ASCO 2025 Congress
Special Report

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ABSTRACT

The Annual Meeting of the American Society of Clinical Oncology (ASCO) is the most relevant scientific event in global oncology. This report reviews ASCO's history and significance, general data for the 2025 edition, main advances in lung, breast, colorectal, and prostate cancer, as well as updates on drugs, genetics, molecular biology, and artificial intelligence. The report highlights studies that will be milestones in clinical practice, with special emphasis on those chosen for the plenary session.

INTRODUCTION

The American Society of Clinical Oncology (ASCO) is the world's leading scientific and educational organization dedicated to advancing cancer treatment. Its annual meeting, traditionally held in Chicago, USA, gathers thousands of oncology professionals from around the globe and is considered the most important event on the international oncology agenda.

ASCO has become the main forum for presenting clinical research, advances in therapies, innovations in molecular biology, and new technologies applied to cancer diagnosis and treatment. The 2025 congress promises to continue this tradition, showcasing high-impact clinical trial results and fostering discussion about the future of oncology.

HISTORY AND SIGNIFICANCE OF ASCO

The American Society of Clinical Oncology (ASCO) was founded in 1964 by a group of seven visionary oncologists who recognized the need for an organization exclusively dedicated to the study and treatment of human cancer [1].

The first ASCO annual meeting was held in 1965, with just 51 members. Since then, the event has grown exponentially, becoming the largest and most prestigious scientific oncology meeting in the world.

Each year, ASCO brings together over 40,000 health professionals, including medical oncologists, surgeons, radiation oncologists, researchers, nurses, and representatives from the pharmaceutical industry.

The congress is the main stage for presenting results from phase III clinical trials, molecular biology studies, new diagnostic and therapeutic technologies, as well as debates on health policy and access to innovative treatments [2].

ASCO's impact on the global scientific community is undeniable: many international clinical practice guidelines are updated based on results presented at this forum, and the international collaboration fostered at the congress has been key for the development of large multicenter trials and the advancement of personalized medicine [3].

ASCO 2025: GENERAL DATA

Participants

ASCO 2025 is expected to host more than 45,000 oncology professionals from over 120 countries, reinforcing its global and interdisciplinary character [4].

Attendees include medical oncologists, surgeons, radiation oncologists, pathologists, molecular biologists, pharmacists, nurses, pharmaceutical industry representatives, regulators, and patient advocates.

The hybrid format, implemented since the COVID-19 pandemic, allows both in-person and virtual attendance, further expanding the event's reach and facilitating global interaction.

Submitted Abstracts

In recent editions, over 6,000 abstracts have been submitted for review, with around 2,500 selected for oral presentation, poster, or publication in the official congress proceedings [5].

The studies cover all areas of clinical and translational oncology, including phase I-III clinical trials, molecular biology studies, epidemiology, quality of life, treatment access, artificial intelligence, and health policy.

The rigorous selection process ensures that the studies presented are of high quality and clinical relevance.

Faculty

The ASCO faculty comprises over 500 international experts, including opinion leaders, principal investigators of clinical trials, and leaders in various oncology subspecialties [6].

These professionals are responsible for evaluating abstracts, moderating sessions, and updating ASCO clinical guidelines.

The faculty is characterized by its geographic and disciplinary diversity, promoting a comprehensive and global vision of cancer management.

Key Advances By Tumor Type

Lung Cancer

Lung cancer remains the solid tumor with the highest mortality worldwide. At ASCO 2025, the most relevant advances focus on treatment personalization, early-stage immunotherapy integration, and the development of new targeted therapies.

ADAURA-2 Study: Updated results with adjuvant osimertinib in EGFR-mutated patients, showing sustained improvement in overall and disease-free survival. This study consolidates the use of targeted therapies in early stages and redefines the standard of care for EGFR-mutated NSCLC [7].

KRAS G12C Inhibitors: New data on sotorasib and adagrasib combined with immunotherapy, expanding the benefited population and improving response rates in KRAS G12C-mutated patients [8].

Personalized Therapies In Early-Stage Disease: Results from neoadjuvant immunotherapy trials (nivolumab, pembrolizumab) and their impact on surgical resection, with improvements in disease-free survival [9].

Liquid Biopsy for Early Detection: Validation of genomic panels for screening high-risk populations, enabling earlier disease detection and monitoring of minimal residual disease [10].

RET And MET Targeted Therapies: Efficacy of new inhibitors (selpercatinib, capmatinib) in specific molecular subgroups, with durable responses and manageable toxicity profiles [11].

Breast Cancer

Breast cancer remains the most studied tumor at ASCO. In 2025, advances focus on expanding targeted therapies, immunotherapy, and integrating genomics into decision-making.

DESTINY-Breast06 Study: Trastuzumab deruxtecan in HR+/HER2-low, redefining metastatic disease treatment and expanding anti-HER2 therapy eligibility [12].

Adjuvant CDK4/6 Inhibitors: Long-term results of ribociclib and abemaciclib, showing sustained reduction in recurrence risk in high-risk patients [13].

Immunotherapies In Triple-Negative Breast Cancer: Trials with pembrolizumab and atezolizumab combined with chemotherapy, improving overall survival in selected subgroups [14].

Genomics And Therapeutic Decision-Making: Updates on multigene panels (Oncotype DX, MammaPrint) to avoid overtreatment and personalize adjuvant therapy [15].

Therapeutic Vaccines: First results of personalized vaccines in high-risk relapse patients, opening a new pathway in breast cancer immunotherapy [16].

Colorectal Cancer

Colorectal cancer is an area of intense research, with advances in molecular stratification and immunotherapy integration.

FOCUS4 Study: Molecular stratification and targeted therapies in first-line treatment, enabling personalized therapy based on tumor genomic profile [17].

Immunotherapy in MSI-H/dMMR: Results of pembrolizumab and CTLA-4 combination in metastatic disease, with sustained and durable response rates [18].

Minimally Invasive Surgery: Impact on survival and quality of life, with reduced complications and faster recovery [19].

Anti-EGFR Therapies in RAS Wild-Type: New combinations and treatment sequencing, optimizing efficacy and minimizing toxicity [20].

Microbiome And Therapeutic Response: Studies on modulating the gut microbiome to enhance immunotherapy efficacy, one of the most innovative areas in translational research [21].

Prostate Cancer

Prostate cancer has undergone a revolution in advanced disease management, with the integration of targeted therapies and personalized medicine.

PROpel Study: Olaparib + abiraterone in first-line metastatic castration-sensitive prostate cancer, showing improvements in progression-free and overall survival [22].

PSMA Radioligands: Results of lutetium-177-PSMA in advanced disease, with significant responses and an acceptable toxicity profile [23].

Immunotherapy In Selected Subgroups: Trials with pembrolizumab in patients with high mutational burden or DNA repair defects [24].

Combined Therapies in Early-Stage Disease: Intensification of hormonal treatment and radiotherapy, improving outcomes in high-risk patients [25].

Genomic Sequencing and Personalized Medicine: Identification of new response biomarkers, enabling optimal therapy selection [26].

NEW DRUGS, GENETICS, AND MOLECULAR BIOLOGY

ASCO 2025 will witness the consolidation of targeted therapies and innovative combinations based on tumor genomic profiles.

The most promising molecules include:

- KRAS G12C, RET, MET, NTRK, and ALK inhibitors in solid tumors, with encouraging results in previously poor-prognosis subgroups [27].

- Antibody-drug conjugates (ADC): Trastuzumab deruxtecan and sacituzumab govitecan have expanded indications to HER2-low and triple-negative breast cancer, respectively [28].

- Cellular therapies (CAR-T): Advances in CAR-T application to solid tumors, with improved receptor engineering and reduced toxicity [29].

- Next-generation sequencing (NGS) panels: Allow identification of actionable genomic alterations and monitoring of minimal residual disease, facilitating real-time decision-making [30].

- Gene editing (CRISPR/Cas9): Phase I/II clinical trials explore the feasibility and safety of gene editing in hematologic and solid tumors [31].

The integration of molecular biology into clinical practice has enabled the transition to precision oncology, where treatment is tailored to each patient's unique molecular profile.

ARTIFICIAL INTELLIGENCE IN CANCER RESEARCH AND TREATMENT

Artificial Intelligence (AI) has become a key ally in modern oncology.

At ASCO 2025, advances will be presented in:

- AI-assisted imaging diagnosis: Deep learning algorithms improve detection and characterization of lesions in CT, MRI, and mammography, sometimes surpassing human accuracy [32].

- Prediction of therapeutic response: Machine learning models integrate clinical, genomic, and radiological data to predict therapy response, optimizing treatment selection [33].

- Optimization of clinical trials: AI applied to study design, patient selection, and large database analysis, accelerating new therapy development [34].

- Clinical decision support: Expert systems assist physicians in therapy selection based on updated evidence and interpretation of complex genomic panels [35].

AI integration in oncology practice promises to improve diagnostic precision, treatment efficiency, and patient quality of life. Challenges include clinical validation, ethical interpretation of algorithms, and integration into diverse health systems.

PLENARY SESSION

ASCO Plenary Session Highlights

The ASCO Plenary Session is reserved for presenting the most impactful and innovative studies of the congress, selected for their potential to change global clinical practice.

Stage III Colorectal Cancer and The ATOMIC Study

The ATOMIC trial evaluated the combination of atezolizumab with modified FOLFOX6, showing a significant 50% improvement in disease-free survival among a selected population of resected stage III colon cancer patients—specifically those with R0 resections and dMMR status confirmed by immunohistochemistry (MSI-H). These findings are particularly relevant in settings where surgery is the initial intervention. However, the NICHE-2 trial has demonstrated even greater benefits using neoadjuvant immunotherapy with a reduced treatment burden. The key challenge now lies in ensuring the rapid availability of dMMR/MSI-H results prior to surgery whenever feasible. While this may not be applicable in urgent cases, closer collaboration between surgeons and medical oncologists is essential to timely identify candidates for neoadjuvant immunotherapy. In all other cases, the adjuvant approach evaluated in ATOMIC remains a valid option.

Head And Neck Cancer: The NIVOSTOP Trial

Head and neck cancers are often underrepresented in major scientific forums, making their inclusion in such a high-profile plenary session especially notable. The NIVOSTOP trial showed improved disease-free survival (HR 0.76) by adding nivolumab to chemoradiotherapy in resected high-risk patients (e.g., positive margins or extracapsular nodal extension). One of the most noteworthy findings was the favorable toxicity profile, providing an important clinical benefit: better disease control with minimal added risk. These results underscore the need to consider how best to incorporate nivolumab into clinical practice, particularly in light of the recent presentation of neoadjuvant pembrolizumab data from the KEYNOTE-689 trial.

Ctdna-Guided Strategy in Breast Cancer: SERENA-6 Study

The SERENA-6 trials introduced an innovative approach to extend the benefit of endocrine therapy plus CDK4/6 inhibitors in hormone-sensitive advanced breast cancer. Using ctDNA monitoring to detect ESR1 mutations—associated with endocrine resistance therapy was switched from letrozole or anastrozole to camizestrant before clinical or radiologic progression occurred. This strategy increased two-year progression-free survival (29% vs. 5%). Notably, the safety profile was excellent (only 1% discontinued due to toxicity), and patients experienced improved quality of life (HR 0.5). These results may encourage broader implementation of dynamic molecular testing in routine practice. Nevertheless, the financial burden of ongoing molecular surveillance and its psychological toll (e.g., "scanxiety") must be carefully evaluated.

Perioperative Immunotherapy in Gastric Cancer: MATTERHORN Study

The MATTERHORN trial expands the role of immunotherapy in resectable gastric cancer, shifting from the previously established adjuvant use of nivolumab to a perioperative approach incorporating durvalumab. The study introduced some deviations from standard FLOT administration. While overall survival data are still pending, the trial represents a significant step forward in the evolution of multimodal treatment strategies for gastric cancer.

CONCLUSIONS

ASCO 2025 is shaping up to be a turning point in global oncology, consolidating personalized medicine, the integration of new technologies, and the multidisciplinary approach to cancer.

Advances in targeted therapies, immunotherapy, molecular biology, and AI will set the course for research and clinical practice in the coming years.

As every year, the plenary session will highlight studies that will redefine treatment standards and guide updates to international clinical guidelines.

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