**Supplementary tables: the precision medicine approach to cancer therapy, part 1 — solid tumours**

**Table 1: Biomarkers important in breast cancer, the precision medicine (PM) agents used in this disease, and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| ER | Anastrozole (Arimidex)<br><br>Exemestane (Aromasin)<br><br>Everolimus (Afinitor)<br><br>Letrozole (Femara)<br><br>Fulvestrant (Faslodex)<br><br>Tamoxifen (Nolvadex)<br><br>Palbociclib (Ibrance)<br><br>Ribociclib (Kisqali)<br><br>Raloxifene Hydrochloride** (Evista)<br><br>Toremifene* (Fareston) | Immunohistochemistry[NHS] (IHC) | IHC is assessed as intensity (1–3) and proportion of cells stained (0–5) to provide a score of 0–8 (known as the Allred score) |
| | | EndoPredict gene expression profiling assay (Myriad Genetics) [nNHS] | Identifies ER+ve tumours. Not cost effective for NHS |
| | | Oncotype DX (Genomic Health Inc)[NHS] | Assesses whether a patient is likely to benefit from chemotherapy[66] |
| PgR | Everolimus (Afinitor)<br><br>Toremifene* (Fareston) | EndoPredict Gene Expression Profiling Assay (Myriad Genetics)[nNHS] | Identifies PgR+ve tumours. Not considered to be cost effective for NHS |
| | | Oncotype DX (Genomic Health Inc)[nNHS] | Assesses whether a patient is likely to benefit from chemotherapy[66]. Not considered to be cost effective for NHS |

| | | | |
|---|---|---|---|
| HER2/neu | Lapatinib*** (Tyverb) | Immunohistochemistry[NHS] | Score of 3+ defined as positive, 2+ equivocal |
| | | HER2 IQFISH PharmDX assay[NHS] (Dako Omnis) | Used for direct confirmation of HER2 status, for example to check for amplification of HER2+ antigen in breast tumour cells after an equivocal HER2 IHC result of 2+ |
| | Trastuzumab (Herceptin)<br><br>Trastuzumab Emtansine (Kadcyla)<br><br>Pertuzumab (Perjeta) | HercepTest (Dako PharmDx) — a semiquantitative IHC assay[NHS] | Used to select patients for treatment with trastuzumab and pertuzumab |
| Mutated *BRCA1* and *BRCA2* | Olaparib* (Lynparza) | BRCA Analysis CDx (Myriad Genetics Inc)[NHS] [68,69] | Identifies ovarian cancer patients carrying germline *BRCA* mutations who may benefit from treatment with olaparib or talazoparib[70] |
| | Talazoparib** (BMN-673) | | |
| CDK4 and CDK6 | Abemaciclib (Verzenio)<br><br>Palbociclib (Ibrance)<br><br>Ribociclib (Kisqali) | None | - |
| PIK3CA | Alpelisib** (Piqray) | Qiagen's Therascreen PIK3CA RGQ PCR Kit | Used to detect mutations in PIK3CA found in breast cancer patients |

* agents that are likely to be approved by National Institute for Health and Care Excellence (NICE) in the near future, but may not necessarily be used in the NHS[40,71]

** agents that are unlicensed in the UK at the time of writing

*** agents that have been removed from NICE guidance or rejected by NICE

[NHS] companion diagnostic tests which are used in the NHS based on cost/benefit ratio[72,73]

[nNHS] companion diagnostic tests which are not used in the NHS based on cost/benefit ratio[72,73]

**Table 2: Biomarkers important in lung cancer, the precision medicine (PM) agents used in this disease, and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| Epidermal growth factor receptor tyrosine kinase (EGFR-TK) EGFR1/Human epidermal growth factor receptor 1 (HER1) | Gefitinib (Iressa)‡ | The Cobas EGFR Mutation Test v2**NHS** (Roche Molecular Systems, Inc)‡ | Used to select patients with non-small cell lung cancer (NSCLC) who may benefit from gefitinib and erlotinib |
| | Erlotinib (Tarceva)‡ | | |
| EGFR/Erb-B family | Necitumumab*** (Portrazza) | Thermo Fisher OncomineDx Target Test**NHS** (Thermo Fisher Scientific) | OncomineDx Target is a 23-gene test used to identify the best responders to agents working through the genes identified (i.e. EGFR, *BRAF*, *ALK*, *ROS-1*, *KRAS* and *NRAS*). It can also be used to monitor the presence or absence of variants in other genes[91–93] |
| EGFR (sensitivity toward T790M mutation) and with Exon 19 deletions or Exon 21 L858R mutations | Afatinib (Giotrif)§ | EGFR Pharm Dx test (Dako Inc)**NHS** and the Therascreen EGFR RGQ PCR test (Qiagen)**NHS**,[94] | Both EGFR tests are used to guide the selection of patients who may benefit from treatment with afatinib |
| | Dacomitinib (Vizimpro) | Therascreen EGFR RGQ PCR Kit (Qiagen)**NHS**,[95] | This test detects exon deletions and insertions in the EGFR gene[95] |
| | Osimertinib (Tagrisso)Δ | The Cobas EGFR V2 test**NHS** (Roche Molecular Systems, Inc) | The V2 test is used to select NSCLC patients who may benefit from treatment with osimertinib |
| EGFR and HER2 (Exon 20 insertion mutation in EGFR) | Poziotinib** (also known as NOV120101 or HM781-36B)[96] | Thermo Fisher OncomineDx Target Test**NHS** (Thermo Fisher Scientific) | OncomineDx Target is a 23-gene test used to identify best responders to agents working through the genes identified (i.e. EGFR, *BRAF*, *ALK*, *ROS-1*, *KRAS* and *NRAS*). It can also be used to monitor the presence or absence of variants of other genes[91–93] |
| Anaplastic lymphoma kinase (*ALK*) | Ceritinib (Zykadia) | Ventana ALK (D5F3) Assay**NHS** (Novartis in collaboration with Roche) | Results from this test at the time of diagnosis can help determine whether patients may benefit from treatment with ceritinib and/or alectinib |

| | | | |
|---|---|---|---|
| | Alectinib (Alecensa) | | |
| | Brigatinib (Alunbrig) | HTG EdgeSeq ALKPlus Assay EU**NHS** (HTG Molecular Diagnostics) | HTG EdgeSeq ALKPlus is an *in vitro* next-generation sequencing assay used to test for *ALK* status in NSCLC patients. It works in conjunction with the HTG EdgeSeq Analyser[97] |
| | Crizotinib (Xalkori) | | |
| *ROS-1* | Crizotinib (Xalkori) | Thermo Fisher OncomineDx Target Test**NHS** (Thermo Fisher Scientific) | OncomineDx Target is a 23-gene test that can be used to identify potential best responders to crizotinib, and is also used to monitor for the presence or absence of variants of other genes[91–93] |
| | Lorlatinib (PF-6463922) | | |
| Vascular endothelial growth factor (VEGFR), platelet-derived growth factor (PDGFR) and fibroblast growth factor (FGFR) | Nintedanib (Vargatef) | NexCourse Complete/Solid Test**nNHS** (Genoptix Inc) | This test is used only to detect the mutation and not for drug selection |
| | Ramucirumab*** (Cyramza) | | |
| *BRAF*$^{V600E/K}$ | Dabrafenib*** (Tafinlar) | Thermo Fisher OncomineDx Target Test**NHS** (Thermo Fisher Scientific) | OncomineDx Target is a 23-gene test that can be used to identify best responders to the genes identified (i.e. EGFR, *BRAF*, *ALK*, *ROS-1*, *KRAS* and *NRAS*), and also to detect the presence or absence of variants of other genes[91–93] |

| | | | |
|---|---|---|---|
| MEK | Trametinib*** (Mekinist) | | |
| PD-L1[◊] | Pembrolizumab (Keytruda) | PD-L1 IHC 22C3 PharmDxTest[NHS] (Agilent Technologies/Dako Inc) | Used in the selection of patients who may benefit from treatment with pembrolizumab |
| | Nivolumab (Opdivo) | PD-L1 IHC 28-8 PharmDxTest[NHS] (Agilent Technologies/Dako Inc) | Used in the selection of patients who may benefit from treatment with nivolumab |
| | Durvalumab (Imfinzi) | The Ventana PD-L1 (SP263) Assay [NHS] using the Ventana BenchMark Ultra Instrument (Ventana Medical Systems Inc) | Used to select patients who may benefit from treatment with durvalumab |
| | Atezolizumab (Tecentriq) | None | - |
| | Avelumab** (Bavencio) | None | - |
| | Tramelimumab** (CP-675,206) | None | - |
| TMB (not currently used in practice) | Ipilimumab** (Yervoy) | FoundationOne CDx[NHS] (FoundationFocus Inc)[98] | The FoundationOne CDx profiles 324 genes as well as microsatellite instability and TMB, and is used to identify potential best responders to 15 FDA-approved treatments Although it is not yet an approved companion diagnostic assay for TMB, it is being used experimentally to inform the clinical management of patients with respect to this biomarker[87,99] |

*agents that are likely to be approved by National Institute for Health and Care Excellence (NICE) in the near

future, but may not necessarily be used in the NHS[40,71]
** agents that are unlicensed in the UK at the time of writing
*** agents that have been removed from NICE guidance or rejected by NICE
**NHS** companion diagnostic tests which are used in the NHS based on cost/benefit ratio[72,73]
**nNHS** companion diagnostic tests which are not used in the NHS based on cost/benefit ratio[72,73]
‡Both gefitinib and erlotinib are first-generation TKIs
‡The Idylla™ EGFR Mutation Assay is used only for research and not for diagnostic purposes
§Afatinib is considered a second-generation inhibitor
ΔOsimertinib is considered a third-generation inhibitor. The decision by NICE to disallow the use of osimertinib for end-of-life consideration in this cancer type is being appealed by AstraZeneca (100)
◊The PD-L1 assays described in this section can be used with more than one type of PD-L1 inhibitor

**Table 3: Biomarkers important in metastatic colorectal cancer (mCRC), the precision medicine (PM) agents used in this disease and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| **Biomarkers** | **Agents used** | **Examples of companion diagnostic tests** | **Use of test results** |
|---|---|---|---|
| *NRAS*/*KRAS* | Panitumumab (Vectibix) | Idylla NRAS-BRAF Mutation Test**NHS** (Biocartis/Amgen)[116] | Used to help identify mCRC patients eligible for treatment with panitumumab based on a lack of mutations |
| | | Cobas KRAS Mutation Test**NHS** (Roche Molecular Systems Inc) | Used to help identify mCRC patients who may benefit from treatment with cetuximab or panitumumab based on a lack of mutations |
| | | Therascreen KRAS RGQ PCR Test**NHS** (Quiagen Ltd) | |

| | | | |
|---|---|---|---|
| | Cetuximab (Erbitux) | Idylla ctKRAS Mutation Test[nNHS] (Biocartis/Merck)[117] | Detects 21 mutations in the *KRAS* gene. The first liquid biopsy test to improve the selection of patients who may benefit from anti-EGFR therapies such as cetuximab[117]. Not considered to be cost effective by the NHS |
| HER3 | Panitumumab (Vectibix) | Idylla NRAS-BRAF Mutation Test[nNHS] (Biocartis/Amgen)[116] | Used to help identify mCRC patients suitable for treatment with panitumumab. Not considered to be cost effective for the NHS |
| VEGF-A | Bevacizumab*** (Avastin) | None | - |
| VEGFR2 | Ramucirumab* (Cyramza) | None | - |
| VEGFR2-TIE2 | Regorafenib (Stivarga) | None | - |
| UGT1A1 | Irinotecan (Campto) | UGT1A1 Molecular Assay[nNHS] (Pfizer) | The presence of the polymorph UGT1A1*28 is associated with poor metabolism of the irinotecan metabolite (SN-38), and the need for a lower starting dose (or avoidance of treatment) due to potentially severe hematological toxicity |

| | | | |
|---|---|---|---|
| PD-L1<br><br>(some of the PD-L1 tests described can be used in association with different PD-L1 inhibitors) | Pembrolizumab* (Keytruda) | See entry for pembrolizumab in Table 2 | See entry for pembrolizumab in Table 2 |
| | Nivolumab* (Opdivo) | See entry for nivolumab in Table 2 | See entry for nivolumab in Table 2 |
| | Ipilimumab* (Yervoy) | FoundationOne CDx**NHS** (FoundationFocus Inc)[98] | The FoundationOne CDx test profiles 324 genes and is used to help identify potential best responders to 15 FDA-approved treatments. Although it is not formally recognised as a companion diagnostic kit for MSI-H and dMMR, it can be used to inform the clinical management of patients with respect to these biomarkers[87] |
| | Atezolizumab** (Tecentriq) | None | - |

* agents that are likely to be approved by National Institute for Health and Care Excellence (NICE) in the near future, but may not necessarily be used in the NHS[40,71]

** agents that are unlicensed in the UK at the time of writing

*** agents that have been removed from NICE guidance or rejected by NICE

**NHS** companion diagnostic tests which are used in the NHS based on cost/benefit ratio[72,73]

**nNHS** companion diagnostic tests which are not used in the NHS based on cost/benefit ratio[72,73]

**Table 4**: **Biomarkers important in metastatic melanoma, the precision medicine (PM) agents used in this disease and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| *BRAF*$^{V600}$ | Vemurafenib (Zelboraf) | Cobas 4800 *BRAF* V600 Mutation Test **NHS** (Roche Molecular Systems, Inc) | Indicates the presence of the *BRAF*$^{V600}$ mutation identifying patients suitable for treatment with vemurafenib |
| | | Thermo Fisher Oncomine Dx Target Test**nNHS** (Thermo Fisher Scientific) | Identifies those patients who might best respond to *BRAF* inhibitors based on the profiling of 23 genes including EGFR, *BRAF*, *ALK*, *ROS-1*, *KRAS* and *NRAS* (91-93). Not considered to be cost-effective for the NHS |
| | | Idylla BRAF Mutation Test**nNHS** (Biocartis, Inc) | Detects V600E/E2/D and V600K/R/M mutations in codon 600 of the *BRAF* gene, and is used to help identify patients who may benefit from *BRAF* inhibitors[127]. Not considered to be cost effective for the NHS |
| *BRAF*$^{V600E/K}$ | Dabrafenib (Tafinlar) | THxID-*BRAF* CDx Test**#,NHS** (BioMérieux Inc) | Indicates the presence of V600E and V600K mutations in patients with unresectable or metastatic melanoma to select those who may benefit from treatment with dabrafenib and trametinib (or cobimetinib) |
| *MEK* | Trametinib (Mekinist) | | |
| | Cobimetinib*** (Cotellic) | | |
| PD-L1 | Pembrolizumab (Keytruda) | See entry for pembrolizumab in Table 2. | See entry for pembrolizumab in Table 2 |
| | Nivolumab (Opdivo) | See entry for nivolumab in Table 2. | See entry for nivolumab in Table 2 |

| | | | |
|---|---|---|---|
| CTLA-4 | Ipilimumab (Yervoy) | None | - |

*** agents that have been removed from National Institute for Health and Care Excellence (NICE) guidance or rejected by NICE

**NHS** companion diagnostic tests which are used in the NHS based on cost/benefit ratio[72,73]

**nNHS** companion diagnostic tests which are not used in the NHS based on cost/benefit ratio[72,73]

**#**In 2013 the FDA approved the use of dabrafenib and trametinib in combination alongside the THxID BRAF test from BioMérieux. It is the second companion diagnostic approved by the FDA for *BRAF* mutation detection following approval of Roche's Cobas 4800 BRAF V600 Mutation Test in 2011

**Table 5: Biomarkers important in ovarian cancer, the precision medicine (PM) agents used in this disease and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| Mutated *BRCA1* and *BRCA2* | Niraparib (Zejula) | BRACAnalysis CDx **NHS** (Myriad Genetics Inc) | Identifies ovarian cancer patients carrying germline *BRCA* mutations who should respond to niraparib |
| | Olaparib (Lynparza) | BRCA Analysis CDx (Myriad Genetics Inc)**NHS,68,69** | Identifies ovarian cancer patients carrying germline *BRCA* mutations who may benefit from treatment with olaparib[70] |
| | Rucaparib (Rubraca) | FoundationFocus CDxBRAC **NHS** (Foundation Medicine Inc) | Identifies advanced ovarian cancer patients with mutations in their *BRCA1* and *BRCA2* genes who are likely to benefit from treatment with rucaparib |
| VEGFR1 and VEGFR2 | Bevacizumab (Avastin) | None | - |
| CA125 and CA125 II | None | Test kits, based on ELISA, are under development in collaboration between Morphotek Inc and Fujirebio Diagnostics | CA125 and CA125 II are diagnostic biomarkers for ovarian cancer |

**NHS** companion diagnostic tests which are used in the NHS based on cost/benefit ratio[72,73]

**Table 6**: **Biomarkers important in prostate cancer, the precision medicine (PM) agents used in this disease and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| AR (Androgen Receptor) | Apalutamide* (Erleada) | Numerous commercial test kits available. | There is currently no screening program for prostate cancer in the UK, as benefits have not been proven to outweigh the risks[147] |
| | Abiraterone (Zytiga) | - | N/A |
| | Enzalutamide (Xtandi) | - | N/A |
| | Darolutamide** (Nubeqa) | - | N/A |
| Mutated *BRCA1* and *BRCA2* | Olaparib** (Lynparza) | See Table 5 for examples of companion diagnostic tests available for *BRCA1* and *BRCA2* | BRACA1/2 analysis has been used experimentally to identify prostate cancer patients who are likely to respond to PARP inhibitors such as olaparib |

* agents that are likely to be approved by National Institute for Health and Care Excellence (NICE) in the near future, but may not necessarily be used in the NHS[40,71]

** agents that are unlicensed in the UK at the time of writing

**Table 7**: **Biomarkers important in renal cancer, the precision medicine (PM) agents used in this disease and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| VEGFR 1–3 and PDGFRα/β | Pazopanib (Votrient) | NexCourse **nNHS** Complete/Solid Genoptix-A (Novartis Inc) | Over-expression of VEGFR 1–3 is detected and allows the selection of patients for treatment with Pazopanib |
| | Sunitinib (Sutent) | LC-MS/MS**NHS** | Within the NHS, plasma levels of the active metabolite of Sunitinib (i.e. N- |

| | | | |
|---|---|---|---|
| | | | desmethylsunitin-ib) are measured to assess adherence and optimise treatment |
| | Lenvatinib (Lenvima) | None | - |
| | Tivozanib (Fotivda) | None | - |
| | Sorafenib (Nexavar) | None | - |
| | Everolimus (Afinitor) | None | - |
| | Temsirolimus (Torisel) | None | - |
| VEGFR 1-3 | Axitinib (Inlyta) | None | - |
| | Cabozantinib (Cabometyx) | None | - |
| PD-L1 | Pembrolizumab* (Keytruda) | See entry for pembrolizumab in Table 2 | See entry for pembrolizumab in Table 2 |
| | Nivolumab (Opdivo) | See entry for nivolumab in Table 2 | See entry for nivolumab in Table 2 |
| | Atezolizumab** (Tecentriq) | None | - |

* agents that are likely to be approved by National Institute for Health and Care Excellence (NICE) in the near future, but may not necessarily be used in the NHS[40,71]

** agents that are unlicensed in the UK at the time of writing

**NHS** companion diagnostic tests which are used in the NHS based on cost/benefit ratio[72,73]

**nNHS** companion diagnostic tests which are not used in the NHS based on cost/benefit ratio[72,73]

**Table 8**: **Biomarkers important in hepatocellular carcinoma, the precision medicine (PM) agents used in this disease, and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| **Biomarkers** | **Agents used** | **Examples of companion diagnostic tests** | **Use of test results** |
|---|---|---|---|
| VEGFR and PDGFR | Sorafenib (Nexavar) | Sorafenib by LC-MS/MS**NHS** | Measures the active metabolite of Sorafenib (Sorafenib N-oxide) in plasma to assess adherence, monitor toxicity and optimise treatment |

| | | | |
|---|---|---|---|
| | Lenvatinib (Lenvima) | None | - |
| | Regorafenib (Stivarga) | None | - |
| VEGFR | Cabozantinib (Cometriq) | None | - |
| | Vandetanib** (Caprelsa) | None | - |
| PD-L1 | Nivolumab** (Opdivo) | See entry for nivolumab in Table 2 | See entry for nivolumab in Table 2 |

** agents that are unlicensed in the UK at the time of writing
**NHS** companion diagnostic tests which are used in the NHS based on cost/benefit ratio[72,73]

**Table 9**: **Biomarkers used in medullary and papillary thyroid cancers, the precision medicine (PM) agents used in this disease, and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| **Biomarkers** | **Agents used** | **Examples of companion diagnostic tests** | **Use of test results** |
|---|---|---|---|
| VEGFR and PDGFR | Sorafenib (Nexavar) | See entry for Sorafenib in Table 8 | See entry for Sorafenib in Table 8 |
| | Lenvatinib (Lenvima) | None | - |
| | Regorafenib** (Stivarga) | None | - |
| VEGFR | Cabozantinib (Cometriq) | None | - |
| | Vandetanib (Caprelsa) | None | - |
| *BRAF*$^{V600}$ | Dabrafenib** (Tafinlar)<br><br>Trametinib** (Mekinist) | See entry for Dabrafenib and Trametinib in Table 4 | See entry for Dabrafenib and Trametinib in Table 4 |

** agents that are unlicensed in the UK at the time of writing

**Table 10**: **Biomarkers used in pancreatic neuroendocrine tumours (PNTs), the precision medicine (PM) agents used in this disease, and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| VEGF | Everolimus (Afinitor ) | Tandem mass spectrometric (LC-MS/MS) assay for measuring everolimus[NHS] | Due to a narrow therapeutic index, plasma concentrations of everolimus must be routinely monitored, usually on a pre-dose (trough) sample |
| VEGFR, VEGFR2 and PDGFRα/β | Sunitinib (Sutent) | See entry for Sunitinib in Table 7 | See entry for Sunitinib in Table 7 |
| | Vandetanib** (Caprelsa) | None | - |
| | Erlotinib** (Tarceva) | None | - |
| UGT1A1 | Nano-Liposomal Irinotecan*** (Onivyde) | See entry for Irinotecan in Table 3 | See entry for Irinotecan in Table 3 |
| *BRCA1* and *BRCA2* | Olaparib* (Lynparza) | See Table 5 for examples of companion diagnostic tests available for *BRCA1* and *BRCA2* | See Table 5 for examples of companion diagnostic tests available for *BRCA1* and *BRCA2* |

** agents that are unlicensed in the UK at the time of writing

*** agents that have been removed from National Institute for Health and Care Excellence (NICE) guidance or rejected by NICE

[NHS] companion diagnostic tests which are used in the NHS based on cost/benefit ratio[72,73]

**Table 11**: **The main biomarker used in bladder cancer, the precision medicine (PM) agents used in this disease, and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| PD-L1 | Durvalumab** (Imfinzi) | See entry for Durvalumab in Table 2 | See entry for Durvalumab in Table 2 |
| | Atezolizumab** (Tecentriq) | None | - |

| | | | |
|---|---|---|---|
| | Avelumab** (Bavencio) | None | - |
| FGFR | Erdafitinib** (Balversa) | Therascreen FGFR RGQ RT-PCR Kit[nNHS] (Qiagen) | This testing kit is used to identify patients who may benefit from erdafitinib |

** agents that are unlicensed in the UK at the time of writing
[nNHS] companion diagnostic tests which are not used in the NHS based on cost/benefit ratio[72,73]

**Table 12**: **The main biomarker relevant to basal cell carcinoma, and the small molecule inhibitors associated with it**

| Biomarker | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| Hedgehog signaling pathway | Vismodegib (Erivedge) | None | - |
| | Sonidegib** (Odomzo) | None | - |

** agents that are unlicensed in the UK at the time of writing

**Table 13**: **The main biomarkers relevant to gastrointestinal stromal tumours, the precision medicine (PM) agents used in this disease, and the companion diagnostic (CDx) tests used to select patients most likely to respond**

| Biomarkers | Agents used | Examples of companion diagnostic tests | Use of test results |
|---|---|---|---|
| C-Kit (also known as CD117) or DOG1 | Imatinib (Glivec) | None | - |
| | Sunitinib (Sutent) | See entry for Sunitinib in Table 7 | See entry for Sunitinib in Table 7 |
| | Regorafenib (Stivarga) | None | - |
| PDGFR*A* | Sunitinib (Sutent) | See entry for Sunitinib in Table 7 | See entry for Sunitinib in Table 7 |
| | Regorafenib (Stivarga) | None | - |

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