PARTNERSHIP WHITE PAPER – MARKETING MATERIAL
Prepared by **Back Bay Life Science Advisors** with DNB Carnegie

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Strategic and Financing Partner to Global Healthcare

The Multispecific Moment

Trends in biologic drug development

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6 August 2025

Summary – biologic drug development

Bispecific or multi-specific antibodies (collectively referred to in this analysis as msAbs) are rapidly emerging as an area of keen investor and biopharma focus. First-generation approaches approved over a decade ago were hampered by poor pharmacokinetic (PK) and safety concerns, while next-generation approaches, with impressive clinical results and acceptable PK revitalized interest in the space. With 14 FDA-approved msAbs, Hemlibra (emicizumab, factor IXa/X binding, approved for hemophilia A prophylaxis) and Vabsymo (faricimab, VEGF/Ang-2 binding, for wAMD, DME, and ME) have quickly reached blockbuster status. The field continues to churn out commercial products as 2023–2025 saw eight approvals, with Epkinly (epcoritamab, CD20/CD3, R/R DLBCL and R/R follicular lymphoma) and Tecvayli (teclistamab, BCMA/CD3, R/R multiple myeloma) expected to reach blockbuster status by 2030. Recent clinical data with PD-1(L1) x VEGF assets and conditionally active T-cell engagers continue to spur deal-making and company formation.

Clinical development momentum for msAbs is substantial, with nearly 250 assets in clinical trials, and 24 in late-stage registrational studies. Approximately 34% (85 of 247) of these assets are T cell engagers (TCE), in which one half of the targeting moiety is meant to bind to and activate a T cell (through the CD3 cell surface antigen), while the other half, in most cases, is meant to bring the activated T cell in close proximity to the target cells. Indeed, the most common msAb target combo is CD20/CD3, which has already established itself as a commercially successful approach in hematologic malignancies. Within solid tumors, CD3 in combination with CLDN18.2 or EpCAM is the most common TCE in clinical development. Beyond TCEs, dual engagement of immunomodulators (e.g., PD-1/L1 and 4-1BB) and/or well validated tumor targets (e.g., VEGF, HER2, etc.) round out the highly active target space.

In parallel, deal flow within the bispecific space accelerated in the previous 18 months as compared to other modalities. Over the previous five years, there have been 180 bispecific transactions as compared to 192 for antibody drug conjugates (ADCs), 63 for radiopharmaceutical approaches (RPTs), and 62 for targeted protein degraders (TPDs). In 2024 through the first half of 2025, msAb deal flow has outpaced ADCs (62 compared to 46, respectively). While ADCs average higher deal value (USD2.4bn) relative to other modalities (USD1.1bn-USD1.4bn), msAb deals have commanded attractive values, with preclinical deals averaging USD99m in upfront and USD753m in milestones, and clinical-stage deals commanding USD234m–USD484m in upfront payments and USD1.1bn–USD2.8bn in potential milestones.

Summary – biologic drug development
Continued

The majority of deal flow in this space has focused on oncology applications, with over 61% of deals solely focused on anti-cancer approaches. Recently, there has been a noticeable expansion into immunology and inflammation (I&I), driven by promising data from early-stage trials such as systemic lupus erythematosus. In 2024, I&I saw an uptick in volume, comprising 43% of msAb transactions (9 of 21 deals). When assessing the flow of venture capital, this diversification looks likely to continue.

In 2023, there were six private financing events encompassing USD312m of capital for companies developing oncology msAbs compared to four deals at a total of USD37m in capital for I&I-focused companies. In the first half of 2025 there was one oncology financing at USD50m and four I&I deals collecting a total USD319m of venture capital.

Competition remains fierce, as msAbs compete not only within their class but also against alternative therapeutic modalities such as ADCs and CAR-T therapies. Manufacturing and formulation stability challenges add complexity to their development and commercialization. Nevertheless, msAbs' ability to address unmet clinical needs with potentially improved safety profiles compared to more complex cell-based therapies positions them as attractive assets, ensuring continued robust investment and development activity.

At a glance – Biologic drug development

Multispecific antibodies (msAbs) are entering an age of innovation and commercial validation, with next-gen platforms and clinical data driving both deal activity and investor confidence

- Fourteen FDA-approved msAbs today; eight of which cleared since 2023
- Two products (Hemlibra, Vabysmo) have already reached >USD1bn annually and set the precedent that non-oncology indications can achieve blockbuster scale
- Seven oncology assets (Imdelltra, Columvi, Epkinly, Lunsumio, Tecvayli, Rybrevant, Blincyto) look set to achieve blockbuster status by 2030
- Nearly 250 msAbs are in clinical trials, including 24 in late-stage registrational studies, showcasing robust industry commitment and a steady flow of new candidates

Deal velocity eclipsing every modality except ADCs, and catching up fast

- 180 msAb BD transactions in five and a half years versus 192 for ADCs; 62 versus 46 in 2024–H1 2025 alone
- Upfront economics trending higher and approaching ADC territory: pre-clinical deals ~USD100m cash / ~USD750m milestones; clinical-stage USD234m–USD484m upfront, with up to USD2.8bn on the back-end
- There is significant interest in early-stage transactions, with 70% of msAb transactions at discovery or preclinical stages

Diversification into I&I is set to accelerate, supported by clinical success and capital flows, positioning msAbs as a foundational pillar in future immunology and oncology therapeutics

- Historically 60%+ of deals were oncology-only, but I&I represented 43% of 2024 msAb transactions (9/21 deals)
- Venture swing: H1 2025 saw USD319m raised across four I&I-focused private rounds versus USD50m for oncology – an inversion of 2023's split

Bispecific antibodies versus other emerging modalities

Bispecific antibodies are emerging in a competitive marketplace alongside antibody-drug conjugates, radiopharmaceuticals, and targeted protein degraders

Multispecific Antibodies

- Bi- or multispecific antibodies (msAbs) are engineered to have two or more binding domains for dual binding of different epitopes or antigens
- The mechanism of action for msAbs can be combinatorial, where two or more antibodies targeting independent mechanism are combined within one, or obligate, where the mechanism depends on either simultaneous or sequential binding of the targets to exert the therapeutic effect
- Common msAb approaches include T-cell engagers (TCEs), checkpoint inhibitors (CPIs), signal inhibition, and innate cell engagers (ICEs)
- The majority of historical development has been focused on oncology, however, there is increasing development in ex-oncology applications including I&I and neurodegeneration
- Toxicities commonly associated with msAbs are infections, off-tumor toxicities, cytokine release syndrome, neurotoxicity, and tumor lysis syndrome

Antibody Drug Conjugate

- Antibody drug conjugates (ADCs) consist of a targeted therapy (monoclonal antibody) conjugated to a cytotoxic drug, which offer a more precise alternative to cytotoxic treatments
- Despite the enhanced selectivity of the targeting mechanism, safety concerns persist with ADCs due to off-target cytotoxicity
- In addition to safety concerns, the modality features manufacturing challenges that further complicate development such as variability in drug-antibody ratios and poor linker stability
- See Back Bay's prior analysis of the ADC transactional landscape here

Radiopharmaceuticals

- Radiopharmaceuticals (RPTs) are drugs that link radioactive isotopes to targeting moieties, and differ fundamentally due to their reliance on radiation for therapeutic effect
- Beyond therapeutics, RPTs are also used in imaging and diagnostics, where the radioactive component selectively accumulates in the organ of interest
- RPTs face manufacturing and supply chain challenges, as well as toxicity concerns, and therefore there is a need for drugs with improved safety, stability, and with applicability to a broader range of tumor types
- See Back Bay's prior radiopharmaceutical white paper here

Targeted Protein Degraders

- Targeted protein degraders (TPDs) remove disease-associated proteins, often by leveraging the ubiquitin-proteasome system (UPS)
- This class of drugs includes proteolysis targeting chimeras (PROTACs), molecular glues, degrader antibody conjugates (DACs), lysosome-targeting chimeras (LYTACs), and ligand-directed degraders (LDDs), and offers the potential to target previously "undruggable" proteins
- The technology remains nascent, although key assets are expected to be approved in the coming year (e.g., Arvinas' vepdegestrant)
- See our analysis on dealmaking in the TPD space here

Sources: Klein et al, 2024. *Nat Rev Drug Discov*, 23(4):301-319., AstraZeneca – Bispecific Antibody, JMP – SMMT Initiating Coverage Nov 2024, StatPearls – Bispecific Antibody Toxicity

Bispecific antibodies overview

Originally approved in 2014, the class continues to gain momentum with a flurry of approvals in the last three years

Technology Overview

- As of publication, 15 bispecific antibodies have received FDA approval, with 13 indicated for oncology
- No trispecifics or higher-order multispecifics have been approved to date
- Bispecifics targeting CD20/CD3 in hematologic malignancies represent a notable share of the current landscape
- Recent approvals include Regeneron's Lynozyfic and Pfizer's Elrexfio for relapsed/refractory multiple myeloma, Merus' Bizengri for non-small cell lung cancer, and Jazz Pharmaceuticals' Ziihera for HER2-positive biliary tract cancer
- Although oncology remains the primary area of focus, the development of multispecific antibodies is steadily expanding into other therapeutic domains, with inflammation and immunology (I&I) emerging as a particularly promising frontier

Approved Bispecific Antibodies in the US

Asset	Company	Approval	Lead Indication	Targets
Lynozyfic	REGENERON	2025	Adults with R/R MM who have received ≥4L of tx including a PI, IMiD, and anti-CD38 mAb	BCMA/CD3
Bizengri zenocutuzumab-zbco	Merus	2024	Adults with advanced, unresectable or metastatic NSCLC harboring a NRG1 gene fusion	HER2/ HER3
ZIIHERA (zanidatamab-hrii)	Jazz Pharmaceuticals	2024	Adults with previously treated, unresectable, or metastatic HER2+ BTC	HER2/ HER2
IMDELLTRA (tarlatamab-dlle)	AMGEN	2024	Adults with ES-SCLC with disease progression on or after platinum-based chemotx	DLL3/CD3
ELREXFIO (elranatamab-bcmm)	Pfizer	2023	Adults with R/R MM who have received ≥4L of tx including a proteasome inhibitor, an immunomodulatory agent, and an anti-CD38 mAb	BCMA/CD3
TALVEY (talquetamab-tgvs)	janssen	2023	Adults with R/R MM who have received ≥4L of tx including a proteasome inhibitor, an immunomodulatory agent, and an anti-CD38 mAb	GPRC5D/ CD3
COLUMVI (glofitamab-gxbm)	Roche	2023	Adults with R/R DLBCL NOS or LBCL arising from follicular lymphoma, after ≥2L of systemic tx	CD20/CD3
epkinly (epcoritamab-bysp)	abbvie Genmab	2023	Adults with R/R DLBCL NOS including DLBCL arising from indolent lymphoma and high-grade B-cell lymphoma, and R/R follicular lymphoma, after ≥2L of systemic tx	CD20/CD3
Lunsumio (mosunetuzumab-axgb)	Roche	2022	Adults with R/R follicular lymphoma after ≥2L of systemic tx	CD20/CD3
TECVAYLI (teclistamab-cqyv)	janssen	2022	Adults with R/R MM who have received ≥4L of tx including a proteasome inhibitor, an immunomodulatory agent, and an anti-CD38 mAb	BCMA/CD3
VABYSMO (faricimab-svoa injection 6 mg)	Roche	2022	Neovascular wAMD, DME, and macular edema following RVO	ANG2/ VEGF
KIMMTRAK (tebentafusp)	IMMUNOCORE	2022	HLA-A*02:01-positive adults with unresectable or metastatic uveal melanoma	gp100-HLA/ CD3
RYBREVANT (amivantamab-vmjw)	janssen	2021	Adults with locally advanced or metastatic NSCLC with EGFR exon 20 insertion mutations with disease progression on or after platinum-based chemotx	EGFR/MET
HEMLIBRA (emicizumab-kxwh)	Roche	2017	Routine prophylaxis to prevent or reduce the frequency of bleeding episodes in adults and pediatrics with hemophilia A with factor VIII inhibitors	factor IXa/ factor X
BLINCYTO (blinatumomab)	AMGEN	2014	Adults and pediatrics one month and older with CD19+ B-cell precursor ALL in 1st or 2nd complete remission with MRD ≥0.1%, R/R CD19+ B-cell precursor ALL, or CD19+ Philadelphia chromosome- B-cell precursor ALL in the consolidation phase of chemotx	CD19/CD3

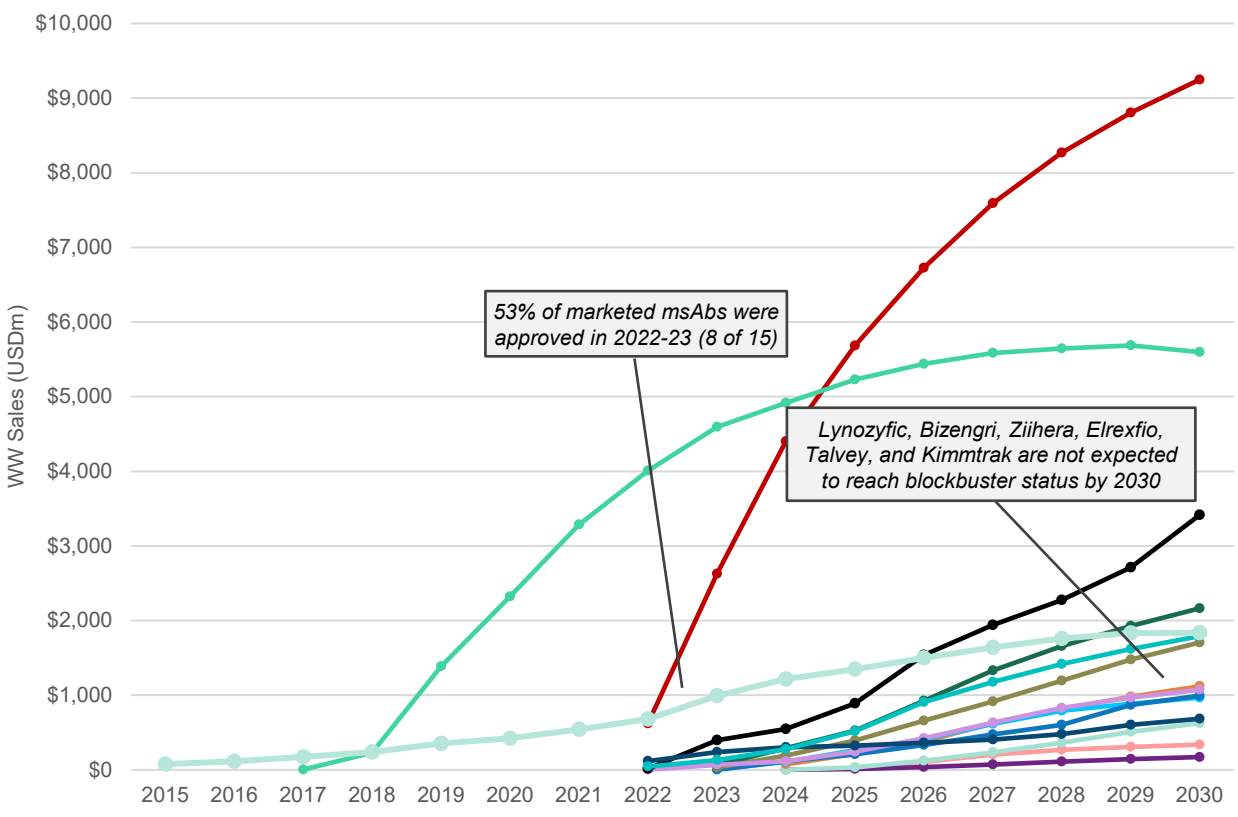
ALL: Acute lymphoblastic leukemia, Ang-2: angiopoietin-2, BTC: biliary tract cancer, chemotx: chemotherapy, DLBCL: diffuse large B-cell lymphoma, DLL3: delta-like ligand 3, DME: diabetic macular edema, ES-SCLC: extensive stage small cell lung cancer, HER2: human epidermal growth factor receptor 2, HER3: human epidermal growth factor receptor 3, LBCL: large B-cell lymphoma, mAb: monoclonal antibody, MG: myasthenia gravis, MM: multiple myeloma, MRD: minimal residual disease, NOS: not otherwise specified, NRG1: neuregulin 1, NSCLC: non-small cell lung cancer, R/R: relapsed or refractory, RVO: retinal vein occlusion, SLE: systemic lupus erythematosus, tx: therapy, VEGF: vascular endothelial growth factor, wAMD: wet age-related macular degeneration

Sources: Biomedtracker, Evaluate, FDA drug labels

Bispecific antibodies commercial landscape

The bispecific antibody market is growing rapidly, with multiple assets already achieving or poised to achieve blockbuster status

WW Sales of Approved msAb Drugs, Actual & Consensus Forecast (USDm)



Asset	Sponsor	Indications	Est 2030 sales (USDm)
Lynozyfic	Regeneron	R/R MM	USD338
Bizengri	Merus	NRG1 gene fusion NSCLC	USD172
Ziihera	Jazz Pharma	HER2+ BTC	USD626
Imdelltra	Amgen	ES-SCLC	USD1,120
Elrexfio	Pfizer	R/R MM	USD968
Talvey	Janssen	R/R MM	USD994
Columvi	Roche	R/R DLBCL NOS or LBCL from FL	USD1,706
Epkinly	Abbvie/ Genmab	R/R DLBCL NOS and R/R FL	USD2,164
Lunsumio	Roche	R/R FL	USD1,073
Tecvayli	Janssen	R/R MM	USD3,415
Vabysmo	Roche	wAMD, DME, and macular edema	USD9,248
Kimmtrak	Immunocore	HLA-A*02:01+ uveal melanoma	USD685
Rybrevant	Janssen	NSCLC w/ EGFR exon 20 insertion mutations	USD1,791
Hemlibra	Roche	Hemophilia A with factor VIII inhibitors	USD5,598
Blincyto	Amgen	ALL	USD1,837

ALL: Acute lymphoblastic leukemia, BTC: biliary tract cancer, DLBCL: diffuse large B-cell lymphoma, DME: diabetic macular edema, ES-SCLC: extensive stage small cell lung cancer, EGFR: epidermal growth factor receptor, FL: follicular lymphoma, HER2: human epidermal growth factor receptor 2, LBCL: large B-cell lymphoma, MG: myasthenia gravis, MM: multiple myeloma, NOS: not otherwise specified, NSCLC: non-small cell lung cancer, R/R: relapsed or refractory, RVO: retinal vein occlusion, SLE: systemic lupus erythematosus, wAMD: wet age-related macular degeneration

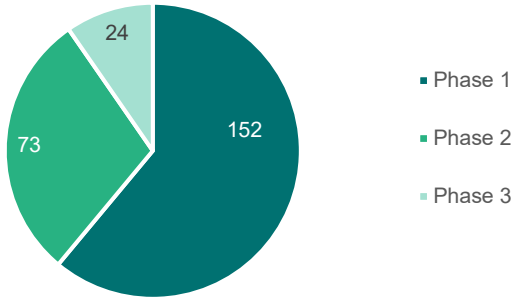
Sources: Evaluate, FDA drug labels

Bispecific antibodies clinical pipeline

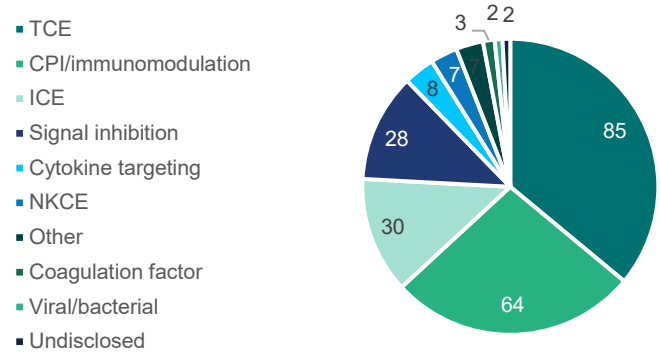
- Over 200 multispecific antibody assets are currently in clinical development, with approximately 80% focused on oncology

Bispecific Antibody Clinical Pipeline – Individual Assets (Phase 1 to Phase 3) – as of January 2025

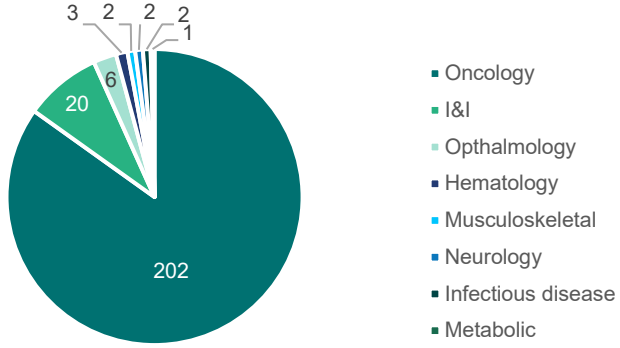
of Assets by Highest Phase of Development



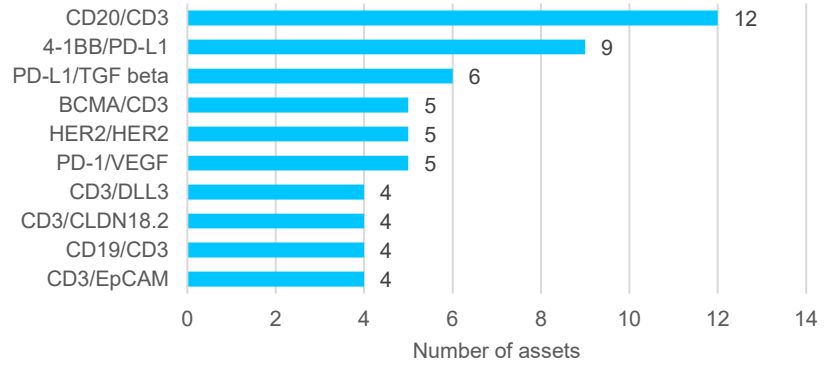
Assets by Mode of Action



Assets by Therapeutic Area



Assets by Drug Target (≥4 assets per target)



Source: Evaluate, company websites and press releases

EGFR: epidermal growth factor receptor, mCRPC: metastatic castration-resistant prostate cancer, NSCLC: non-small cell lung cancer, PSMA: prostate-specific membrane antigen, SLE: systemic lupus erythematosus, VEGF: vascular endothelial growth factor

Near-term clinical readouts

- A number of upcoming clinical readouts are expected to springboard new msAb approaches into the clinic, such as multi-checkpoint approaches, and validate novel msAb modalities and TAs

Key Pipeline Readouts

Asset	Company	Targets	Trial & Phase	Patient population	Anticipated Data	Comments
Ivonescimab	Akesobio / Summit therapeutics	PD-1/VEGF	HARMONi-3 Phase 3 Study	1L treatment of metastatic NSCLC patients	Readout date not publicly disclosed – trial primary completion in Dec 2027	▪ Demonstrated a clinically meaningful benefit over Keytruda (pembrolizumab) in a China-only Phase 3 NSCLC trial, and therefore the global HARMONi-3 study readout is highly anticipated
Tibulizumab	zurabio / Lilly	BAFF/IL-17A	TibuSHIELD Phase 2 Study	Hidradenitis suppurativa	Topline results expected in Q3 2026	▪ Tetravalent bispecific cytokine targeting antibody, with potential for more robust immune modulation relative to approved agents
GEN1286	Genmab	EGFR/c-MET ADC	GCT1286-01 Phase 1/2 Study	Advanced solid tumors	Readout date not publicly disclosed – trial primary completion in May 2028	▪ Keen interest in developing multiple specific ADCs with the with the promise of simultaneously blocking several signaling pathways and enhancing tumor specificity for payload delivery ▪ Multiple late-stage China-originated bsADCs in development (e.g., Jiangsu Alphamab, Biotheus/Biontech) ▪ Originally developed by ProfoundBio, now acquired by Genmab
JANX007	Janux	CD3/PSMA	ENGAGER-PSMA-01 Phase 1 Study	Metastatic CRPC	Additional data from trial expected in H2 2025	▪ Marks the advent of a new msAb modality, masked TCEs, in the clinic, offering the potential for enhanced safety and increased targeting precision
JANX008		CD3/EGFR	EGFR-008-001 Phase 1 Study	Advanced or metastatic solid tumor malignancies	Additional data from trial expected in H2:2025	
CLN-978	cullinan THERAPEUTICS	CD19/CD3	CLN-978-SL-101 Phase 1b Study	Moderate-to-severe SLE	Initial data from Phase 1b trial in SLE expected in Q4 2025	▪ Denotes the entry of TCEs for B-cell-driven autoimmune disease in the clinic, with near-term readout in SLE
ISB 2001	IGI	BCMA/CD3/ CD38	TRIgnite-1 Phase 1 Study	Relapsed/refractory multiple myeloma that have been treated with IMiDs, proteasome inhibitors, and anti-CD38 therapies	Readout date not publicly disclosed – trial primary completion in Jul 2027	▪ Notable trispecific that has entered the clinic and recently secured a licensing agreement with AbbVie that includes a USD700m upfront payment and over USD1bn in committed milestone payments

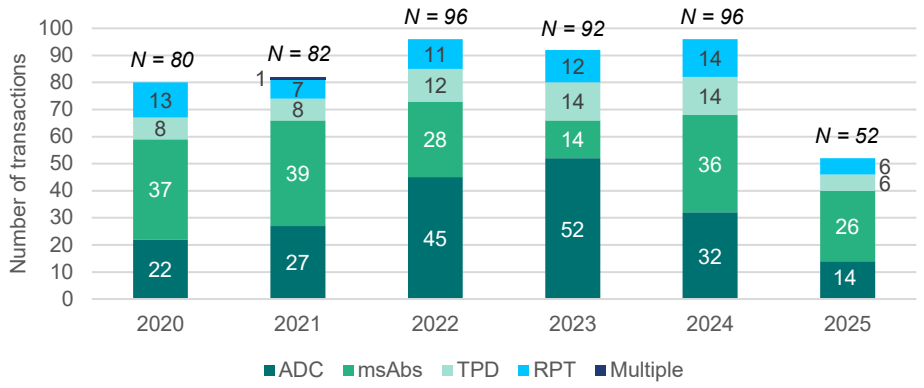
Source: Evaluate, company websites and press releases

BAFF: B lymphocyte activating factor of the tumor necrosis factor family, EGFR: epidermal growth factor receptor, c-MET: tyrosine kinase receptor for the hepatocyte growth factor, CRPC: castration-resistant prostate cancer, IMiDs: immunomodulatory drugs, NSCLC: non-small cell lung cancer, PSMA: prostate-specific membrane antigen, SLE: systemic lupus erythematosus, Top1: topoisomerase 1, VEGF: vascular endothelial growth factor

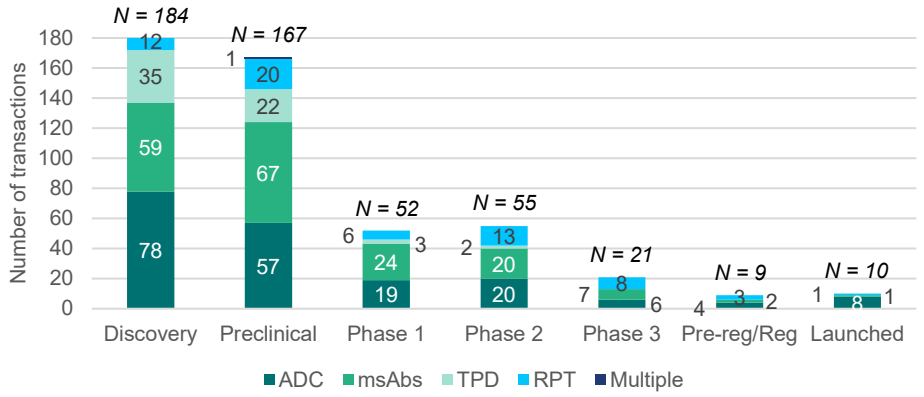
M&A, licensing, and partnering activity across emerging modalities

Strategics continue to access advanced biologic modalities through licensing and M&A at the earliest stages of development, with msAbs garnering the most interest in the previous 18 months

Emerging Modality Transactions by Year (Jan 2020 to Jun 2025)



Emerging Modality Transactions by Phase (Jan 2020 to Jun 2025)



Key Takeaways

- We identified 180 msAb, 192 ADC, 62 TPD, 63 RPT deals, which primarily occur at the discovery and preclinical stages
  - As is common for novel technologies, consolidators have been eager to access the platform capabilities of pre-clinical stage companies to develop novel therapies against targets of their strategic interest
  - So far in 2025, preclinical deals account for 75% of transactions, up from a 70% five-year average
- Overall, ADCs have the highest aggregate transaction volume in the dataset (~40% of relevant deals)
- However, msAb activity recently outpaced ADCs in 2024 and 2025 to date (38% versus 33% of deals in 2024 and 50% versus 27% in H1 2025), potentially driven by a number of high-profile data read-outs:
  - Summit's ivonescimab demonstrated a clinically meaningful benefit over Keytruda (pembrolizumab) in a China-only Phase 3 NSCLC trial (n=398, NCT05499390) with a median PFS of 11.14 versus 5.82 months and comparable safety – the global read-out of ivonescimab, the HARMONi-3 study, is highly anticipated (n=1080, NCT05899608)
  - Janux Therapeutics' masked TCEs, JANX007 and JANX008, reported promising early clinical data with potential best-in-class efficacy in mCRPC and low levels of cytokine release syndrome (CRS), which is an adverse event commonly associated with TCEs (NCT05519449 and NCT05783622)
  - CytomX's masked TCE, CX-904, also reported favorable preliminary efficacy and low CRS levels in advanced solid tumors (NCT05387265)
  - The decline in bispecific activity during 2022 and 2023 was likely influenced by the emergence of catalysts promoting other modalities within the field, whereas bispecifics generated more excitement in 2024
- RPT and TPD transaction activity has remained relatively constant in the past five years, each ranging between 7 and 14 transactions per year

mCRPC: advanced or metastatic castration-resistant prostate cancer, NSCLC: non-small cell lung cancer, TCE: t-cell engager
Source: Cortellis, Biomedtracker, clinicaltrials.gov, company websites and press releases

Transaction activity by technology type across emerging modalities

Asset-only transactions are most common across emerging modalities, although 'Asset + Platform' transactions command higher deal value

Emerging Modality Transactions by Technology Type and Phase (Jan 2020 to Jun 2025)

Modality	Discovery	Preclinical	Phase 1	Phase 2	Phase 3	Pre-Reg/Reg	Launched
Asset	**16**	**108**	**35**	**47**	**17**	**8**	**7**
ADC	11	35	13	15	6	3	6
msAbs	4	52	17	19	6	2	1
RPT	1	13	4	11	5	3	0
TPD	0	8	1	2	0	0	0
Platform	**135**	**20**	**1**	**1**	**0**	**0**	**0**
ADC	52	5	0	1	0	0	0
msAbs	43	3	0	0	0	0	0
RPT	7	1	0	0	0	0	0
TPD	33	10	1	0	0	0	0
Multiple	0	1	0	0	0	0	0
Asset + Platform	**33**	**39**	**16**	**7**	**4**	**1**	**3**
ADC	15	17	6	4	0	1	2
msAbs	12	12	7	1	1	0	0
RPT	4	6	2	2	3	0	1
TPD	2	4	1	0	0	0	0

Transaction Volume 0 130

Key takeaways

- Asset-only transactions are most prevalent across modalities, except for TPDs, where platform-only deals are more prevalent
- Platform-only deals typically involve target discovery or modality-specific engineering platforms and are therefore largely confined to discovery and preclinical stages of development
- Asset + platform deals are the least common in the dataset, however their occurrence is largely modality-driven, with collaborators exploring the integration of existing antibody with modality-specific engineering platforms, or M&A-driven where strategics are acquiring assets alongside a platform
- Average deal value is similar for asset- or platform-only deals (USD1.3bn versus USD1.2bn), although a larger portion is paid upfront with asset-based deals (16% versus 3%)
- Asset + Platform deals have high average upfront and total deal value (USD3.5bn total with 73% paid upfront) relative to asset- or platform-only, although the data is skewed by several large full company acquisitions

Source: Cortellis, company websites and press releases

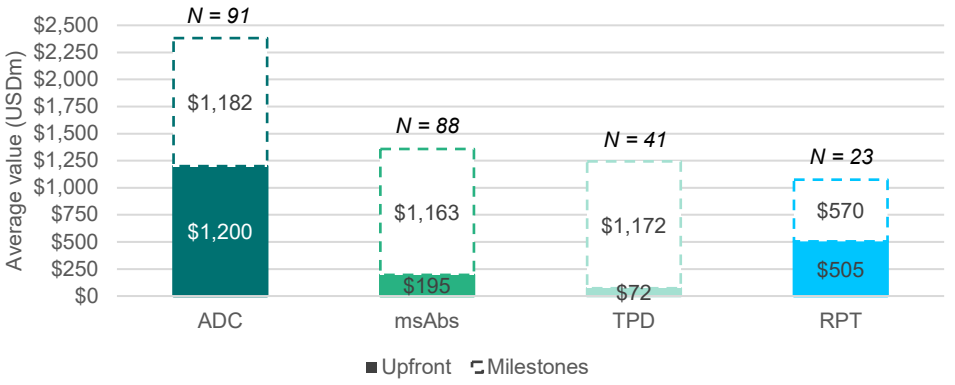
Transaction activity comparison across emerging modalities

ADCs command the highest deal value driven by a number of M&As, and remain largely oncology-focused, while the therapeutic area focus of msAbs are more diversified, expanding in neurology and I&I

Key Takeaways

- ADCs average higher deal value (USD2.4bn) relative to other emerging modalities (USD1.1bn–USD1.4bn), however the data is skewed by the same large full company acquisitions from the Asset + Platform deals
  - That is Pfizer's acquisition of Seagen for USD43bn, Gilead's acquisition of Immunomedics for USD21bn, and AbbVie's acquisition of ImmunoGen for USD10bn
- RPTs have the lowest average deal value although upfront payments are high relative to msAbs and TPDs
- ADCs and RPTs are largely confined to oncology, with minimal presence in other therapeutic areas, whereas TPDs and msAbs are more diversified
  - TPDs activity outside of oncology is most common in neurology, while msAbs are active within I&I

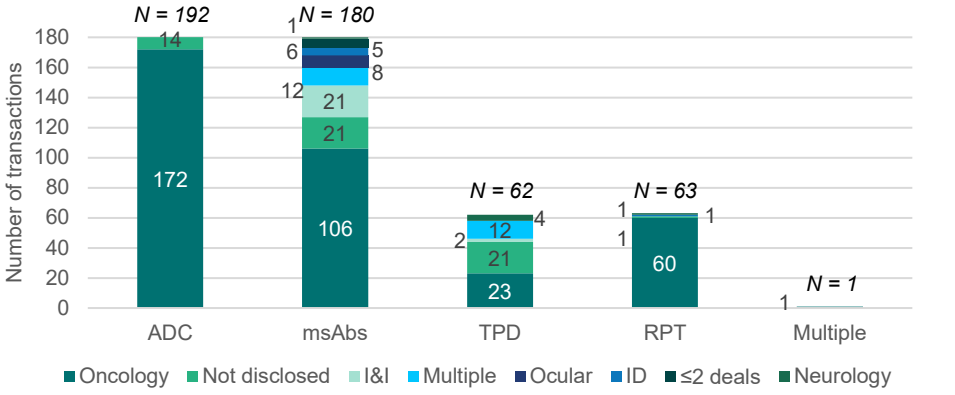
Emerging Modality Disclosed Transactions by Value (Jan 2020 to Jun 2025)



Therapeutic Targets Across Emerging Modality Transactions (≥1 deals across ≥3 featured modalities, Jan 2020 to Jun 2025)

Target	ADC Deals	msAb Deals	TPD Deals	RPT Deals	TOTAL
HER2	9	11	-	1	21
PSMA	2	2	-	10	14
EGFR	2	9	2	1	14
Trop-2	10	2	-	1	13
HER3	5	5	-	1	11
C-Met	3	1	1	1	6
PTK7	1	1	-	1	3

Emerging Modality Transactions by Therapeutic Area (Jan 2020 to Jun 2025)

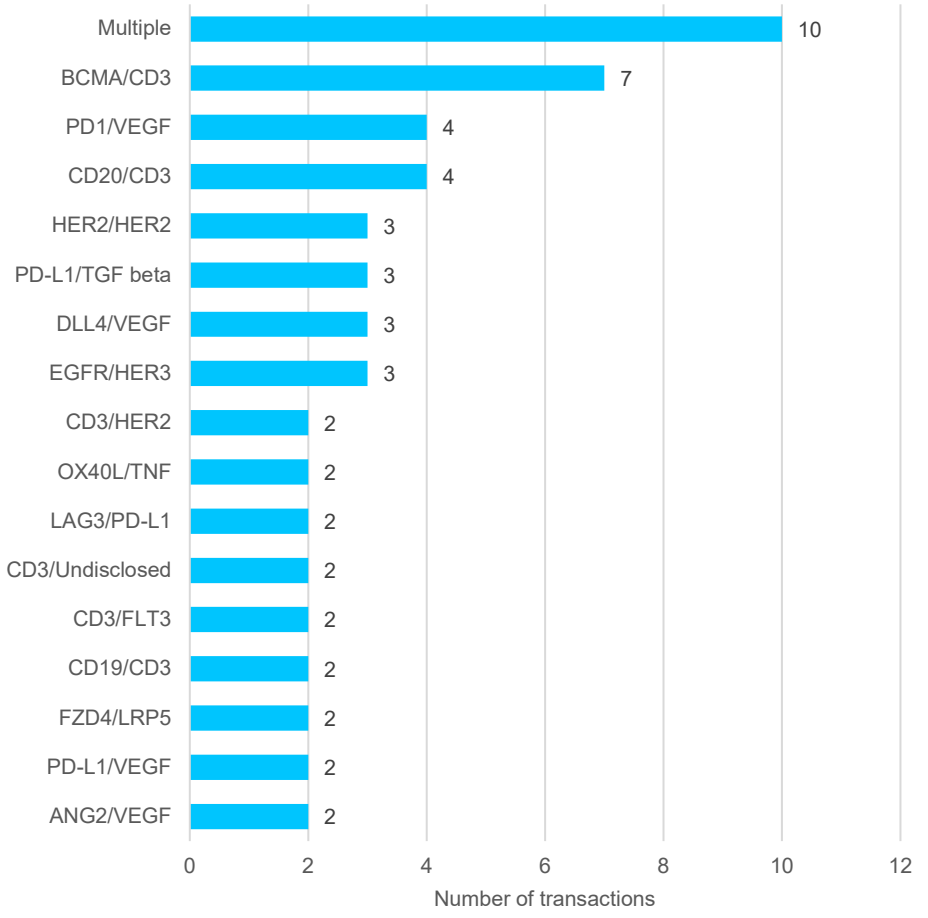


Source: Cortellis, company websites and press releases

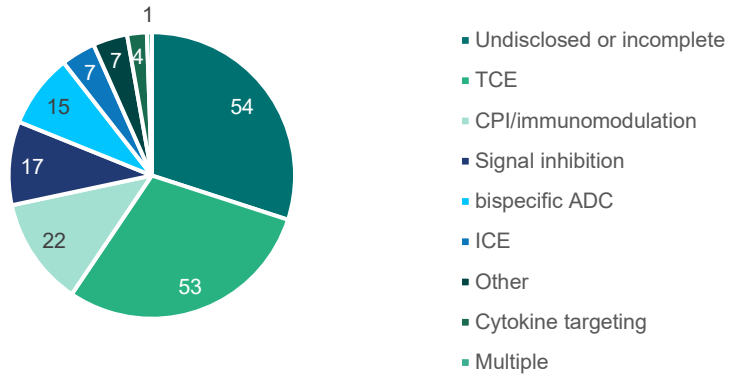
Bispecific antibodies transaction activity by mechanism

TCE technologies have been the majority focus of msAbs transactions, while bispecific ADCs are gaining momentum

msAbs Transactions by Disclosed Targets (≥2 transactions per target, Jan 2020 to Jun 2025)



msAbs Transactions by Mode of Action (Jan 2020 to Jun 2025)



Key Takeaways

- TCEs are most prevalent in our dataset, followed by CPI/immunomodulation, although activity in the latter has declined since 2022
- Interest in TCE and bispecific ADC technologies has increased, with a rise in partnering and M&A activity beginning in 2024
- Key participants in the TCE space include Candid Therapeutics (4 deals), Johnson & Johnson (4 deals), Context Therapeutics (3 deals), Hemogenyx Pharma (2 deals), AstraZeneca (2 deals), and AbbVie (2 deals)
- Avenzo Therapeutics has demonstrated repeat interest in the bispecific ADC space (2 deals) and AffaMed Therapeutics in the signal inhibition space (2 deals)
- Bispecific ADC deals have the highest relative deal value among msAbs, with a total disclosed value of USD2.1bn and 11% paid upfront (n=6), compared to an average of USD1.4bn total value and 14% upfront across the broader msAbs dataset (n=88)
- Disclosed deals involving signal inhibition and cytokine targeting have lower overall deal values, totaling USD557m (n=8) and USD647m (n=3), respectively

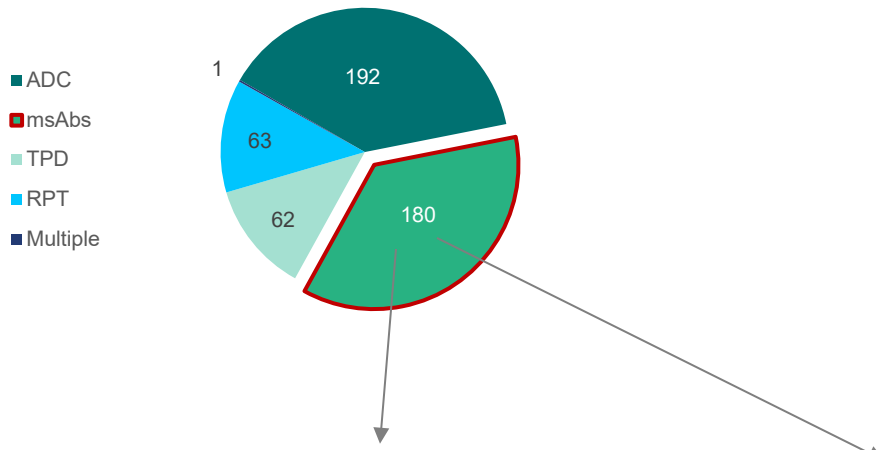
Notes: 'Multiple' captures transactions that feature several assets with different therapeutic targets; 'Other' mode of action classification includes assets without clear classification or n=1 in our dataset (e.g., SNCA/IGF1R, FAZD4/LRP5, FVIIA/TLT-1, IL-31/IL-4Rα, CD32B/CD79B)

Source: Cortellis, company websites and press releases

Bispecific antibodies M&A, licensing, and partnering activity

Multispecific antibody technologies receive higher upfront payments as they advance through clinical stages, with notable value increases in global agreements

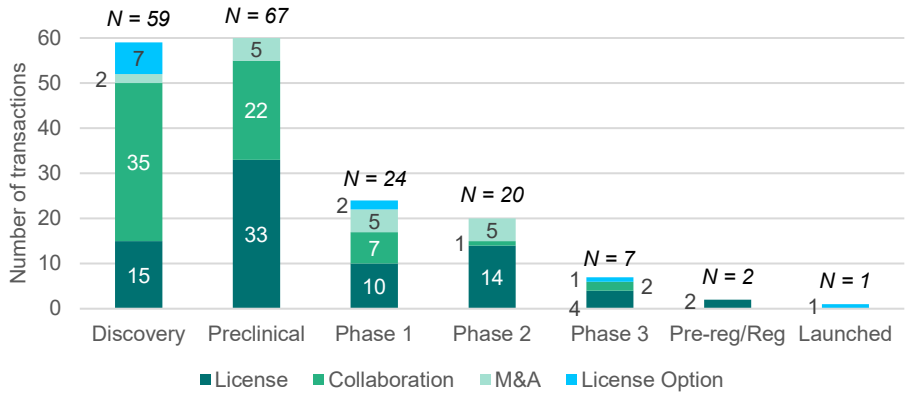
Transactions by Emerging Modality (Jan 2020 to Jun 2025)



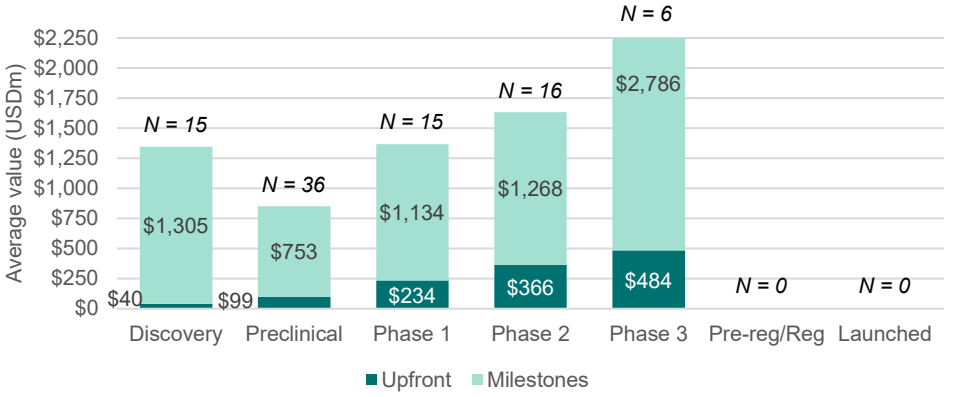
Key Takeaways

- Preclinical transactions are most frequent for msAbs, with deal volume declining through later clinical stages
- Licensing deals and collaborations account for 43% and 37% of the transactions, respectively, while M&A represents only 9%
- Upfront deal value increases as assets progress through clinical development, although the total deal value varies
  - The BMS-SystImmune collaboration skews the Phase 2 average deal value due to its large size (USD800m upfront and USD7.6bn milestones) – the average drops to USD224m upfront and USD443m in milestones by excluding the deal
- Global deals command a deal value premium from preclinical to Phase 3 – excluding regional deals – raising the total deal value average by 10% in preclinical, 7% in Phase 1, 62% in Phase 2, and 46% in Phase 3

msAbs Transactions by Stage and Deal Type (Jan 2020 to Jun 2025)



msAbs Disclosed Transactions by Stage and Value (Jan 2020 to Jun 2025)

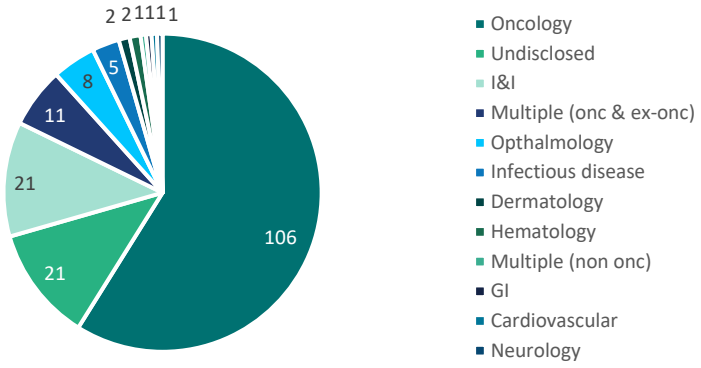


Source: Cortellis, company websites and press releases

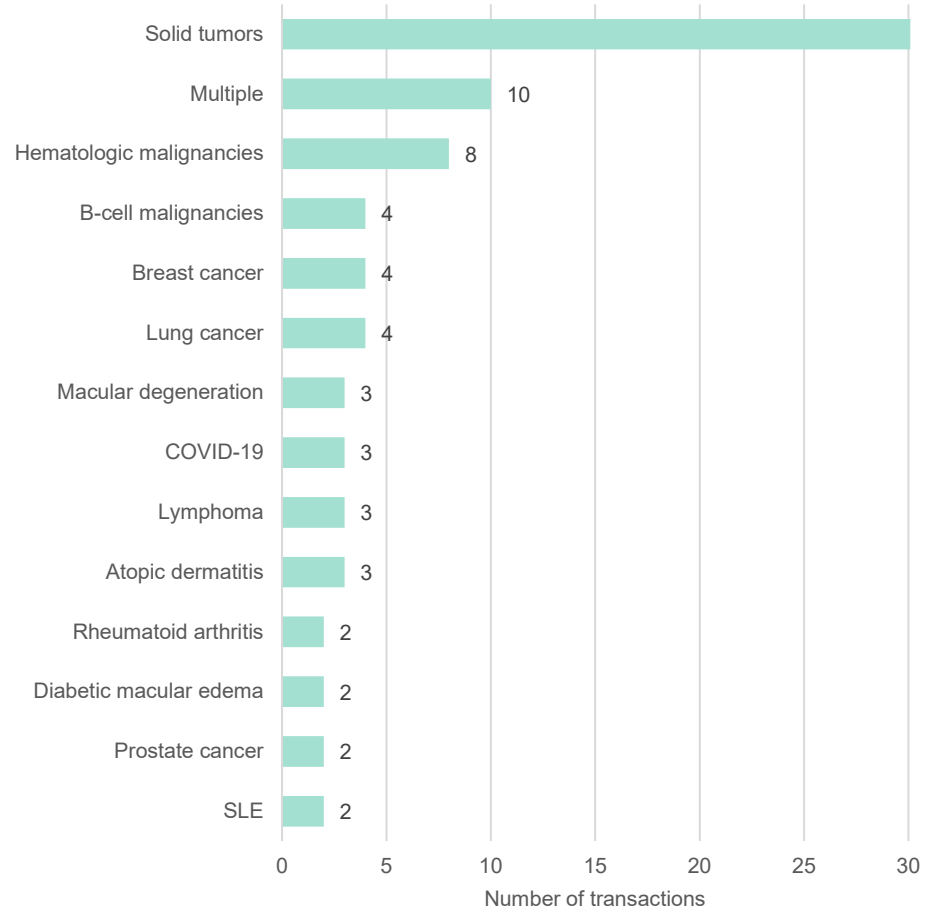
Bispecific antibodies transaction activity by therapeutic area

Oncology-focused assets are the most common msAb transactions, however I&I is gaining traction in terms of volume and garnering higher relative upfront payments

msAbs Transactions by Therapeutic Area (Jan 2020 to Jun 2025)



msAbs Transactions by Disclosed Indication (≥2 transactions per indication, Jan 2020 to Jun 2025)



Key Takeaways

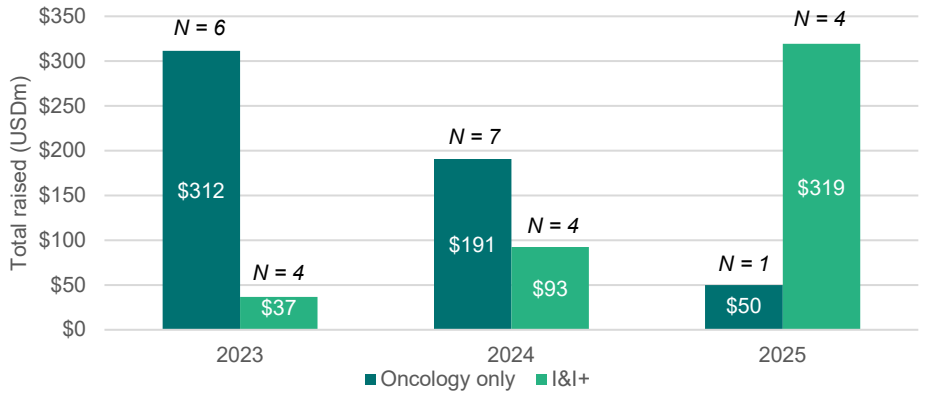
- Oncology dominates the msAbs transactional landscape, representing 65% of all deals over the past five years
- Disclosed oncology deals average USD1.5bn in total value (n=58), which is slightly above the msAbs aggregate average of USD1.4bn (n=88)
- I&I saw an uptick in 2024, with volume making up 43% of I&I transactions over the past five years (9 of 21 deals) – a broader theme across the biotech industry (see appendix)
  - TCE momentum in B-cell driven autoimmune diseases is driving this trend, including Cullinan Therapeutics' CD19/CD3 bispecific (CLN-978) in Phase 1 for SLE, with a planned readout by year-end
  - Despite increased deal activity, average total deal size remains lower at USD668m, although relative upfront payments are notably higher (37% versus 15% across the dataset)
  - Key participants investing in I&I msAbs are Candid Therapeutics (3 deals) and Johnson & Johnson Pharma (2 deals)

Source: Cortellis, company websites and press releases

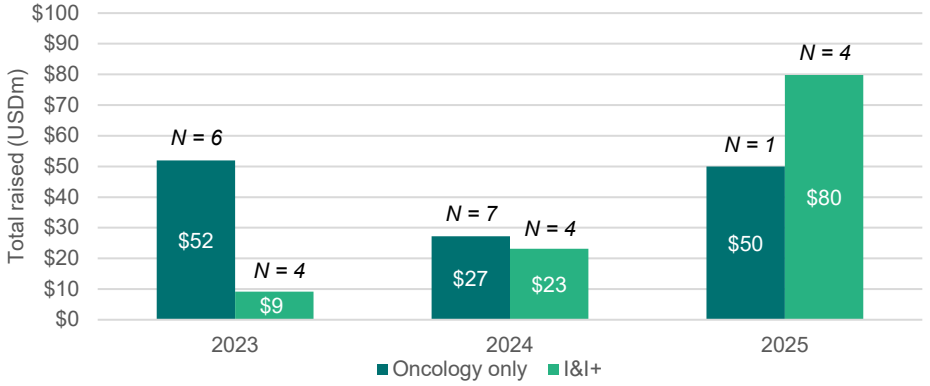
Bispecific antibodies venture financing activity by therapeutic area

Over the past three years, both average and total financing for I&I msAbs have risen, with a substantial uptick in H1 2025 activity

msAbs Aggregate Venture Financings by Therapeutic Area (oncology and I&I only, Jan 2023 to Jun 2025)



msAbs Average Venture Financings by Therapeutic Area (oncology and I&I only, Jan 2023 to Jun 2025)



Notable I&I+ Venture Financings in 2024–2025

Company	Technology	Phase	Raise	Key Investors
Reverb Therapeutics	Cytokine targeting bispecific (IL-15 / PD-1)	Preclinical	Seed round: USD12m	Amplitude Ventures KdT Ventures Finchley Healthcare Ventures Seido Capital
Bambusa Therapeutics	Undisclosed I&I-focused msAbs	Preclinical	Series A: USD90m Seed round: ~USD14m	RA Capital Management Janus Henderson Investors Redmile Group Invus ADAR1 Capital Management
Commit Biologics	Bispecific complement (C1q) engager	Preclinical	Seed round: ~USD22m	Novo Holdings Bioqube Ventures
NUMAB	Trispecific antibody targeting 4-1BB / CD137 / PD-L1	Phase 1	Series C: ~USD195m	Cormorant Asset Management Forbion HBM Healthcare Investment Novo Holdings

Aggregate and average deal sizes for I&I have significantly increased from 2023 to 2025, with Q1 2025 seeing less interest in oncology-only multispecific deals; meanwhile, the volume of deals involving I&I remains steady, and H2 2025 onwards could see higher volumes due to growing interest in the field

Source: Pitchbook, company websites and press releases

Key emerging therapeutic areas for bispecific antibodies

I&I is an emerging area of growth for bispecific antibodies based on recent transaction volume and interest from large pharma companies

Ex-Oncology msAbs Therapeutic Areas

Therapeutic Area	Transaction Volume	Avg Deal Value (USDm, disclosed deals)	Select Active Partners	Clinical Pipeline Volume	Select Active Companies	Key Indications
I&I	Discovery: 4 Preclinical: 10 Phase 1: 5 Phase 2: 2	Discovery: USD210 (0% upfront, n=1) Preclinical: USD1,160 (13% upfront, n=10) Phase 1: USD894 (29% upfront, n=5) Phase 2: USD514 (30% upfront, n=2)	Johnson & Johnson Innovative Medicine MERCK CandiD Therapeutics	Phase 1: 11 Phase 2: 6 Phase 3: 3	Novartis Cullinan Therapeutics AstraZeneca	Atopic dermatitis, rheumatoid arthritis, PsA, SLE, asthma, and MG
Ophthalmology	Preclinical: 7 Phase 2: 1	Preclinical: USD599 (2% upfront, n=2) Phase 2: USD3,000 (43% upfront, n=1)	AffaMed Therapeutics MERCK	Phase 1: 4 Phase 2: 1 Phase 3: 1	Innovent	DME and wAMD
Infectious Disease	Discovery: 3 Preclinical: 1 Phase 1: 1	No disclosed deals	ModeX Therapeutics ImmunoPrecise KEDRION BIOPHARMA	Phase 1: 2	OPKO AstraZeneca	COVID-19 and HIV infection
Hematology	Discovery: 1 Preclinical: 1	No disclosed deals	novo nordisk HEMOB	Phase 2: 2 Phase 3: 1	CHUGAI	Hemophilia A and other clotting indications
Neurology	Preclinical: 1	Preclinical: USD1,060 (7% upfront, n=1)	sanofi	Phase 1: 1 Phase 2: 1	ablbio AstraZeneca	Parkinson's disease

DME: diabetic macular edema, MG: myasthenia gravis, PsA: psoriatic arthritis, SLE: systemic lupus erythematosus, wAMD: wet age-related macular degeneration

Source: Cortellis, Evaluate, company websites and press releases

Key takeaways and outlook

As biopharma continues to innovate in the space, the second half of 2025 will see a number of critical data read-outs in Oncology and non-Oncology applications

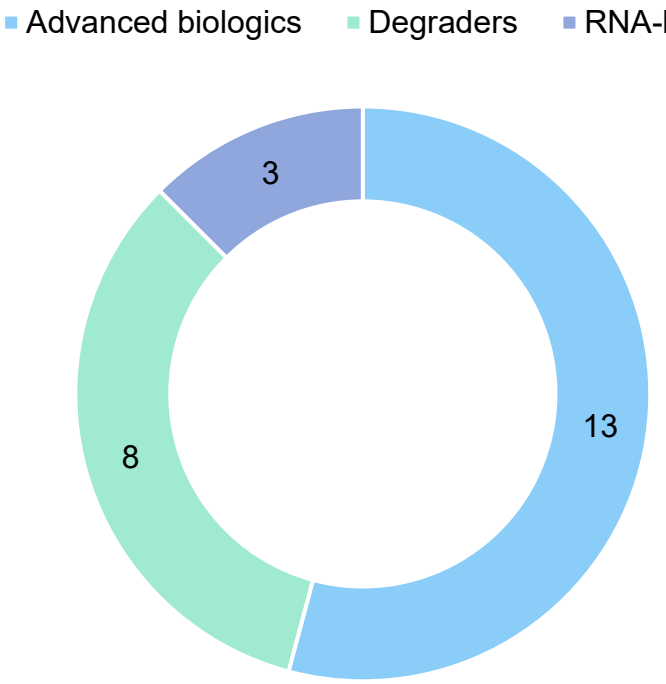
Key Data in PD-1/L1 x VEGF as a Bellwether in IO	▪ Key data read-outs will continue to be released this year, in particular the maturation of the PD-1/L1 x VEGF bi-specific activity which has been a closely watched bellwether for how msAbs may shake up the immuno-oncology (IO) field ▪ While much has been written about the potential of the class, the ability of msAbs to supplant combinations of mAbs as a backbone of therapy will be highly dependent on offering an improvement on monospecific approaches – as such the field is watching closely for the release of the HARMONi ex-China data
Continued Data on Commercial Evolution	▪ While still early days for some product launches, a number of competitive commercial markets are emerging, where sponsors are competing for preferred status based on their product's efficacy/safety/convenience profile ▪ In the CD20 × CD3 space, Abbvie/Genmab (Epkinly) and Roche (Columvi/Lunsumio) are jockeying for positioning within a number of indications based on the dosing and safety profile, with a PDUFA date for Regeneron's Odronextamab expected early in Q3 2025 ▪ The multiple myeloma space is quickly becoming crowded, with Regeneron's recently approved Lynozyfic, a BCMA × CD3 launching with a potential dosing interval advantage over the Pfizer's Elrexfio and Janssen's Tecvayli approved BCMA × CD3 bispecifics
I&I Comes Centerstage	▪ The advent of msAb approaches in I&I has come, and investors and strategics will be looking at how these assets perform in the clinic; with key data readouts coming in 2025, such as Cullinan's CLN-978 in SLE ▪ While msAbs in I&I span large markets such as RA and AD as well as more niche opportunities such as SLE and MG, the ability to compete in a crowded commercial market and command a significant share of smaller opportunities remains to be seen
Interested in Newer Techologies	▪ Novel approaches to improve the safety tolerability, including masked TCEs, targeting three or more antigens, and delivery of cytotoxics with a msAb backbone, are progressing through the clinic and may signal the next wave of innovation ▪ Data readouts from Janux and CytomX's masked bispecific TCEs have generated significant enthusiasm, highlighting growing interest in this innovative therapeutic approach ▪ Indeed, on 10 July 2025 AbbVie and Ichnos announced a license for ISB 2001, a first-in-class CD38×BCMA×CD3 trispecific antibody in Phase 1 studies, paying a USD700m upfront with USD1bn+ in milestones committed ▪ AI/ML is increasingly being leveraged by organizations to differentiate and accelerate product development; in the realm of discovery research, AI/ML is being used to model binding to novel confirmations of known epitopes (e.g., iBio) or rapidly combine known individual antibody sequences into a bispecific format (e.g., AbCellera's OrthoMab platform)

Appendix

Biotechs flocking to immunology & inflammation

Strategic redeployment of cutting-edge modalities to I&I set to drive market growth

#Companies pivoting, expanding or launching with an I&I pipeline by modality (2021 onwards)



#Companies pivoting, expanding or launching with an I&I pipeline by modality (2021 onwards)

	Expanded to I&I	Pivoted to I&I	Launched with I&I
*Multispecific biologics**	CUE BIOPHARMA, dren bio	VOR BIOPHARMA, cullinan THERAPEUTICS, igm biosciences	Bambusa Therapeutics, LIFEORDI IMMUNOTHERAPEUTICS, merida BIOSCIENCES, triveni BIO, NAVIGATOR MEDICINES, ThirdArcBio, CandiD THERAPEUTICS, SANTA ANA BIO
Degraders	Monte Rosa Therapeutics, nurix, LYCIA THERAPEUTICS	KYMERA	GLYCOERA, Avilar THERAPEUTICS, PRAZER THERAPEUTICS, EpiBiologics
RNA-based	generation bio, arrowhead pharmaceuticals, BARINTHUS BIOTHERAPEUTICS		

**Includes bispecific abs, trispecific abs, bispecific fusion proteins, engineered antibody approaches*

Source: Evaluate, company press releases

Transactions analysis methodology

- DNB//Back Bay applied the following inclusion and exclusion criteria to select transactions relevant to the analysis, and defined classification terms as follows

Precedent Transactions Analysis	
Overview	Licenses, M&A, joint ventures, and collaborations for therapeutics between January 2020 and June 2025
Criteria	**Inclusion** • MsAb, ADC, RPT, and TPD therapeutic assets, platforms, and adjacent technologies (e.g., bispecific fusion proteins, molecular glues, antibody degraders) across therapeutic areas and stages of development • Transactions between industry partners (e.g., not academic) **Exclusion** • Purely diagnostic, companion diagnostics, imaging, software, animal health, medical devices, animal model, or manufacturing technologies • Lead oligonucleotide, nucleic acid, vaccine, vaccine adjuvant, biosimilar, cell and gene, formulation, generic, small molecule, peptide, viral, or monoclonal antibody therapies • Solely clinical trial, research, supply, distribution, marketing/promotion, manufacturing, or service agreement deals
Definitions	**Technology type** • **Platform:** partner buys access to a discovery or technology platform, which can often be used to develop several drugs (assets) • **Asset:** partner gains rights to a therapeutic program or drug in one or several indications, therapeutic areas, and/or geographies • **Platform + asset:** transaction features both a discovery or technology platform alongside an asset(s) **Modality type** – *see slide 4* **Multispecific antibody subtype** • **T-cell engager (TCE):** binds to T cells (e.g., CD3) • **Checkpoint inhibitor (CPI):** blocks immune checkpoint proteins (e.g., PD-1, PD-L1, CTLA-4), which are key immune system regulators • **Signal inhibition:** targets tumor/cell receptors, ligands, or signaling pathways to compensate for disease driven mechanisms • **Bispecific antibody drug conjugate (bsADC):** bispecific antibody linked to a cytotoxic agent • **Innate cell engager (ICE):** binds to innate immune cells (e.g., NK cells, macrophages) • **Cytokine targeting:** targets cytokines (e.g., IL-36, IL-17)
Please note that while we are pulling from proprietary databases, the information is typically aggregated from public press releases that often do not disclose all relevant information	

Source: Cortellis, Klein et al, 2024. *Nat Rev Drug Discov*, 23(4):301-319.

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