

ADC bioanalytics

Antibody-drug conjugates (ADCs) combine monoclonal antibodies with potent cytotoxic agents, delivering a targeted treatment to cancer cells and leaving healthy cells undamaged. In this infographic, we explore the key trends for ADCs including the techniques being used by our audience, their bioanalytical challenges and the emerging techniques and trends we'll likely see in future.



Key trends in ADCs

Techniques currently being used by our audience

To assess the whole ADC

To assess the antibody

Ligand binding assays (e.g., ELISA, MSD)

80%

80%

LC-MS/MS

62%

37%

Affinity capture LC-MS/MS

51%

42%

Other

8%

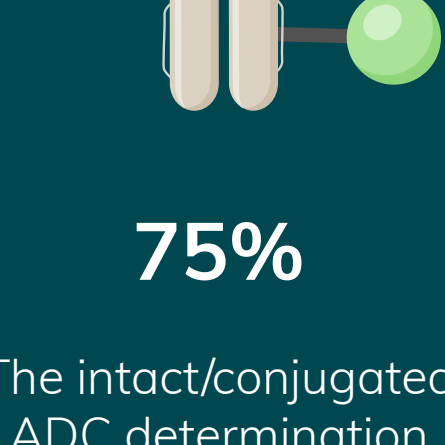
8%

Which of these bioanalytical determinations do you regularly monitor as a primary endpoint?



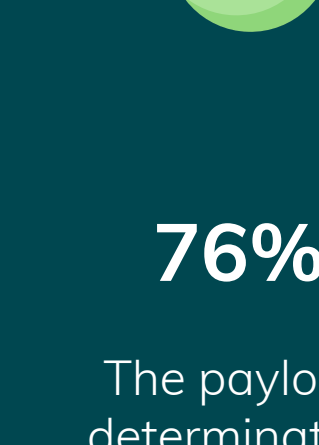
59%

The antibody determination



75%

The intact/conjugated ADC determination



76%

The payload determination

Which PK and ADA assays are usually requested by the project teams or sponsors?

77%

PK

Free payload, total antibody and conjugated (intact) antibody

33%

PK

DAR determination

28%

PK

Metabolites plus (fractions of the) linker

22%

PK

Payload plus (fractions of the) linker

71%

ADA

Immunogenicity against the ADC

38%

ADA

Domain specificity of the immune response against the ADC

Percent (%) of audience

Changes observed in the bioanalytical assessment of ADCs:



61%

A shift in the use of LBA to LC-MS/MS technology for the antibody assessment



41%

A shift in volume i.e., support of more ADC trials



20%

No change observed

Bioanalytical challenges with ADCs

Main challenges in ADC analysis:



41%

ADC stability (e.g., linker cleavage, degradation)



28%

Lack of suitable critical reagents / reference standards



28%

Batch-to-batch variability in ADCs



27%

Requirement of technical expertise



20%

Lack of standardized methods



24%

Heterogeneity characterization



15%

Matrix complexity



6%

Regulatory compliance



15%

High cost

What strategies/technologies do you believe could address the most significant challenges in ADC bioanalysis?

Improved high-res MS instruments
Reduced cytotoxicity
Improved quality of critical reagents
Automation
More uniform ADCs
More learning material in LC-MS/MS

Standardized protocols

Improved functionality assays
Standardized regulatory guidance
More sensitive assays for hybrid-LC-MS measurement

Improved detection methods

Homogeneous linker methods
AI-enabled technologies
Microfluidic technology to decrease sample volume

Faster assays
Linkers that are appropriate for the drug's function
More cost-effective detection methods

17

More robust linkers

11

Stable, cleavable linkers
More stable antibodies

Emerging techniques and future directions

Which emerging techniques/technologies are you most interested in exploring for ADC bioanalysis?

High-resolution MS 66%

Automation and robotics in sample handling 47%

Advanced imaging 30%

Single-molecule sequencing 29%

AI/ML in data analysis and interpretation 29%

How do you anticipate ADC bioanalysis will evolve in the next 5 years?

Improved standardization and regulatory alignment 72%

Enhanced sensitivity of detection methods 51%

Increased use of high-throughput platforms 49%

Broader adoption of AI/ML for data interpretation 38%

Demographics

Geography

54% North America

3% South America

5% Africa

31% Europe

7% Asia

Job function

Researcher / Scientist 71%

Clinician / Surgeon 2%

Engineer 3%

Managing Director / Senior Management 15%

Marketing / Sales 2%

Quality assurance 2%

Student 3%

Other healthcare or medical professional 2%

Sector

Academia 13%

CRO / CDMO 23%

Diagnostics 8%

Government / NGO 2%

Hospital / Clinic 7%

Pharma / Biotech 42%

Private research foundation 3%

Vendor / Manufacturer 2%

This infographic has been created as part of a Bioanalysis Zone feature in association with ICON.