Personalised Cancer Medicine Flashcards 2025

Cátedra de
Medicina Personalizada de Precisión

UAM Universidad Autónoma de Madrid

Fundación InstitutoRoche

Prof. Ramon Colomer
Prof. Rebeca Mondéjar
Prof. Nuria Romero-Laorden
Prof. Patricia Toquero
Dra. Berta Hernández
Dr. Jacobo Rogado

July 2025

Personalised Cancer Medicine Flashcards 2025

Lung Cancer

Breast Cancer

Colorectal Cancer

Gastric Cancer

Pancreatic Cancer

GIST

Melanoma

Prostate Cancer

Ovarian Cancer

Cátedra de
Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
Lung Cancer

Standard

PDL-1 + NGS

Alternative: PDL-1 + secuential gene testing

KRAS*
EGFR*
ALK*
ROS1*
MET*
RET*
NTRK*

Recommended

HER2*
BRAF*
NRG1*

Currently not recommended

TROP-2
KEAP1, STK11, MSI, or
TMB (with NGS)

* If a single test is performed due to the non-availability of NGS or limited material, a sequence of testing (related by the probability of the molecular alterations) is suggested

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. Isla D, Lozano MD, Paz-Ares L, et al. Nueva actualización de las recomendaciones para la determinación de biomarcadores predictivos en el carcinoma de pulmón no célula pequeña: Consenso Nacional de la Sociedad Española de Anatomía Patológica y de la Sociedad Española de Oncología Médica [New update to the guidelines on testing predictive biomarkers in non-small-cell lung cancer: a National Consensus of the Spanish Society of Pathology and the Spanish Society of Medical Oncology]. Rev Esp Patol. 2023 Apr-Jun;56(2):97-112. Spanish. doi: 10.1016/j.patol.2023.02.002.
2. Colomer R, Mondejar R, Romero-Laorden N et al,. When should we order a next generation sequencing test in a patient with cancer? EClinicalMedicine. 2020 Jul 31;25:100487. doi: 10.1016/j.eclinm.2020.100487.
3. Mosele F, Remon J, Mateo J, et al. Recommendations for the use of next-generation sequencing (NGS) for patients with metastatic cancers: a report from the ESMO Precision Medicine Working Group. Ann Oncol. 2020 Nov;31(11):1491-1505. doi: 10.1016/j.annonc.2020.07.014..
4. https://www.accessdata.fda.gov/cdrh_docs/pdf17/P170019S006A.pdf

Cátedra de Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
Breast Cancer

Standard

	Early stage	Advanced stage
ER	✓	✓
PR	✓	✓
HER2	✓	✓
Ki-67	✓	✓
Genetic platforms*	✓	✗
BRCA Genes**	✓	✗
PDL-1***	✗	✓
PI3KCA****	✗	✓
ESR1****	✗	✓

*in early luminal breast cancercon bajo riesgo de recaída
**in early high risk triple negative or luminal breast cancer (in Spain iPARP inhibitors are not reimbursed in advancer cancer)
***in advanced triple negative breast cancer
****in advanced luminal breast cancer

Recommended

	Early stage	Advanced stage
TILs	✓	✗
HRD	✓	✓
AKT pathway activation	✗	✓
NGS*	✗	✓
NTRK	✗	✓
MSI	✗	✓

***** Approved in US as companion diagnostics of targeted drugs against BRCA, ALK or PI3K

Currently not recommended

AR
TROP-2
CDK4/6
FGFR1
PTEN
Liquid biopsy
CTCs
TMB

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. Colomer R, González-Farré B, Ballesteros AI, Peg V, Bermejo B, Pérez-Mies B, de la Cruz S, Rojo F, Pernas S, Palacios J. Biomarkers in breast cancer 2024: an updated consensus statement by the Spanish Society of Medical Oncology and the Spanish Society of Pathology. Clin Transl Oncol. 2024 Dec;26(12):2935-2951. doi: 10.1007/s12094-024-03541-1

Cátedra de Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
Colorectal Cancer

Standard

Microsatellite Instability Study (MSI-H, dMMR)*
KRAS, NRAS
BRAF
DPD

* by IHC (MLH1, PMS2, MSH2 and MSH6) or genetic study (BAT25 and BAT26, D2S123, D5S346 and D17S250).

Recommended

NTRK*
HER2**

* in tumors with microsatellite instability, MIG1 hypermetilation and RAS wild type (IHQ + FISH, NGS, RT-PCR, NanoString)
**(IHC or FISH or NGS) en RAS y BRAF WT

Currently not recommended

Inmunoscore
CMS classification
MET
EGFR
FGFR
PI3K

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. García-Alfonso P, García-Carbonero R, García-Foncillas J, et al. Update of the recommendations for the determination of biomarkers in colorectal carcinoma: National Consensus of the Spanish Society of Medical Oncology and the Spanish Society of Pathology. Clin Transl Oncol. 2020 Nov;22(11):1976-1991. doi: 10.1007/s12094-020-02357-z.
2. Di Nicolantonio F, Vitiello PP, Marsoni S, Siena S, Tabernero J, Trusolino L, Bernards R, Bardelli A. Precision oncology in metastatic colorectal cancer - from biology to medicine. Nat Rev Clin Oncol. 2021 Aug;18(8):506-525. doi: 10.1038/s41571-021-00495-z
3. Ros J, Vaghi C, Baraibar I, Saoudi González N, Rodríguez-Castells M, García A, Alcaraz A, Salva F, Tabernero J, Elez E. Targeting *KRAS*G12C Mutation in Colorectal Cancer, A Review: New Arrows in the Quiver. Int J Mol Sci. 2024 Mar 14;25(6):3304. doi: 10.3390/ijms25063304. PMID: 38542278; PMCID: PMC10970443.

Cátedra de Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
Gastroesophageal Cancer

Standard

Microsatellite Instability
(MSI-H, dMMR)*
HER2
Claudin 18.2
PDL-1

Recommended

-

Currently not recommended

VEGFR
EGFR
MET
EBV

*by either IHQ (MLH1, PMS2, MSH2 and MSH6) or by
Genomic studies (BAT25 and BAT26, D2S123, D5S346 and D17S250).

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. Alsina Maqueda M, Teijo Quintáns A, Cuatrecasas M, Fernández Aceñero MJ, Fernández Montes A, Gómez Martín C, Jiménez Fonseca P, Martínez Ciarpaglini C, Rivera Herrero F, Iglesias Coma M. Biomarkers in gastroesophageal cancer 2025: an updated consensus statement by the Spanish Society of Medical Oncology (SEOM) and the Spanish Society of Pathology (SEAP). Clin Transl Oncol. 2025 Mar 12. doi: 10.1007/s12094-025-03865-6.
2. Shitara K, Fleitas T, Kawakami H, et al. Pan-Asian adapted ESMO Clinical Practice Guidelines for the diagnosis, treatment and follow-up of patients with gastric cancer. *ESMO Open*. 2024;9(2):102226. doi:10.1016/j.esmoop.2023.102226

Cátedra de
Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
Pancreatic Cancer

Standard

Microsatellite Instability (MSI-H, dMMR)*
Germ-line BRCA 1-2
NTRK

Recommended

K-RAS

Currently not recommended

ATM, PALB2, p53, KRAS, CDKN2, SMAD4, MLL3, TGFBR2, ARID1A, ALK, BRAF, HER2, ROS, RRG1

* By either IHC (MLH1, PMS2, MSH2 a MSH6) or by genomic study(BAT25 and BAT26, D2S123, D5S346 and D17S250).

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. Curtin NJ, Drew Y, Sharma-Saha S. Why BRCA mutations are not tumour-agnostic biomarkers for PARP inhibitor therapy. Nat Rev Clin Oncol. 2019 Dec;16(12):725-726. doi: 10.1038/s41571-019-0285-2.
2. a-Saha S. Why BRCA mutations are not tumour-agnostic biomarkers for PARP inhibitor therapy. Nat Rev Clin Oncol. 2019 Dec;16(12):725-726. doi: 10.1038/s41571-019-0285-2.
3. Golan T, Hammel P, Reni M, Van Cutsem E, Macarulla T, et al. Maintenance Olaparib for Germline BRCA-Mutated Metastatic Pancreatic Cancer. N Engl J Med. 2019 Jul 25;381(4):317-327. doi: 10.1056/NEJMoa1903387.

Cátedra de Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
GIST

Standard

CD 117/c-kit
CD34
Number of mitosis/50 large fields
KIT and PDGFR mutations

Recommended

DOG1*
BRAF, SDHB, NTRK**

Currently not recommended

NF1
RAS
FGFR

* CD117 negative
** GIST wild type

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. Martin-Broto J, Martinez-Marín V, Serrano et al. Gastrointestinal stromal tumors (GISTs): SEAP-SEOM consensus on pathologic and molecular diagnosis. Clin Transl Oncol. 2017 May;19(5):536-545. doi: 10.1007/s12094-016-1581-2.

Cátedra de Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
Melanoma

Standard

BRAF v-600

Recommended

NRAS*
NTRK
PDL1**
C-KIT***
HLA-A*02:01****

Currently not recommended

NRAS
GNAQ/GNA11
PTEN
MITF
CDKN2A
MHC-II
Tumor mutational burden

*in cases BRAF negative
**for using combinations of anti-PD1 with anti-CTL4 or anti-LAG3
***in mucosal or acral melanoma or melanoma associated with sunlight
****in uveal melanoma

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. Amaral T, Ottaviano M, Arance A, et al; ESMO Guidelines Committee. Cutaneous melanoma: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. Ann Oncol. 2025 Jan;36(1):10-30. doi: 10.1016/j.annonc.2024.11.006.
2. European consensus-based interdisciplinary guideline for melanoma. Part 1: Diagnostics Update 2024. Garbe, Claus et al. European Journal of Cancer, Volume 215, 115152
3. Márquez-Rodas I, Muñoz Couselo E, Rodríguez Moreno JF, Arance Fernández AM, Berciano Guerrero MÁ, Campos Balea B, de la Cruz Merino L, Espinosa Arranz E, García Castaño A, Berrocal Jaime A. SEOM-GEM clinical guidelines for cutaneous melanoma (2023). Clin Transl Oncol. 2024 Nov;26(11):2841-2855. doi: 10.1007/s12094-024-03497-2. Epub 2024 May 15. PMID: 38748192; PMCID: PMC11467041

Cátedra de Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
Prostate Cancer

Standard

BRCA1 and BRCA2*

*germ-line and somatic

Recommended

CHECK2, PALB2, CDK12, RAD51D, ATM, FANCA*

Microsatellite instability (MSI-H, dMMR)**

*germ-line and somatic
** By either IHC (MLH1, PMS2, MSH2 a MSH6) or by genomic study(BAT25 and BAT26, D2S123, D5S346 and D17S250).

Currently not recommended

Androgen receptor aberrations
PDL1
PTEN

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. de Bono J, Mateo J, Fizazi K, et al. Olaparib for Metastatic Castration-Resistant Prostate Cancer. N Engl J Med. 2020 May 28;382(22):2091-2102. doi: 10.1056/NEJMoa1911440.
2. 2. To SQ, Kwan EM, Fettke HC, et al. Expression of Androgen Receptor Splice Variant 7 or 9 in Whole Blood Does Not Predict Response to Androgen-Axis-targeting Agents in Metastatic Castration-resistant Prostate Cancer. Eur Urol. 2018 Jun;73(6):818-821. doi: 10.1016/j.eururo.2018.01.007.
3. González Del Alba A, Méndez-Vidal MJ, Vazquez S, Castro E, Climent MA, Gallardo E, Gonzalez-Billalabeitia E, Lorente D, Maroto JP, Arranz JA. SEOM clinical guidelines for the treatment of advanced prostate cancer (2020). Clin Transl Oncol. 2021 May;23(5):969-979. doi: 10.1007/s12094-021-02561-5.
4. Fenton SE, VanderWeeler DJ, Rebbeck TR, Chen DL. Advancing Prostate Cancer Care: Treatment Approaches to Precision Medicine, Biomarker Innovations, and Equitable Access. Am Soc Clin Oncol Educ Book. 2024 Jun;44(3):e433138. doi: 10.1200/EDBK_433138

Cátedra de Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025
Ovarian Cancer

Standard

BRCA1 and BRCA2*
Homologous Recombination Deficiency (HRD)**

*germ-line and somatic
**somatic

Recommended

NGS*
FRα (alfa-folate receptor)**
Microsatellite instability (MSI-H, dMMR)***
HER2****

*Germinal multigene panel (including PALB2, CHECK2, RAD51C, RAD51D, BRIP1, MLH1, MSH2, MSH6, PSM2)
**by IHC
***by IHC (MLH1, MSH2, MSH6, PSM2) or genomic study(BAT25, BAT26, DS2123, D5S346, D17S250)
****by IHC(3+/2+)

Currently not recommended

PD1/PDL1, BARD1, CHECK1, p53, FAM175A, MRE11A, NBN

The **Standard** category is based on current treatment indications with approved funding by the Spanish National Health System
The **Recommended** category is based on current recommendations by EMEA and FDA

1. NCCN Guidelines Version 3.2025 Breast, Ovarian, Pancreatic, and Prostate Cancer Genetic Assessment.
2. Newly diagnosed and relapsed epithelial ovarian cancer: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. González-Martín, A. et al. Annals of Oncology, Volume 34, Issue 10, 833 - 848
3. Oaknin A, Guarch R, Barretina P, et al. Recommendations for biomarker testing in epithelial ovarian cancer: a National Consensus Statement by the Spanish Society of Pathology and the Spanish Society of Medical Oncology. Clin Transl Oncol. 2018 Mar;20(3):274-285. doi: 10.1007/s12094-017-1719-x.

Cátedra de Medicina Personalizada de Precisión
UAM Universidad Autónoma de Madrid
Fundación InstitutoRoche

Personalised Cancer Medicine Flashcards 2025

Cátedra de
Medicina Personalizada de Precisión

UAM Universidad Autónoma de Madrid

Fundación InstitutoRoche

July 2025