acute myeloid, M2 | Namalwa | Human | Lymphoma, Burkitt | Drexler et al, 2009 | 19344951 |
| MV522 | Human | Lung carcinoma | HT-29 | Human | Colon carcinoma | ATCC FAQ #1075 | No PMID |
| NC-37 | Human | Lymphoblastoid cell line, normal donor | Raji | Human | Lymphoma, Burkitt | JCRB website | No PMID |
| NCC16 | Human | Cervical carcinoma | PHK16-0b | Human | Skin, immortalised keratinocytes | JCRB website | No PMID |
| NCI/ADR-RES (MCF-7/AdrR) | Human | Breast carcinoma | OVCAR-8 | Human | Ovarian carcinoma | Liscovitch and Ravid, 2007 | 16504380 |
| NCI-H1264 | Human | Lung carcinoma | NCI-H157 | Human | Lung carcinoma | ATCC FAQ #930, #931 | No PMID |
| NCI-H1304 | Human | Lung carcinoma, small cell | NCI-H1870 | Human | Lung carcinoma, small cell | ATCC FAQ #1069 | No PMID |
| NCI-H1514 | Human | Lung carcinoma | Unknown | Human | Unknown | Durkin et al, 2000; ATCC website | 10949990 |
| NCI-H157 | Human | Lung carcinoma | NCI-H1264 | Human | Lung carcinoma | ATCC FAQ #930, #931 | No PMID |

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|--|-------------------------------------|--|-------------------------|------------------------------------|---|--|---------------------|
| NCI-H1622 | Human | Lung carcinoma | Unknown | Human | Unknown | ATCC website | No PMID |
| NCI-H1870 | Human | Lung carcinoma, small cell | NCI-H1304 | Human | Lung carcinoma, small cell | ATCC FAQ #1069 | No PMID |
| NCI-H249 | Human | Lung carcinoma, small cell | NCI-H69 | Human | Lung carcinoma, small cell | ATCC FAQ #1073 | No PMID |
| NCI-H513 | Human | Mesothelioma | NCI-H125 | Human | Lung carcinoma | ATCC FAQ #1060 | No PMID |
| NCI-H592 | Human | Lung carcinoma, small cell | NCI-H69 | Human | Lung carcinoma, small cell | ATCC FAQ #1070, #1073 | No PMID |
| NCI-H60 | Human | Lung carcinoma, small cell | NCI-N417 | Human | Lung carcinoma, small cell | ATCC FAQ #1064 | No PMID |
| NCI-H630 | Human | Metastatic sample | Mixture | Human | Unknown | ATCC FAQ #1065 | No PMID |
| NCI-H738 | Human | Lung carcinoma | Unknown | Human | Unknown | ATCC website | No PMID |
| NCOL-1 | Human | Intestinal cells, normal colon | LoVo | Human | Colon carcinoma | Melcher et al, 2005 | 15771911 |
| NCTC 2544 | Human | Skin epithelium | HeLa | Human | Cervical adenocarcinoma | Lavappa, 1978; Nelson-Rees et al, 1981 | 566722, 6451928 |
| NCTC 3075 | Human | Not specified | HeLa | Human | Cervical adenocarcinoma | Lavappa, 1978; Nelson-Rees et al, 1981 | 566722, 6451928 |
| ND-1 | Human | Prostate carcinoma | DU-145 | Human | Prostate carcinoma | van Bokhoven et al, 2001 | 11304728 |
| NM2C5 and derivatives (MDA-MB-435 derivatives) | Human | Breast carcinoma | M14 | Human | Melanoma | ATCC website | No PMID |
| NOI-90 | Human | Lymphoma, non-Hodgkin, natural killer cell | REH | Human | Leukemia, acute lymphoblastic, B cell precursor | Drexler et al, 2003 | 12592342 |
| NPA87 | Human | Thyroid, papillary carcinoma | M14 | Human | Melanoma | Schweppe et al, 2008; Zhao et al, 2011 | 18713817, 21868764 |
| NS-3 | Human | Gastric carcinoma | COLO 201 | Human | Colon carcinoma | JCRB website | No PMID |
| OCUM-6 | Human | Gastric carcinoma | OCUM-11 | Human | Gastric carcinoma | JCRB website | No PMID |
| OE | Human | Endometrium | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981; Ogura et al, 1997 | 6451928, 9556756 |
| OF | Human | Not specified | HeLa | Human | Cervical adenocarcinoma | Ogura et al, 1997 | 9556756 |
| OLGA-PH-J/92 [OL-J/92] | Crayfish, <i>Orconectes limosus</i> | Brain, cerebral ganglion | Unknown | Unknown, similar to amoeba species | Unknown | Lee et al, 2011; ATCC website | 21938590 |
| ONCO-DG-1 | Human | Thyroid, papillary carcinoma | OVCAR-3 | Human | Ovarian carcinoma | DSMZ website | No PMID |
| OST | Human | Sarcoma (osteosarcoma) | HeLa | Human | Cervical adenocarcinoma | Personal communication, R. Nardone | No PMID |
| OU-AML-1 | Human | Leukemia, acute myeloid, M4 | OCI/AML2 | Human | Leukemia, acute myeloid, M4 | Drexler et al, 2003 | 12592342 |
| OU-AML-2 | Human | Leukemia, acute myeloid, M2 | OCI/AML2 | Human | Leukemia, acute myeloid, M4 | Drexler et al, 2003 | 12592342 |
| OU-AML-3 | Human | Leukemia, acute myeloid, M4 | OCI/AML2 | Human | Leukemia, acute myeloid, M4 | Drexler et al, 2003 | 12592342 |
| OU-AML-4 | Human | Leukemia, acute myeloid, M2 | OCI/AML2 | Human | Leukemia, acute myeloid, M4 | Drexler et al, 2003 | 12592342 |
| OU-AML-5 | Human | Leukemia, acute myeloid, M5 | OCI/AML2 | Human | Leukemia, acute myeloid, M4 | Drexler et al, 2003 | 12592342 |
| OU-AML-6 | Human | Leukemia, acute myeloid, M1 | OCI/AML2 | Human | Leukemia, acute myeloid, M4 | Drexler et al, 2003 | 12592342 |
| OU-AML-7 | Human | Leukemia, acute myeloid, M4 | OCI/AML2 | Human | Leukemia, acute myeloid, M4 | Drexler et al, 2003 | 12592342 |
| OU-AML-8 | Human | Leukemia, acute myeloid, M4 | OCI/AML2 | Human | Leukemia, acute myeloid, M4 | Drexler et al, 2003 | 12592342 |
| OV-1063 | Human | Ovarian carcinoma | Unknown | Human | Unknown | ATCC website | No PMID |
| OVMIU | Human | Ovarian carcinoma | OVSAYO | Human | Ovarian carcinoma | JCRB website | No PMID |
| P1-1A3 | Human | Thymic epithelium | SK-HEP-1 | Human | Liver carcinoma | MacLeod et al, 1999 | 10508494 |
| P1-4D6 | Human | Thymic epithelium | SK-HEP-1 | Human | Liver carcinoma | MacLeod et al, 1999 | 10508494 |
| P39/TSUGANE (P39/TSU) | Human | Leukemia, acute myeloid, M2 | HL-60 | Human | Leukemia, acute myeloid, M2 | Drexler et al, 2003; JCRB website | 12592342 |

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| PBE1 | Human | Leukemia, acute lymphoblastic, B cell precursor | NALM-6 | Human | Leukemia, acute lymphoblastic, B cell precursor | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| PC-93 | Human | Prostate carcinoma | HeLa | Human | Cervical adenocarcinoma | van Bokhoven et al, 2003 | 14518029 |
| PC-MDS | Human | Myelodysplastic syndrome, therapy-related | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Drexler et al, 2009 | 19344951 |
| PCI-22A | Human | Oral squamous cell carcinoma | Unknown, does not match other cell line from same donor | Human | Unknown | Zhao et al, 2011 | 21868764 |
| PCI-22B | Human | Oral squamous cell carcinoma (lymph node) | Unknown, does not match other cell line from same donor | Human | Unknown | Zhao et al, 2011 | 21868764 |
| PCI-3 | Human | Oropharyngeal squamous cell carcinoma | PC-3 | Human | Prostate carcinoma | Zhao et al, 2011 | 21868764 |
| PEAZ-1 | Human | Prostate carcinoma | HT-1080 | Human | Sarcoma (fibrosarcoma) | Schmelz et al, 2001 [erratum] | 11433418 [erratum] |
| PH61-N | Human | Not specified | MIA PaCa-2 | Human | Pancreatic carcinoma | JCRB website | No PMID |
| PLB-985 | Human | Leukemia, acute myeloid, M4 | HL-60 | Human | Leukemia, acute myeloid, M2 | Drexler et al, 2003 | 12592342 |
| PPC-1 | Human | Prostate carcinoma | PC-3 | Human | Prostate carcinoma | Chen, 1993 | 8428522 |
| PSV811 | Human | Skin fibroblast, Werner's syndrome | WI-38 | Human | Lung, normal diploid fibroblasts | JCRB website | No PMID |
| RAMAK-1 | Human | Muscle synovium | T-24 | Human | Bladder carcinoma | MacLeod et al, 1999 | 10508494 |
| RB | Human | Lymphoma, Hodgkin | OMK-210 | Monkey, Owl (<i>Aotus trivirgatus</i>) | Kidney, normal renal cells | Nelson-Rees et al, 1981; Drexler et al, 2003 | 6451928, 12592342 |
| RBHF-1 | Human | Liver, hepatoma | Unknown | Non-human | Unknown | MacLeod et al, 1999 | 10508494 |
| RC-2A | Human | Leukemia, acute myeloid, M4 | CCRF-CEM | Human | Leukemia, acute lymphoblastic, T cell | Drexler et al, 2003 | 12592342 |
| RED-3 | Human | Leukemia, acute myeloid | HL-60 | Human | Leukemia, acute myeloid, M2 | Drexler et al, 2003 | 12592342 |
| REH-6 | Human | Leukemia, acute lymphoblastic, B cell precursor | Unknown | Mouse | Unknown | Drexler et al, 2003 | 12592342 |
| RERF-LC-MA | Human | Lung carcinoma, small cell | SK-MES-1 | Human | Lung, squamous cell | Personal communication, A. Capes-Davis | No PMID |
| RERF-LC-OK | Human | Lung carcinoma | Marcus | Human | Astrocytoma | JCRB website | No PMID |
| RM-10 | Human | Leukemia, chronic myeloid, blast crisis | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Drexler et al, 2003 | 12592342 |
| RMG-I | Human | Ovarian carcinoma | RMG-II | Human | Ovarian carcinoma | JCRB website | No PMID |
| RMUG-L | Human | Ovarian carcinoma | SNG-II | Human | Endometrial carcinoma | JCRB website | No PMID |
| RPMI-4788 | Human | Colon carcinoma | HeLa | Human | Cervical adenocarcinoma | Personal communication, A. Capes-Davis | No PMID |
| RPMI-6666 | Human | Lymphoma, Hodgkin | Correct name, incorrect cell type | Human | EBV+ B-lymphoblastoid cell line | Drexler et al, 2003 | 12592342 |
| RPTC-1 | Human | Thyroid, papillary carcinoma | TPC-1 | Human | Thyroid, papillary carcinoma | Zhao et al, 2011 | 21868764 |
| RS-1 | Human | Leukemia, acute myeloid, M7 | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Drexler et al, 2003 | 12592342 |
| RTSG | Human | Ovarian carcinoma | SNG-II | Human | Endometrial carcinoma | JCRB website | No PMID |
| RY | Human | Lymphoma, Hodgkin | Unknown | Monkey | Unknown | Harris et al, 1981; Drexler et al, 2003 | 7192801, 12592342 |
| SA4 | Human | Sarcoma (liposarcoma) | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| SAM-1 | Human | Leukemia, chronic myeloid, blast crisis | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Drexler et al, 2003 | 12592342 |
| SAML-1 | Human | Lymphoma, Hodgkin | U-937 | Human | Lymphoma, histiocytic | ATCC FAQ #1074 | No PMID |
| SBC-2 | Human | Bladder carcinoma | HeLa | Human | Cervical adenocarcinoma | MacLeod et al, 1999 | 10508494 |
| SBC-7 | Human | Bladder carcinoma | HeLa | Human | Cervical adenocarcinoma | MacLeod et al, 1999 | 10508494 |
| SCCTF | Human | Oral squamous cell carcinoma | SCCKN | Human | Oral squamous cell carcinoma | Yoshino et al, 2006 | 16643607 |
| SCLC-16H | Human | Lung carcinoma, small cell | SCLC-21/22H | Human | Lung carcinoma, small cell | MacLeod et al, 1999 | 10508494 |
| SCLC-24H | Human | Lung carcinoma, small cell | SCLC-21/22H | Human | Lung carcinoma, small cell | MacLeod et al, 1999 | 10508494 |
| SEG-1 | Human | Esophageal adenocarcinoma | NCI-H460 | Human | Lung carcinoma, large cell | Boonstra et al, 2010 | 20075370 |

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| SH-2 | Human | Breast carcinoma | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| SH-3 | Human | Breast carcinoma | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| SJPL | Pig, <i>Sus scrofa</i> | Lung cells, immortalized epithelial | Unknown | Monkey, African green (<i>Cercopithecus aethiops</i>) | Unknown | Silversides et al, 2010 | 20200241 |
| SK-GT-5 | Human | Esophageal adenocarcinoma | SK-GT-2 | Human | Gastric carcinoma (gastric fundus) | Boonstra et al, 2010 | 20075370 |
| SK-MG-1 | Human | Astrocytoma | Marcus | Human | Astrocytoma | JCRB website | No PMID |
| SK-N-MC | Human | Neuroblastoma | Unknown | Human | Sarcoma (Ewing's) | Staeger et al, 2004 | 15548687 |
| SKW-3 | Human | Leukemia, chronic lymphocytic, T cell | KE-37 | Human | Leukemia, acute lymphoblastic | DSMZ website | No PMID |
| SNB-19 | Human | Glioblastoma | U-251 MG | Human | Glioblastoma | Azari et al, 2007; ATCC website | 17254797 |
| SPI-801 | Human | Leukemia, acute lymphoblastic, T cell | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Gignac et al, 1993; Drexler et al, 2003 | 8220135, 12592342 |
| SPI-802 | Human | Leukemia, acute lymphoblastic, T cell | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Gignac et al, 1993; Drexler et al, 2003 | 8220135, 12592342 |
| SpR | Human | Lymphoma, Hodgkin | OMK-210 | Monkey, Owl (<i>Aotus trivirgatus</i>) | Kidney, normal renal cells | Nelson-Rees et al, 1981; Drexler et al, 2003 | 6451928, 12592342 |
| SQ-5 | Human | Lung carcinoma | HeLa | Human | Cervical adenocarcinoma | Yoshino et al, 2006 | 16643607 |
| SR-91 | Human | Leukemia, acute lymphoblastic, T cell | AML-193 | Human | Leukemia, acute myeloid, M5 | Drexler et al, 2003 | 12592342 |
| SW-527 | Human | Colon carcinoma | SW-480, SW-620 | Human | Colon carcinoma | Nelson-Rees et al, 1981 | 6451928 |
| SW-598 | Human | Colon carcinoma | SW-480, SW-620 | Human | Colon carcinoma | Nelson-Rees et al, 1981 | 6451928 |
| SW-608 | Human | Colon carcinoma | SW-480, SW-620 | Human | Colon carcinoma | Nelson-Rees et al, 1981 | 6451928 |
| SW-613 | Human | Colon carcinoma | SW-480, SW-620 | Human | Colon carcinoma | Nelson-Rees et al, 1981 | 6451928 |
| SW-732 | Human | Colon carcinoma | SW-480, SW-620 | Human | Colon carcinoma | Nelson-Rees et al, 1981 | 6451928 |
| SW-733 | Human | Colon carcinoma | SW-480, SW-620 | Human | Colon carcinoma | Nelson-Rees et al, 1981 | 6451928 |
| T-1 | Human | Kidney, normal renal cells | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1980; Nelson-Rees et al, 1981 | 7394535, 6451928 |
| T-33 | Human | Leukemia, chronic myeloid, blast crisis | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Drexler et al, 2003 | 12592342 |
| T404 | Human | Oral squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| T406 | Human | Oral squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| T409 | Human | Oral squamous cell carcinoma | UM-SCC-1 | Human | Oral squamous cell carcinoma (recurrence) | Zhao et al, 2011 | 21868764 |
| T-9 (WI-38 derivative) | Human | Lung cells, transformed normal diploid fibroblasts | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| TCO-1 | Human | Cervical carcinoma | TCO-2 | Human | Cervical carcinoma | Yoshino et al, 2006 | 16643607 |
| TDL-1 | Human | Tonsillar lymphoid cells, non-neoplastic | P3JHR-1 | Human | Lymphoma, Burkitt | Nelson-Rees et al, 1981 | 6451928 |
| TDL-2 | Human | Tonsillar lymphoid cells, non-neoplastic | P3JHR-1 | Human | Lymphoma, Burkitt | Nelson-Rees et al, 1981 | 6451928 |
| TDL-3 | Human | Tonsillar lymphoid cells, non-neoplastic | RPMI 1788 | Human | Lymphoblastoid cell line, normal donor | Nelson-Rees et al, 1981 | 6451928 |
| TDL-4 | Human | Tonsillar lymphoid cells, non-neoplastic | Raji | Human | Lymphoma, Burkitt | Nelson-Rees et al, 1981 | 6451928 |
| TE-12 | Human | Esophageal squamous cell carcinoma | TE-2, TE-3, TE-12 or TE-13 (genetically identical) | Human | Esophageal squamous cell carcinoma | Boonstra et al, 2007 | 17804709 |
| TE-13 | Human | Esophageal squamous cell carcinoma | TE-2, TE-3, TE-12 or TE-13 (genetically identical) | Human | Esophageal squamous cell carcinoma | Boonstra et al, 2007 | 17804709 |

| Misidentified Cell Line | Claimed Species | Claimed Cell Type | Contaminating Cell Line | Actual Species | Actual Cell Type | Misidentification Reported By | Reference PubMed ID |
|----------------------------------|-----------------|---|--|----------------|---|--|-----------------------|
| TE-2 | Human | Esophageal squamous cell carcinoma | TE-2, TE-3, TE-12 or TE-13 (genetically identical) | Human | Esophageal squamous cell carcinoma | Boonstra et al, 2007 | 17804709 |
| TE-3 | Human | Esophageal squamous cell carcinoma | TE-2, TE-3, TE-12 or TE-13 (genetically identical) | Human | Esophageal squamous cell carcinoma | Boonstra et al, 2007 | 17804709 |
| TE671 | Human | Medulloblastoma | RD | Human | Sarcoma (rhabdomyosarcoma) | Stratton et al, 1989; Chen et al, 1989 | 2650908, 2739733 |
| TE671 Subline No.2 | Human | Medulloblastoma | RD | Human | Sarcoma (rhabdomyosarcoma) | ECACC website, ATCC FAQ #1063 | No PMID |
| TE-7 | Human | Esophageal adenocarcinoma | TE-2, TE-3, TE-12 or TE-13 (genetically identical) | Human | Esophageal squamous cell carcinoma | Boonstra et al, 2007 | 17804709 |
| TEC61 | Human | Thyroid, endothelium | JEG3 | Human | Choriocarcinoma | Patel et al, 2003 [retraction] | 12388152 [retraction] |
| TK-1 | Human | Glioblastoma | U-251 MG | Human | Glioblastoma | JCRB website | No PMID |
| TI-1 | Human | Leukemia, acute myeloid, M2 | K-562 | Human | Leukemia, chronic myeloid, blast crisis | Rush et al, 2002; Drexler et al, 2003 | 11871388, 12592342 |
| TMH-1 | Human | Thyroid, benign goitre | IHH-4 | Human | Thyroid, papillary thyroid carcinoma | JCRB website | No PMID |
| TMM | Human | Leukemia, chronic myeloid, blast crisis | Correct name, incorrect cell type | Human | EBV+ B-lymphoblastoid cell line | Drexler et al, 2003 | 12592342 |
| TSU-Pr1 | Human | Prostate carcinoma | T-24 | Human | Bladder carcinoma | van Bokhoven et al, 2001 | 11522622 |
| Tu-138 | Human | Oral squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| Tu-158LN | Human | Oropharyngeal squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| Tu-159 | Human | Oropharyngeal squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| Tu-167 | Human | Oral squamous cell carcinoma | UM-SCC-1 | Human | Oral squamous cell carcinoma (recurrence) | Zhao et al, 2011 | 21868764 |
| Tu-182 | Human | Oropharyngeal squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| Tu-212 | Human | Hypopharyngeal squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| Tu-212LN | Human | Hypopharyngeal squamous cell carcinoma (lymph node) | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| TuWi | Human | Kidney, Wilms' tumor | HeLa | Human | Cervical adenocarcinoma | Lavappa, 1978; Nelson-Rees et al, 1981 | 6451928 |
| U-118 MG | Human | Glioblastoma | U-138 MG | Human | Glioblastoma | ATCC website | No PMID |
| UM-UC-2 | Human | Bladder carcinoma | T-24 | Human | Bladder carcinoma | Chiong et al, 2009 | 19375735 |
| UM-UC-3-GFP (UM-UC-3 derivative) | Human | Bladder carcinoma, GFP-transfected | Unknown, NOT UM-UC-3 | Human | Unknown | Chiong et al, 2009 | 19375735 |
| UPES/C | Human | Brain, non-neoplastic astrocytes | Unknown | Rat | Unknown | Higgins et al, 2010 | 20951163 |
| UPHHJA | Human | Glioblastoma | Unknown | Rat | Unknown | Higgins et al, 2010 | 20951163 |
| UTMB-460 | Human | B-cells | CCRF-CEM | Human | Leukemia, acute lymphoblastic, T cell | Drexler et al, 2003 | 12592342 |

| Misidentified Cell Line | Claimed Species | Claimed Cell Type | Contaminating Cell Line | Actual Species | Actual Cell Type | Misidentification Reported By | Reference PubMed ID |
|-------------------------|-----------------|----------------------------------|-------------------------|----------------------|---|--|---------------------|
| VC312R | Human | Medulloblastoma | Unknown | Mixed, human + mouse | Unknown | Higgins et al, 2010 | 20951163 |
| VM-CUB-III | Human | Bladder carcinoma | VM-CUB-I | Human | Bladder carcinoma | Masters et al, 1986 | 3708594 |
| WiDr | Human | Colon carcinoma | HT-29 | Human | Colon carcinoma | Chen et al, 1987 | 3472642 |
| WISH | Human | Amnion, normal cells | HeLa | Human | Cervical adenocarcinoma | Lavappa, 1978; Nelson-Rees et al, 1981 | 566722, 6451928 |
| WKD | Human | Conjunctiva | HeLa | Human | Cervical adenocarcinoma | ECACC website | No PMID |
| Wong-Kilbourne | Human | Conjunctiva | HeLa | Human | Cervical adenocarcinoma | Lavappa, 1978; Nelson-Rees et al, 1981 | 566722, 6451928 |
| WRL 68 | Human | Liver, embryonic cells | HeLa | Human | Cervical adenocarcinoma | ECACC website | No PMID |
| WSU-ALCL | Human | Lymphoma, anaplastic large cell | CCRF-CEM | Human | Leukemia, acute lymphoblastic, T cell | Drexler et al, 2003 | 12592342 |
| WSU-CLL | Human | Leukemia, chronic lymphocytic | REH | Human | Leukemia, acute lymphoblastic, B cell precursor | Drexler et al, 2002; Drexler et al, 2003 | 12200708, 12592342 |
| YAA | Human | Monocytes | U-937 | Human | Lymphoma, histiocytic | Drexler et al, 2003 | 12592342 |
| YAP | Human | Monocytes | U-937 | Human | Lymphoma, histiocytic | Drexler et al, 2003 | 12592342 |
| YJ | Human | Leukemia, chronic myelomonocytic | HL-60 | Human | Leukemia, acute myeloid, M2 | Drexler et al, 2003 | 12592342 |
| YMB-1 | Human | Breast carcinoma | ZR-75-1 | Human | Breast carcinoma | Personal communication, A. Capes-Davis | No PMID |
| YMB-1-E | Human | Breast carcinoma | ZR-75-1 | Human | Breast carcinoma | Personal communication, A. Capes-Davis | No PMID |

Cross-contamination has been reported in the following cell lines but authentic stocks apparently do exist.
 As with any imported cell line check identity on receipt or obtain from authenticated stock, e.g. from a reputable cell bank.

Table 2. Cross-contaminated or Misidentified Cell Lines where Authentic Stock May Exist

| Misidentified Cell Line | Claimed Species | Claimed Cell Type | Contaminating Cell Line | Actual Species | Actual Cell Type | Misidentification Reported By | Reference PubMed ID |
|-------------------------|-------------------------------|--|--|------------------------|---|--|---------------------|
| 1483 | Human | Oral squamous cell carcinoma | UM-SCC-1 | Human | Oral squamous cell carcinoma (recurrence) | Zhao et al, 2011 | 21868764 |
| 183 | Human | Oropharyngeal squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| 207 (EU-2) | Human | Leukemia, acute lymphoblastic, B cell precursor | REH and SUP-B2 | Human | Leukemia, acute lymphoblastic, B cell precursor | MacLeod et al, 1999; Drexler et al, 2003 | 10508494, 12592342 |
| B10X1 | Chicken, <i>Gallus gallus</i> | Intestinal cells | Unknown | Pig, <i>Sus scrofa</i> | Unknown | Steube et al, 2011 | 22193509 |
| B6 | Chicken, <i>Gallus gallus</i> | Intestinal cells, small intestine | Unknown | Pig, <i>Sus scrofa</i> | Unknown | Steube et al, 2011 | 22193509 |
| BJA-B | Human | Bladder carcinoma | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees & Flandermeyer, 1976 | 1246601 |
| BT-20 | Human | Breast carcinoma | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| Ca9-22 | Human | Oral squamous cell carcinoma | MSK-922 | Human | Laryngeal squamous cell carcinoma (recurrence) | Zhao et al, 2011 | 21868764 |
| D-17 | Dog, <i>Canis familiaris</i> | Sarcoma (osteosarcoma) | Moresco | Dog | Sarcoma (osteosarcoma) | O'Donoghue et al, 2011 | 21908323 |
| EB-3 | Human | Lymphoma, Burkitt | Daudi | Human | Lymphoma, Burkitt | JCRB website | No PMID |
| FU-RPNT-2 | Human | Kidney, renal primitive neuroectodermal tumor | FU-RPNT-1 | Human | Kidney, renal primitive neuroectodermal tumor | RIKEN website | No PMID |
| Grey | Dog, <i>Canis familiaris</i> | Sarcoma (osteosarcoma) | Unknown | Human | Unknown | O'Donoghue et al, 2011 | 21908323 |
| HPB-ALL | Human | Leukemia, acute lymphoblastic, T cell | JURKAT | Human | Leukemia, acute lymphoblastic, T cell | Drexler et al, 2003 | 12592342 |
| IPEC | Pig, <i>Sus scrofa</i> | Intestinal cells | Unknown | Cow | Unknown | Steube et al, 2011 | 22193509 |
| J-82 | Human | Bladder carcinoma | T-24 | Human | Bladder carcinoma | Masters et al, 1986 | 3708594 |
| JHH-1 | Human | Liver, hepatocellular carcinoma | Unknown | Mouse | Unknown | JCRB website | No PMID |
| KARPAS-45 | Human | Leukemia, acute lymphoblastic, T cell | Unknown | Human | Unknown | Drexler et al, 1999 | 10516762 |
| KBM-3 | Human | Leukemia, acute myeloid, M4 | HL-60 | Human | Leukemia, acute myeloid, M2 | Drexler et al, 2003 | 12592342 |
| KE-37 | Human | Leukemia, acute lymphoblastic, T cell | CCRF-CEM | Human | Leukemia, acute lymphoblastic, T cell | Drexler et al, 1999 | 10516762 |
| L-540 | Human | Lymphoma, Hodgkin | CCRF-CEM | Human | Leukemia, acute lymphoblastic, T cell | Drexler et al, 2003 | 12592342 |
| MB-02 | Human | Leukemia, acute myeloid, M7 | HU-3 | Human | Leukemia, acute myeloid, M7 | Drexler et al, 1999 | 10516762 |
| MDA1986LN | Human | Oral squamous cell carcinoma (lymph node) | UM-SCC-1 | Human | Oral squamous cell carcinoma (recurrence) | Zhao et al, 2011 | 21868764 |
| MDA686LN | Human | Oropharyngeal squamous cell carcinoma (lymph node) | UM-SCC-1 | Human | Oral squamous cell carcinoma (recurrence) | Zhao et al, 2011 | 21868764 |
| MDA686TU | Human | Oropharyngeal squamous cell carcinoma | T404, T406, Tu-138, Tu-158LN, Tu-159, Tu-182, Tu-212, Tu-212LN (genetically identical) | Human | Head and neck squamous cell carcinoma | Zhao et al, 2011 | 21868764 |
| Parks | Dog, <i>Canis familiaris</i> | Melanoma | Unknown | Human | Unknown | O'Donoghue et al, 2011 | 21908323 |
| RPMI-8402 | Human | Leukemia, acute lymphoblastic, T cell | Unknown | Human | Unknown | Drexler et al, 1999 | 10516762 |
| RT4 | Human | Bladder carcinoma | HeLa | Human | Cervical adenocarcinoma | Nelson-Rees et al, 1981 | 6451928 |
| T3M-12 | Human | Lung carcinoma | T3M-1 | Human | Oral carcinoma | RIKEN website | No PMID |
| U-373 MG | Human | Glioblastoma | U-251 MG | Human | Glioblastoma | ECACC website; ATCC website | No PMID |
| U-937 | Human | Lymphoma, histiocytic | Unknown | Human | Unknown | Drexler et al, 1999 | 10516762 |

| Misidentified Cell Line | Claimed Species | Claimed Cell Type | Contaminating Cell Line | Actual Species | Actual Cell Type | Misidentification Reported By | Reference PubMed ID |
|-------------------------|------------------------------|-----------------------------|-------------------------|----------------|-----------------------|-------------------------------|---------------------|
| UT-7 | Human | Leukemia, acute myeloid, M7 | U-937 | Human | Lymphoma, histiocytic | Drexler et al, 2003 | 12592342 |
| Yamada | Dog, <i>Canis familiaris</i> | Sarcoma (osteosarcoma) | Unknown | Mouse | Unknown | O'Donoghue et al, 2011 | 21908323 |
| | | | | | | | |

Cell Banks Cited

| Name | Website |
|--|---|
| ATCC: American Type Culture Collection | http://www.atcc.org/ |
| DSMZ: Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH | http://www.dsmz.de/ |
| ECACC: European Collection of Cell Cultures | http://www.hpacultures.org.uk/collections/ecacc.jsp |
| JCRB: Japanese Collection of Research Bioresources | http://cellbank.nibio.go.jp/ |
| RIKEN Bioresource Center Cell Bank | http://www.brc.riken.go.jp/lab/cell/english/guide.shtml |

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分担研究報告書

細胞資源におけるウイルス検出法開発に関する研究

－マルチプレックス PCR 法を用いたウイルス検査－

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研究要旨

医薬品開発や再生医療研究におけるヒト培養細胞研究資源の重要性が著しく増している。培養細胞を使用した研究の質を確保するためには、細胞株の品質管理を徹底することが必須である。特に研究用培養細胞資源に持続感染するウイルス・マイコプラズマは、不正確な実験結果を生む主要な原因となるため、培養細胞研究資源を使用した研究の質を高めるためには、簡便・安価に多種類のウイルス・マイコプラズマを測定する手法を開発し、ヒト培養細胞研究資源のウイルス汚染の実態を把握することが極めて重要である。本研究では、DNA ウイルス・RNA ウイルスおよびマイコプラズマを 1 ステップ・同時・迅速・高感度に測定するため、同一バッファー・同一酵素・同一反応条件下で効率よく RT-PCR と PCR 反応を同時に行うことが可能な実験系の開発を行い、十分な性能を持つ試薬の開発に成功した。

A. : 研究目的

体性幹細胞や iPS 細胞を用いた再生医療研究・医薬品開発が加速されていることに伴い、ヒト培養細胞研究資源の重要性が著しく増し、再生医療の研究に用いる分化能を持ったヒト由来培養細胞のバンクへの寄託は増加傾向にある。今後、再生医療研究の質を高めるためには、ヒト培養細胞研究資源の品質管理法を確立し、研究に使用する培養細胞の品質管理を徹底することが極めて重要である。実際、培養細胞に微生物が持続感染すると、細胞の性質・増殖性、遺伝子発現パターン、動物に接種した際の細胞の挙動や動物の反応などに大きく影響する可能性があるため、細菌・マイコプラズマ・ウイルスの汚染状況に関する情報は非常に

重要である。さらに、近年、外国に細胞を出荷する際には、ウイルス・マイコプラズマ汚染状況に関する情報の添付を求められる事が多く、今後その必要性が増していくと予想される。培養細胞に持続的に感染し、検出が難しい微生物として、特にウイルスとマイコプラズマが重要である。我々はこれまでに、マルチプレックス PCR 法を応用した DNA ウイルス、RNA ウイルスおよびマイコプラズマの検出系を独立に作製・検査を実施してきたが、3種類の微生物の検査を同時にできれば検査を著しく単純化・簡便化でき、作業量とコストを大幅に低下させることができる可能性がある。前年度の研究により開発した DNA ウイルスと RNA ウイル

スを1チューブ内で、同時・迅速・高感度に測定することが可能な実験系を使用して、マイコプラズマを同時に検出することはできないことが予備実験により予想された。本研究では、DNA ウイルス・RNA ウイルスおよびマイコプラズマの3種類の微生物を1チューブ内で、迅速・高感度・簡便に測定するため、同一バッファー・同一酵素・同一条件下で効率よくRT-PCR (RNA ウイルス) と PCR (DNA ウイルス・マイコプラズマ) の両方を行、高感度に検出できる実験系の開発を目的に研究を行った。

B: 研究方法

1. RT-PCR と PCR の対象

1 Step RT-PCR のモデル実験系としてヒトインフルエンザウイルス B (FluB) を、DNA ウイルス検出(PCR)のモデル実験系として HHV6 を選択した。マイコプラズマ検出系 (PCR) には我々が開発したマルチプレックス PCR 法による1のマイコプラズマ属の菌種を検出可能な検査系を用いた (遺伝子情報から142種類の検出が可能と推定され、日本薬局方記載の3種類のマイコプラズマ種が検出可能なことが実証されている)。

2. 増幅領域とプライマー・プローブ配列

- インフルエンザウイルス B (FluB) 検出系
F-primer: aaatacgggtgattaaataaaaagcaa
R-primer: ccagcaatagctccgaagaaa
Probe: FAM-cacccatattgggcaatttctctatggc-iowaBK
- HHV6 検出系
F-primer: gaagcagcaacgcaacaca
R-primer: acaacatgtaactcgggtgtacggt
Probe: FAM-aacccgtgcccgtccc-iowaBlack
- マイコプラズマ検出系
F-primer 2種類、R-primer 9種類、Probe 5種類の合計16種類を同一反応に使用するマルチプレ

ックスPCR検出系 (標的遺伝子は 16S , 23Sリボソーム遺伝子およびそのスペーサー領域: 特許申請中のためプライマー・プローブ配列は未記載)

3. 試薬と反応条件

- 5X RT-PCR Buffer
50mM Tris-HCL
250mM KCL
7.5 mM MgCL₂
2.7M Betain
0.025% Gelatin
- 酵素
逆転写酵素: ReverseScribe (GW 社)
PCR 用酵素: HiTaq (抗 Taq 抗体含有: GW 社)
- 反応液組成
2xPremix (20 μl 反応系に 10 μl 使用)
 - a. Buffer (5xRT-PCR)
 - b. dNTP Mix (final 0.5mM)
 - c. ReverseScribe 1 μl (100U)
 - d. HiTaq 0.2 μl (0.4U)
 - e. Primer 各 5 pmol Probe 7.5 pmol
 - f. RT-primer は PCR 用の specific primer を使用し、FluB RT-PCR 法により増幅した。
- ウイルス遺伝子の増幅・検出にはアプライドバイオシステム社の ABI-Prism 7300 および Roche 社の LightCycler 480 を使用。
- RT-PCR, PCR 反応条件
 - ・逆転写反応: 42°C5 分
 - ・PCR 反応: 95°C15 秒, 60°C60 秒 45 サイクル
- RT-PCR および PCR の同時測定の比較実験に使用した市販の 1 Step RT-PCR キット
 - a. RT-PCR Quick Master Mix (東洋紡)
 - b. EXPRESS One-Step Super Script qRT-PCR Kit (Life technologies)
 - c. Titan one tube RT-PCR system (Roche)
 - d. PrimeScript One Step RT-PCR Kit: Perfect

Real Time (Takara)

e. One Step RT-PCR & PCR premix (Gene world : 本試薬は我々の研究室と共同で開発したものであるが、詳細な組成は GW 社より開示されていない)

(倫理面への配慮)

倫理面の配慮が必要な研究は行っていない。

C : 結果

1. One Step RT-PCR Kit を使用した RNA・DNA ウイルス・マイコプラズマの検出

研究方法に記載した様々な One Step RT-PCR Kit の RT-PCR の性能を比較検討したところ、Takara 社の PrimeScript が DNA ウイルス (PCR)・RNA ウイルス (RT-PCR) の検出において不十分ながらも最も良い結果が得られた(昨年度の研究と検出項目が違うが同様な結果が得られた)。しかし、マイコプラズマ検出 (PCR) の検出感度は非常に低く、当該キットは我々が開発したマイコプラズマ検出系に使用するには性能が不十分であることが示された。

2. 開発した One Step RT-PCR 試薬を使用した DNA・RNA ウイルス・マイコプラズマの検出

昨年度の研究により開発した One step RT-PCR 系は Perfect Real Time と同等の RNA 検出能を持ち、さらに、HHV6 の検出 (PCR) では実験に用いた HHV6 スタンダード ($10^7 \sim 10^1$ copies/reaction) すべてが良好に増幅し、検査の用いるのに十分な感度とダイナミックレンジを持つことが示された。しかし、マイコプラズマ (M. orale) の検出感度は 10^3 程度であり、PrimeScript より性能が優れているものの、なおマイコプラズマの検出感度は不十分だった。したがって、今回の実験目的である DNA ウイルス・RNA ウイルス・マイコプラズマを同

時・同条件で検査するためには適さないことが示された。

3. Gene World (GW)社と共同開発したプレミックスを使用した検討

GW 社との共同で、我々が開発したマルチプレックス PCR を応用した DNA ウイルス・RNA ウイルス・マイコプラズマ検出系に使用可能な濃縮タイプのプレミックス (酵素、バッファーなどを含む) の開発を行った。具体的には、GW 社から提供された複数のプレミックス試作品の性能を当研究室で評価する方法により実験を実施した (試作品の詳細な試薬組成は GW 社から開示されていない)。以下に一番性能が良かったプレミックスを使用した実験結果を示す (図 1)。実験には、FluB、HHV6、マイコプラズマ (M. orale) の 3 種類の濃度のスタンダード (10^5 , 10^3 , 10^1 copies/reaction) を使用し、感度検定を行った。図 1 に示す通り、3 種類の病原体ともに 10 コピーの感度で検出することが可能だった。

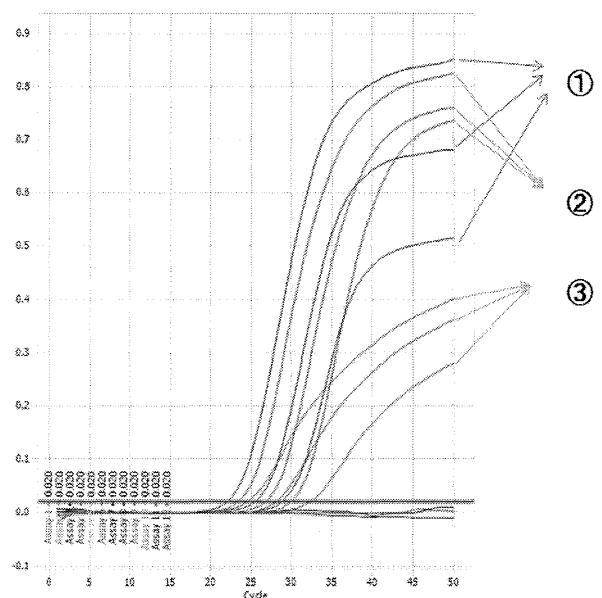


図 1 : ①FluB (RT-PCR) ②HHV6 (PCR) ③マイコプラズマ (PCR) の増幅結果

4. マイコプラズマの添加回収試験

GW社のプレミックスを使用したマイコプラズマの添加回収試験を行った。細胞浮遊液に一定量のマイコプラズマ（*M. orale*, *M. pneumoniae*）を添加し、回収・DNA抽出後にPCR法によるマイコプラズマの検出を試みた。なお、実験に使用した温度・時間条件はOne Step RT-PCRを行う際と同様な条件により行った。結果により、両方の菌株ともに10 copies/reactionの感度で検出可能なことが示された（図2）。

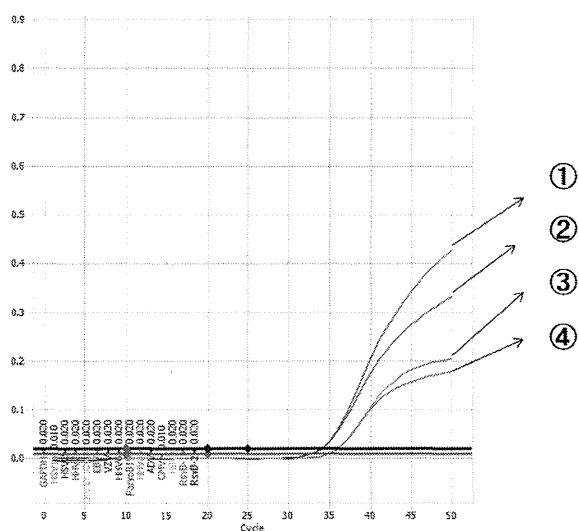


図2:マイコプラズマの添加回収試験

M. orale : ①100 copies ②10 copies
M. pneumoniae : ③100 copies ④10 copies

D: 考察

1. 今回試した One step RT-PCR 試薬キットのうちでは、DNA ウイルスと RNA ウイルスの同時検査に適用できるものは Takara 社の PrimeScript であったが、マイコプラズマの検出には使用できない。昨年度の研究により独自に開発した試薬は DNA ウイルスと RNA ウイルスの同時検査では良好に両方のウイルスを増幅することができたが改めて示されたが、マイコプラズマの検出感度は 10^3 copies/reaction と満足すべきものではなか

った。今回 GW 社と共同開発した One step RT-PCR 試薬は DNA ウイルス・RNA ウイルスに加えてマイコプラズマの検出の同時検出においても検出感度は 10^1 copies/reaction と十分な性能を持つことが示された。我々が開発したウイルス・マイコプラズマ検査系はマルチプレックス PCR 法による検査系であるため、条件が非常にタイトであり、使用できる酵素・バッファーが非常に限られている。GW 社のプレミックスは非常に良好な結果が得られたことから、DNA と RNA の同時増幅が必要となる様々な実験に使用できる汎用性を備えている可能性が高い。今後そのような観点でプレミックスの性能試験を継続していく予定である。

2. GW 社と共同開発したプレミックスを用いたマイコプラズマ（*M. orale*, *M. pneumoniae*）の添加回収試験により、本検査系は 10 copies/reaction の検出感度を持つことが示され、実用に十分な性能を持つことが明らかとなった。日本薬局方に記載のマイコプラズマ種は今回実験に用いた 2 種類の他に *M. hyohinis* を加えた 3 種類である。予備的な検討では *M. hyohinis* も問題なく検出できることが示されているが、欧州薬局方には上記 3 種類を含む 9 種類のマイコプラズマが記載されている。我々はすでにその 9 種類を含む 17 種類のマイコプラズマ種を入手しており、今後 17 種類の菌種に関する添加回収試験を開発したプレミックスを用いて行っていく予定である。

3. 再生医療を実施する際に参考となる指針に記載されている具体的なウイルス種は HIV, HTLV, HBV, HCV であり、それらのゲノムを PCR 法により同時検出するためには、PCR と

RT-PCR を同時に行う必要がある。また、「マイコプラズマ試験を実施すること」とあるが、現在はウイルス試験とマイコプラズマ試験を別々に実施している。今回我々が開発した実験系を使用すればウイルス試験とマイコプラズマ試験を同時・迅速・高感度を実施できるため、再生医療における安全性検査への応用が期待できる。今後、上記の各種ウイルスとマイコプラズマの同時検出実験を実施していく計画である。

E: 結論

DNA ウイルス・RNA ウイルス・マイコプラズマを1ステップ・同時・迅速・高感度に測定することを目的に、RT-PCR、PCR法による検出に使用する酵素・バッファー系の開発を行った。その結果、One step RT-PCR法の温度・時間条件でRT-PCRとPCR反応を同時に行い、3種類の微生物を高感度に検出することが可能なプレミックスの開発に成功した(Gene World社との共同開発)。

今後、再生医療の安全性検査への応用を念頭に、様々なウイルス種、マイコプラズマ種を用いた性能試験を実施し、データの蓄積を行っていく予定である。

F: 健康危険情報

事例無し

G: 研究発表

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2012年3月（東京）

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なし

H： 知的財産権の出願・登録状況

なし

厚生労働科学研究費補助金（創薬基盤推進研究事業）

分担研究報告書

マイコプラズマ検査法に関する研究

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研究要旨

ヘモプラズマ (hemoplasma) は哺乳動物の赤血球に寄生して増殖するマイコプラズマの総称で、感染した動物に溶血性貧血を引き起すことが知られている。これまでの報告で述べたとおり、ウシには2菌種のヘモプラズマが感染することが知られている。培養動物細胞の培養液に広く用いられているウシ血清の原料となる血液へのヘモプラズマ汚染は警戒を要するものと考えられる。しかし、わが国のウシにおける感染状況はこれまでに明らかにされていない。そこで、本年度は国内におけるウシヘモプラズマの浸潤状況を調査した。

A. 研究目的

ヘモプラズマは住血性のマイコプラズマ (hemotropic mycoplasma) とも呼ばれ、哺乳動物の赤血球表面に寄生する無細胞壁原核生物の総称で、これにはかつてリケッチア目アナプラズマ科のヘモバルトネラ属あるいはエペリスロゾーン属に属していた菌種のほか、新たに発見された菌種が含まれている。これらヘモプラズマ菌種はいずれも、16S rRNA 遺伝子あるいは RNase P RNA 遺伝子の塩基配列相同性、宿主細胞外での増殖、および細胞壁ペプチドグリカンの欠如などの性状からマイコプラズマ属の菌種として認定されたものであるが、試験管内での人工培養が成功しないため性状解析ならびに分類学的な検討が遅れている。本研究では動物細胞培養にウシ血清が用いられることに着目し、とくにウシを宿主とする

2菌種のヘモプラズマについて、報告者らが開発したリアルタイム PCR 法を用いてわが国における感染状況を検索した。

B. 研究方法

宮城県、岩手県、広島県、宮崎県で飼育されている乳牛から採取した全血 (EDTA 添加) から QIAamp DNA Blood Mini Kit (Qiagen, Hilden, Germany) を用いて抽出した DNA を被検サンプルとして、ヘモプラズマの 16S rRNA 遺伝子を標的としたリアルタイム PCR を試みた。ウシのヘモプラズマ 2 菌種に共通の Forward プライマー : 5' -ATATTCCTACGGGAAGCAGC-3' (*M. wenyonii* 16S rRNA 遺伝子の 328-347 番目の塩基配列に相当) および Reverse プライマー : 5' -ACCGCAGCTGCTGGCACATA-3' (*M. wenyonii* 16S rRNA 遺伝子の 503-522 番目