

# [Personalised cancer treatment: known markers in treatment](https://assignbuster.com/personalised-cancer-treatment-known-markers-in-treatment/)

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Personalised cancer treatment – known markers and what they mean for treatment

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## Known markers and what they mean for treatment

## Overview

Personalised, targeted and hormonal treatments all depend on genetic mutations that can be identified in cancer cells to be effective. These mutations are sometimes referred to as “ markers”. The markers can manifest through over-expression, lack of expression or mutated expression of specific proteins.

Some markers can be targeted using specific treatments whereas some can act as measurements for disease diagnosis, prognosis and treatment response.

## Drug target markers

The genes listed below have all been associated in cancer, the majority of which can also be treated.

|  |  |  |
| --- | --- | --- |
| Known marker | Cancers they’re associated with / may benefit from targeted therapy | Related treatment/response to treatment |
| ALK[EB1]– anaplastic lymphoma kinase (\*) | * Anaplastic large-cell lymphoma * Familial neuroblastoma (nerve cell) * Non-small cell lung cancer (NSCLC) | * Crizotinib (Xalkori®) * Pemetrexed (Alimta®) |
| AR– androgen receptor | * Bladder * Breast * NSCLC * Ovarian * Prostate | * Abarelix (Plenaxis®) * Bicalutamide (Casodex®) * Flutamide (Eulexin®) * Gonadorelin (Factrel®) * Goserelin (Zoladex®) * Leuprolide (Lupron®) |
| BRAF– v-raf murine sarcoma viral oncogene homolog B1 | * Colon * Lung * Melanoma (skin) * Nervous system * Thyroid | * Cetuximab (Erbitux®) * Panitumumab (Vectibix®) * Vemurafenib (Zelboraf®) |
| BRCA1– breast cancer susceptibility gene 1 | * Breast * Lung * Ovarian | * Cisplatin (Platinol®) * Prophylactic surgery (prevention) |
| BRCA2– breast cancer susceptibility gene 2 | * Breast * Ovarian | * Tamoxifen (Nolvadex®) * Prophylactic surgery (prevention) |
| c-Kit/CD117/SCFR – mast stem cell factor receptor (\*) | * Acute myelogenous leukemia (AML) * Gastrointestinal stromal tumour (GIST) * Melanoma | * Imatinib (Gleevec®) * Sorafenib (Nexavar®) * Sunitinib (Sutent®) |
| c-MET/HGFR – mesenchymal epithelial transition factor/hepatocyte growth factor receptor | * NSCLC * Ovarian | * Erlotinib (Tarceva®) * Gefitinib (Iressa®) |
| COX-2/PTGS2 – cyclooxygenase-2/ prostaglandin-endoperoxide synthase-2 | * NSCLC | * Celecoxib (Celebrex®) |
| EGFR/ErbB-1/HER1 – epidermal growth factor receptor (\*) | * NSCLC | * Cetuximab (Erbitux®) * Erlotinib (Tarceva®) * Gefitinib (Iressa®) * Panitumumab (Vectibix®) |
| ER– oestrogen receptor (\*) | * Breast * Female reproductive tract (cervical, fallopian, ovarian, uterine) | * Anastrazole (Arimidex®) * Exemestane (Aromasin®) * Fulvestrant (Faslodex®) * Goserelin (Zoladex®) * Letrozole (Femara®) * Leuprolide (Eligard®, Lupron®, Viadur®) * Medroxyprogesterone, (Provera®, Amen®, Curretab®, Cycrin®) * Megestrol acetate (Megace®, Megace® ES) * Tamoxifen (Nolvadex®) * Toremifene (Fareston®) |
| ERCC1– excision repair cross-complementation group 1 | * Bladder * Colorectal * Gastric * Lung (NSCLC and SCLC) * Ovarian | * Carboplatin (Paraplatin®) * Oxaliplatin (Eloxatin®) |
| HER2/HER2neu/ErbB-2 – human epidermal growth factor receptor 2 (\*) | * Breast * Colorectal * Gastric * Gastroesophageal * Ovarian | * Doxorubicin (Adriamycin®, Rubex®) * Epirubicin (Ellence®) * Lapatinib (Tykerb®) * Liposomal doxorubicin (Caelyx®, Myocet®), * Trastuzumab (Herceptin®) |
| KRAS– Kirsten murine sarcoma virus (\*) | * Colon * NSCLC * Pancreatic | * Cetuximab (Erbitux®) * Erlotinib (Tarceva®) * Gefitinib (Iressa®) * Panitumumab (Vectibix®) |
| MGMT– O-6-methylguanine-DNA methyltransferase | * Breast * Glioblastoma multiforme (brain) * Melanoma * NSCLC * Oesophageal * Oligodendrogliomas * Pituitary gland carcinoma | * Resistant to temozolomide (Temodar®) |
| MRP1– multidrug resistance-associated protein 1 | * Breast * Head and neck * Lymphoma | * Resistant to doxorubicin (Adrimycin®), vinca alkaloids, methotrexate (Trexall®) |
| PGP– p-glycoprotein | * Breast * Head and neck * Lymphoma * Ovarian | * Resistant to doxorubicin (Adriamycin®), epirubicin (Ellence®), liposomal-doxorubicin (Doxil®), paclitaxel (Taxol®), docetaxel (Taxotere®), vinblastine (Velban®), vincristine (Oncovin®), vinorelbine (Navelbine®) |
| PIK3CAα– phosphatidylinositol-4, 5-bisphosphate 3-kinase, catalytic subunit alpha | * Breast * Colorectal * Gastric * Glioblastoma * Lung * Ovarian | * Lapatinib (Tykerb®) * Resistant to cetuximab (Erbitux®), panitumumab (Vectibix) * Decreased response to trastuzumab (Herceptin®) |
| PR– progesterone receptor (\*) | * Breast * Female genital tract cancer * Ovarian | * Anastrozole (Arimidex®) * Exemestane (Aromasin®) * Foremifene (Fareston®) * Fulvestrant (Faslodex®) * Gonadorelin (Factrel®) * Goserelin (Zoladex®) * Letrozole (Femara®) * Leuprolide (Eligard®, Lupron®, Viadur®) * Medroxyprogesterone (Provera®, Amen®, Curretab®, Cycrin®) * Megestrol acetate (Megace®, Megace® ES) * Tamoxifen (Nolvadex®) |
| PTEN– phosphatase and tensin homolog | * Breast * Colon * Glioblastoma * Head and neck * NSCLC | * Resistant to cetuximab (Erbitux®), erlotinib (Tarceva®), gefitinib (Iressa®), panitumumab (Vectibix®), trastuzumab (Herceptin®) |
| RRM1– ribonucleotide reductase subunit M1 | * NSCLC * Pancreatic | * Decreased response to gemcitabine (Gemzar®), hydroxyurea (Hydrea®, Droxia®) |
| SPARC– secreted protein acidic rich in cysteine | * Breast * Gastric * Head and neck * Melanoma * Pancreatic | * Albumin-bound paclitaxel/nab-paclitaxel (Abraxane®) |
| TLE3– transducin-like enhancer of split | * Breast * Ovarian | * Docetaxel (Taxotere ®) * Paclitaxel (Taxol®), |
| TOPO2α– topoisomerase IIα | * Breast * Colon * SCLC * Ovarian | * Doxorubicin (Adriamycin®) * Epirubicin (Ellence®, Pharmorubucin®) * Liposomal doxorubicin (Caelyx®, Myocet®) |
| TS– thymidylate synthetase | * Breast * Colon * Gastric * Head and neck * Liver * NSCLC * Pancreatic | * Resistant to 5-fluorouracil (Adrucil®), cytarabine (Cytosar-U®), pemetrexed (Alimta®) |
| TUBB3– Class III -tubulin | * NSCLC * Ovarian | * Docetaxel (Taxotere ®) * Paclitaxel (Taxol®) * Vinorelbine (Navelbine®) |

(\*) – Targetable genes and proteins that can also be measured to determine treatment response, cancer diagnosis and prognosis.

## Diagnostic and prognostic markers

The following markers are all related to diagnosis, prognosis and treatment progress.

|  |  |  |
| --- | --- | --- |
| Known marker | Associated cancer | Role |
| α (alpha)-fetoprotein | * Germ cell * Liver | Germ cell tumour staging, prognosis, response to treatment  Liver cancer diagnosis, response to treatment |
| β (beta)-2-microglobulin | * Chronic lymphocytic leukaemia (CLL) * Lymphoma * Multiple myeloma | Prognosis, response to treatment |
| β (beta)-human chorionic gonadotropin (β-hCG) | * Choriocarcinoma (uterine) * Testicular | Staging, prognosis, response to treatment |
| BCR-ABL fusion gene | * Chronic myeloid leukaemia (CML) | Diagnosis, disease status monitoring |
| BRAF (mutation V600E) | * Colorectal * Melanoma | Response to targeted treatment |
| CA15-3/CA27. 29 | * Breast | Treatment success, disease recurrence |
| CA19-9 | * Bile duct * Gallbladder * Gastric * Pancreatic | Treatment success |
| CA-125 | * Ovarian | Diagnosis, treatment response, disease recurrence |
| Calcitonin | * Medullary thyroid | Diagnosis, treatment success, disease recurrence |
| Carcinoembryonic antigen (CEA) | * Breast * Colorectal | Breast cancer recurrence, treatment response  Colorectal disease advance |
| CD20 | * Non-Hodgkin lymphoma (NHL) | Response to targeted treatment |
| Chromogranin A (CgA) | * Neuroendocrine tumours | Diagnosis, treatment response, disease recurrence |
| Chromosomes 3, 7, 17, 9p21 | * Bladder | Disease recurrence |
| Cytokeratin fragments 21-1 | * Lung | Disease recurrence |
| Fibrin/fibrinogen | * Bladder | Treatment response |
| Human epididymis protein 4 (HE4) | * Ovarian | Disease progression, disease recurrence |
| Immunoglobulins (antibodies) | * Multiple myeloma (MM) * Waldenström macroglobulinemia (blood) | Diagnosis, treatment response, disease recurrence |
| Lactate dehydrogenase | * Germ cell tumours | Staging, prognosis, treatment response |
| Nuclear matrix protein 22 | * Bladder | Treatment response |
| Plasminogen activator inhibitor (PAI-1) | * Breast | Grading, treatment planning |
| Prostate-specific antigen (PSA) | * Prostate | Diagnosis, treatment response, disease recurrence |
| Thyroglobulin | * Thyroid | Treatment response, disease recurrence |
| Urokinase plasminogen activator (uPA) | * Breast | Grading, treatment planning |

## Meta description

Cancer markers can help with the diagnosis and treatment of cancer and can give access to targeted therapies.

## Keywords

Cancer markers, genetic markers, diagnostic markers, drug target markers

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[EB1]If these are genes not proteins then they should be in italics