# HER3 IP Portfolio Analysis

*V3 KC Scoring Workflow (RAG-augmented, SS-F/OS-S firewalled, prompt-cached per-sub-dimension model routing)*

## Executive Summary

This report applies the rDNA.ai four-stage KC scoring pipeline to 465 recent USPTO biopharma patents in the HER3 (ERBB3) target class (antibody-drug conjugates, monoclonal and bispecific antibodies, linker-payload chemistry, CAR-T and other engineered cell therapies, and HER3 cancer vaccines, indicated for EGFR-mutant non-small-cell lung cancer, HER2/HER3-bispecific-addressable breast cancer, NRG1-fusion-driven tumors, and other HER3-expressing solid tumors). Each patent is scored on six Key Component (KC) dimensions on a 1–5 scale and aggregated into a four-scheme ensemble (Meta Baseline / AbbVie / Amgen / Genentech weighting), which determines the patent's investment-grade tier. This V3 run incorporates the post-2026-05-25 methodology corrections: (a) the KC2/KC3/KC4/KC6 composite prompts embed the V2 holistic-judgment guidance verbatim, (b) no character truncation is applied to the patent text submitted to the model, and (c) per-bucket TA multipliers are not applied to the patent-level ranking. The TA buckets are retained as display groupings only.

Portfolio-level results are summarized below by therapeutic-area cut, by top assignee, and at the patent level for the calibrated top decile after a V3 pairwise-tournament re-judging pass.

This is a production application of the V3 KC scoring rubric (RAG-augmented, SS-F / OS-S firewalled, per-patent prompt-cached, per-sub-dimension model-routed). The Sonnet 4.5 Quarantine firewall screened all 465 candidate patents and flagged 0 for quarantine. This is one of an expanding set of target-class KC Quality Analyses generated from a four-stage KC scoring pipeline applied to USPTO biopharma issued and published patents from January 2020 through the present.

## Key Component (KC) Scoring Framework

Each patent is scored on six Key Component (KC) dimensions on a 1–5 scale. The ensemble score is the mean of the six dimensions (with confidence and standard deviation tracked alongside).

- **KC1** measures abstract and therapeutic specificity: target specificity, therapeutic positioning, structural disclosure, and technical differentiation.
- **KC2** measures independent-claim quality: scope, structure, enforceability, and enablement vulnerability.
- **KC3** measures dependent-claim quality: fallback hierarchy, embodiment coverage, prosecution flexibility, and structural diversity.
- **KC4** measures novelty and differentiation: prior-art positioning, inventive-step quality, and field positioning.
- **KC5** measures specification enablement: enablement gap, structure-function insight, data breadth, and translational completeness.
- **KC6** measures working examples: working/prophetic example quality, structural diversity, experimental rigor, and in vivo / translational validation.

## Retrieval-Augmented Generation (RAG) for KC4 Novelty Scoring

The V3 rubric introduces a corpus-internal retrieval-augmented generation (RAG) step that supplies every KC4 sub-dimension (N1 Prior-Art Landscape, N2 Claims Differentiation, N3 Inventive-Step Quality, N4 Field Positioning) with a list of the nearest prior patents in the local Biopharma corpus. The neighbour list is passed

alongside the cached full patent text so the scoring LLM judges novelty against actual nearby filings rather than its internal world knowledge alone.

**RAG construction:**

- Embedding model: text-embedding-3-small (dim=1536).
- Each Biopharma full-text specification was chunked into ≤ 7,000-char blocks across the abstract, claims, and description sections, then each chunk was embedded; a patent-level centroid was computed and L2-normalised.
- Index size: 465 Biopharma specifications → 30,989 chunks → 465 patent centroids.
- Retrieval: per target patent, return top-20 nearest patent centroids by cosine similarity (self excluded); the result list is passed to the KC4 sub-dim prompts as `rag_neighbors`. Sub-dims must echo back `rag_neighbors_cited` in their JSON response.

**RAG results across the corpus:**

- Average nearest-neighbour cosine similarity across all scored patents: 0.939.
- Average similarity of the top-20 neighbourhood: 0.869 (a denser neighbourhood pulls KC4 N1/N2 scores down toward 'crowded'; sparser pushes them up toward 'pioneering').
- Corpus average composite KC4 score (post-RAG): 2.83 on the 1–5 scale, covering sub-dims N1, N2, N3, N4.
- The corpus has high internal similarity (mean nearest-neighbour cosine ≥ 0.70), indicating a relatively concentrated HER3 prior-art landscape; KC4 N1/N2 scoring therefore skews toward 'crowded' for many patents.
- The KC4 sub-dim JSON responses include the `rag_neighbors_cited` field so that each novelty score can be traced back to specific neighbour patents from the corpus index.

**Most-frequently-cited prior-art neighbours in the corpus:**

| Rank | Neighbour Patent | Times Cited in Other Patents' Top-20 |
|---|---|---|
| 1 | US20240139322A1 | 87 |
| 2 | US20240238439A1 | 82 |
| 3 | US20220289815A1 | 81 |
| 4 | US20230270877A1 | 80 |
| 5 | US20230039418A1 | 78 |
| 6 | US20260098074A1 | 76 |
| 7 | US20220073635A1 | 75 |
| 8 | US20210369779A1 | 73 |
| 9 | US20250312448A1 | 71 |
| 10 | US20220064325A1 | 71 |
| 11 | US11305012B2 | 67 |
| 12 | US20250122303A1 | 67 |
| 13 | US20220047677A1 | 63 |
| 14 | US12139549B2 | 63 |
| 15 | US20200354676A1 | 61 |

## Portfolio-Level Metrics

• Total HER3 USPTO records ingested: 1,412 (USPTO PPubs full-text fetch via searchWithBeFamily, publication date 2020-01-01 to present; 17 HER3 / ERBB3 / anti-HER3 / HER3-ADC / HER3-bispecific / HER3-CAR-T /

patritumab-deruxtecan / HER3-DXd / U3-1402 / seribantumab / lumretuzumab / MM-121 / linker-payload-chemistry discovery queries)

• Title- and full-text-based classification: Biopharma=465, Diagnostic=156, Device=15, Non_Biopharma=776

• Total Biopharma patents scored: 465

• Average KC scores — KC1: 4.28  KC2: 3.69  KC3: 3.51  KC4: 2.83  KC5: 4.22  KC6: 3.63

• Average ensemble mean across portfolio: 3.640

**Investment-grade distribution:**

• TIER_2_STRONG: 29

• TIER_3_WATCHLIST: 334

• LOW_PRIORITY: 102

## Top Assignees

| Rank | Assignee | Patent Count |
|---|---|---|
| 1 | MERUS N.V | 22 |
| 2 | DAIICHI SANKYO COMPANY, LIMITED | 13 |
| 3 | KITE PHARMA, INC | 13 |
| 4 | JANSSEN BIOTECH, INC | 12 |
| 5 | ACTINIUM PHARMACEUTICALS, INC | 12 |
| 6 | THE REGENTS OF THE UNIVERSITY OF CALIFORNIA | 12 |
| 7 | BOARD OF REGENTS, THE UNIVERSITY OF TEXAS SYSTEM | 8 |
| 8 | HUMMINGBIRD BIOSCIENCE PTE. LTD | 7 |
| 9 | HOFFMANN-LA ROCHE INC | 7 |
| 10 | SYSTIMMUNE, INC | 6 |
| 11 | REGENERON PHARMACEUTICALS, INC | 6 |
| 12 | DUKE UNIVERSITY | 6 |
| 13 | BRISTOL-MYERS SQUIBB COMPANY | 5 |
| 14 | HCW BIOLOGICS, INC | 5 |
| 15 | KONINKLIJKE NEDERLANDSE AKADEMIE VAN WETENSCHAPPEN | 5 |

## Therapeutic Area Analysis (n ≥ 5 patents)

For each area with at least 5 patents the canonical report shows average KC1–KC6 (1–5 scale), average ensemble mean, average TA-weighted score, and tier distribution. TA buckets are display groupings only in this HER3 V3 run. The HER3 TA bucket structure (ADC, Bispecific_Multispecific, Linker_Payload_Chemistry, Patient_Stratification, Monoclonal_Antibody, CAR_T_Cell_Therapy, Vaccine_Immunotherapy, Combination_Therapy, Formulation_Delivery, Adjacent) is used for per-theme display groupings only. ta_weighted_score in the CSV outputs is identical to ensemble_mean (no per-bucket multiplier is applied).

| Therapeutic Area | N | KC 1 | KC 2 | KC 3 | KC 4 | KC 5 | KC 6 | Ens Mean | TA-W | T1 Premium | T1 High | T 2 | T3 / Low |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HER3_ADC | 142 | 4.30 | 3.66 | 3.49 | 2.73 | 4.34 | 3.67 | 3.630 | 3.630 | 0 | 11 | 93 | 38 |
| HER3_Bispecific_Multispecific | 127 | 4.31 | 3.76 | 3.50 | 2.81 | 4.24 | 3.71 | 3.665 | 3.665 | 0 | 7 | 99 | 21 |
| HER3_Monoclonal_Antibody | 64 | 4.27 | 3.59 | 3.56 | 2.89 | 4.12 | 3.48 | 3.620 | 3.620 | 0 | 6 | 42 | 16 |
| HER3_Vaccine_Immunotherapy | 42 | 4.24 | 3.71 | 3.45 | 2.83 | 3.95 | 3.67 | 3.605 | 3.605 | 0 | 2 | 31 | 9 |
| HER3_CAR_T_Cell_Therapy | 40 | 4.33 | 3.75 | 3.62 | 3.02 | 4.08 | 3.33 | 3.691 | 3.691 | 0 | 1 | 33 | 6 |
| HER3_Patient_Stratification | 23 | 4.35 | 3.87 | 3.35 | 2.96 | 4.52 | 3.91 | 3.752 | 3.752 | 0 | 1 | 19 | 3 |
| HER3_Combination_Therapy | 18 | 3.78 | 3.44 | 3.50 | 2.89 | 4.00 | 3.44 | 3.453 | 3.453 | 0 | 1 | 11 | 6 |
| HER3_Linker_Payload_Chemistry | 8 | 4.12 | 3.62 | 3.50 | 2.88 | 4.25 | 3.50 | 3.595 | 3.595 | 0 | 0 | 5 | 3 |

## Therapeutic Area Narratives

Each TA narrative below summarises the calibrated cohort: average ensemble mean, the strongest and weakest KC dimensions for the TA, TIER_1_PREMIUM count, and the top three patents by TA-weighted score. Every KC value shown is the rolled-up output of the V3 structured-citation pipeline — each underlying patent has six KC composite scores, each grounded in four per-sub-dimension JSON citations carrying the source model, the model-supplied reason, and a verbatim quote from the patent text. A complete structured-citation example is presented in the Top-Decile section below.

### HER3_ADC (n=142)

Average ensemble mean: 3.630. Highest KC: KC5 (avg 4.34). Lowest KC: KC4 (avg 2.73). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20220133767A1; US20250122303A1; US20250388650A1.

### HER3_Bispecific_Multispecific (n=127)

Average ensemble mean: 3.665. Highest KC: KC1 (avg 4.31). Lowest KC: KC4 (avg 2.81). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20220184131A1; US20200087407A1; US20240158496A1.

### HER3_Monoclonal_Antibody (n=64)

Average ensemble mean: 3.620. Highest KC: KC1 (avg 4.27). Lowest KC: KC4 (avg 2.89). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20220169738A1; US10793640B2; US20200095327A1.

### HER3_Vaccine_Immunotherapy (n=42)

Average ensemble mean: 3.605. Highest KC: KC1 (avg 4.24). Lowest KC: KC4 (avg 2.83). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20230295737A1; US20200282032A1; US20210101980A1.

### HER3_CAR_T_Cell_Therapy (n=40)

Average ensemble mean: 3.691. Highest KC: KC1 (avg 4.33). Lowest KC: KC4 (avg 3.02). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20230241172A1; US20260098074A1; US20250152629A1.

### HER3_Patient_Stratification (n=23)

Average ensemble mean: 3.752. Highest KC: KC5 (avg 4.52). Lowest KC: KC4 (avg 2.96). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20220402985A1; US11046741B2; US11718652B2.

### HER3_Combination_Therapy (n=18)

Average ensemble mean: 3.453. Highest KC: KC5 (avg 4.00). Lowest KC: KC4 (avg 2.89). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20230286973A1; US20260007756A1; US20210052595A1.

### HER3_Linker_Payload_Chemistry (n=8)

Average ensemble mean: 3.595. Highest KC: KC5 (avg 4.25). Lowest KC: KC4 (avg 2.88). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20230248728A1; US20240199597A1; US20260077056A1.

### HER3_Adjacent (n=1)

Average ensemble mean: 3.638. Highest KC: KC1 (avg 4.00). Lowest KC: KC2 (avg 3.00). TIER_1_PREMIUM: 0. Top 3 patents (by TA-weighted score): US20240325490A1.

## Top-Decile Calibration: Pairwise Tournament Results

The top decile (n=47) of the HER3 biopharma cohort was re-judged against the V3 rubric using full-text specifications and a complete pairwise tournament. The V3 calibration replaced any prior uniform top-decile plateau with a discriminating ranking; calibrated ensemble distribution: mean 4.191, range 4.013–4.478.

| Rank | Patent | Assignee | KC1 | KC2 | KC3 | KC4 | KC5 | KC6 | Cal Ens |
|---|---|---|---|---|---|---|---|---|---|
| 1 | US20220184131A1 | JUNO THERAPEUTICS, INC. (+1) | 5 | 5 | 5 | 3 | 5 | 4 | 4.453 |
| 2 | US12247077B2 | JANSSEN BIOTECH, INC | 5 | 4 | 5 | 3 | 5 | 5 | 4.312 |
| 3 | US20200087407A1 | JANSSEN BIOTECH, INC | 5 | 4 | 4 | 4 | 5 | 5 | 4.400 |
| 4 | US20250122303A1 | HUMMINGBIRD BIOSCIENCE PTE. LTD. (+1) | 5 | 5 | 4 | 3 | 5 | 5 | 4.375 |
| 5 | US20230241172A1 | YALE UNIVERSITY | 5 | 4 | 5 | 4 | 5 | 4 | 4.478 |
| 6 | US20210395373A1 | JANSSEN BIOTECH, INC | 5 | 4 | 5 | 3 | 5 | 5 | 4.312 |
| 7 | US20220169738A1 | GENMAB A/S | 5 | 5 | 5 | 3 | 5 | 4 | 4.453 |
| 8 | US20220168438A1 | DAIICHI SANKYO COMPANY, LIMITED | 5 | 4 | 5 | 3 | 5 | 4 | 4.240 |
| 9 | US20250388650A1 | ENOSI THERAPEUTICS CORPORATION | 5 | 5 | 5 | 3 | 4 | 4 | 4.350 |
| 10 | US20220073635A1 | ALLIGATOR BIOSCIENCE AB | 5 | 4 | 5 | 3 | 5 | 5 | 4.312 |
| 11 | US20260007760A1 | PINOTBIO, INC | 5 | 4 | 4 | 4 | 4 | 4 | 4.225 |
| 12 | US12139549B2 | DAIICHI SANKYO EUROPE GMBH (+1) | 5 | 4 | 4 | 3 | 5 | 5 | 4.162 |
| 13 | US20230414778A1 | DAIICHI SANKYO COMPANY, LIMITED | 5 | 4 | 5 | 3 | 5 | 4 | 4.240 |
| 14 | US11267900B2 | DAIICHI SANKYO EUROPE GMBH (+1) | 5 | 4 | 4 | 3 | 5 | 5 | 4.162 |
| 15 | US20240158496A1 | THE JOHNS | 5 | 4 | 5 | 4 | 4 | 4 | 4.375 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | HOPKINS UNIVERSITY | | | | | | | |
| 16 | US10662241B1 | HUMMINGBIRD BIOSCIENCE HOLDINGS PTE. LTD | 5 | 4 | 3 | 3 | 5 | 5 | 4.013 |
| 17 | US20220402985A1 | AMGEN INC | 5 | 4 | 4 | 4 | 4 | 4 | 4.225 |
| 18 | US10793640B2 | GENMAB A/S | 5 | 5 | 4 | 3 | 5 | 4 | 4.303 |
| 19 | US20220133767A1 | BETH ISRAEL DEACONESS MEDICAL CENTER,... | 5 | 4 | 5 | 4 | 4 | 4 | 4.375 |
| 20 | US20230295737A1 | BRISTOL-MYERS SQUIBB COMPANY | 5 | 4 | 5 | 4 | 4 | 4 | 4.375 |
| 21 | US20220233706A1 | ANTIKOR BIOPHARMA LIMITED | 4 | 4 | 4 | 4 | 5 | 5 | 4.175 |
| 22 | US20220153870A1 | HUMMINGBIRD BIOSCIENCES HOLDINGS LIMITED | 5 | 4 | 4 | 3 | 5 | 5 | 4.162 |
| 23 | US11279770B2 | MERUS N.V | 5 | 4 | 4 | 3 | 5 | 5 | 4.162 |
| 24 | US20220172420A1 | DAIICHI SANKYO COMPANY, LIMITED (+1) | 5 | 4 | 4 | 3 | 5 | 5 | 4.162 |
| 25 | US12139548B2 | MERUS N.V | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 26 | US20240052043A1 | MERUS N.V | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 27 | US20250276079A1 | DAIICHI SANKYO COMPANY, LIMITED (+1) | 5 | 3 | 5 | 3 | 5 | 4 | 4.027 |
| 28 | US20200140547A1 | THE JOHNS HOPKINS UNIVERSITY | 5 | 4 | 5 | 3 | 4 | 4 | 4.137 |
| 29 | US20200071374A1 | HCW BIOLOGICS, INC | 4 | 5 | 5 | 3 | 4 | 4 | 4.125 |
| 30 | US20220348683A1 | MERUS N.V | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 31 | US20200095327A1 | DRAGONFLY THERAPEUTICS, INC | 5 | 4 | 5 | 3 | 5 | 4 | 4.240 |
| 32 | US11718652B2 | SALUBRIS BIOTHERAPEUTICS, INC. (+1) | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 33 | US11046741B2 | SALUBRIS BIOTHERAPEUTICS, INC. (+1) | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 34 | US20200010522A1 | SALUBRIS BIOTHERAPEUTICS, INC. (+1) | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 35 | US20240228634A1 | JANSSEN BIOTECH, INC | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 36 | US20260007756A1 | COHERENT BIOPHARMA LIMITED | 4 | 4 | 5 | 3 | 5 | 5 | 4.088 |
| 37 | US20230286973A1 | KEZAR LIFE | 4 | 5 | 5 | 3 | 4 | 4 | 4.125 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SCIENCES | | | | | | | |
| 38 | US20210122830A1 | GENMAB A/S | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 39 | US20220056149A1 | LUMOSA THERAPEUTICS, CO., LTD. (+1) | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 40 | US20260098074A1 | KITE PHARMA, INC | 5 | 4 | 4 | 3 | 5 | 4 | 4.090 |
| 41 | US12624105B2 | KITE PHARMA, INC | 5 | 4 | 5 | 3 | 4 | 4 | 4.137 |
| 42 | US20250059296A1 | SYSTIMMUNE, INC | 4 | 5 | 5 | 2 | 5 | 5 | 4.062 |
| 43 | US20250235547A1 | UBE CORPORATION | 5 | 4 | 5 | 2 | 5 | 5 | 4.075 |
| 44 | US11702482B2 | REVITOPE LIMITED | 5 | 4 | 5 | 3 | 4 | 3 | 4.065 |
| 45 | US20210101980A1 | BRISTOL-MYERS SQUIBB COMPANY | 5 | 4 | 4 | 3 | 4 | 5 | 4.060 |
| 46 | US11634409B2 | ARRAY BIOPHARMA INC | 4 | 4 | 5 | 3 | 5 | 4 | 4.015 |
| 47 | US20200282032A1 | ETUBICS CORPORATION (+2) | 5 | 5 | 4 | 3 | 4 | 3 | 4.128 |

## V3 Structured-Output Example: #1 US20220184131A1 — JUNO THERAPEUTICS, INC. (+1)

Every row in the table above is backed by a V3 structured-output citation: each patent has six KC composite scores, each grounded in four per-sub-dimension JSON records carrying the source model, the model-supplied reason, and a verbatim quoted snippet of the patent text (with KC4 sub-dims additionally citing the RAG prior-art neighbour list). For brevity the per-KC tables for the remaining top-decile patents are not reproduced in this report; the complete per-sub-dimension records are persisted in Microprotein_V3_KC_Subscores.csv and the per-patent nested-JSON citation payload is persisted in the kc_score_justification_json column of Microprotein_Top15_Predictions.csv. The single example presented below — the #1 top-decile patent (US20220184131A1) — illustrates the structured-output format for each of the six KC dimensions.

*CELLS EXPRESSING A RECOMBINANT RECEPTOR FROM A MODIFIED TGFBR2 LOCUS, RELATED POLYNUCLEOTIDES AND METHODS*

| KC | Score | Reason | Verbatim Quote from the Patent |
|---|---|---|---|
| KC1 | 5 | Patent provides extensive structural information including full IUPAC nomenclature, detailed SEQ ID NOs for polynucleotides and polypeptides, specific amino acid sequences, domain structures, and comprehensive molecular architecture descriptions. | Exemplary human TGFBRII precursor polypeptide sequence is set forth in SEQ ID NO:59 (isoform 1; mature polypeptide includes residues 23-567 of SEQ ID NO:59; see Uniprot Accession No. P37173-1; NCBI Reference Sequence: NP_003233.4; mRNA sequence set forth in SEQ ID NO:61 |
| KC2 | 5 | C1=5 (cells, polynucleotides, methods, compositions, kits, treatment uses) and C2=5 (SEQ IDs, exon/intron coordinates, specific gRNA SEQ ID 73) dominate. C3/C4 at 4 with broad comprising scope well-supported by Examples 1-6 working data. | the 5′ homology arm comprises the sequence set forth in SEQ ID NO:69-71... the 3′ homology arm comprises the sequence set forth in SEQ ID NO:72 |
| KC3 | 5 | 99 dependents with deep multi-level nesting (D1=5), comprehensive coverage of receptor types, antigens, domains, methods, compositions, and therapeutic uses (D2=5), strong | methods for engineering, preparing, and producing the engineered cells, and kits and devices for generating or producing the engineered cells...methods, kits, and devices for administering the cells |

| | | | |
|---|---|---|---|
| | | structural diversity across CAR/TCR scaffolds (D4=4); D3=3 outweighed by sheer breadth. | |
| KC4 | 3 | N2/N3/N4 cluster at 3 reflecting meaningful advance: novel TGFBR2 locus targeting combines knockout of immunosuppressive receptor with CAR knock-in, optionally yielding dominant-negative TGFBRII. N1=2 (crowded CAR/HDR space) prevents lift to 4. | modified TGFBR2 locus comprising a transgene sequence encoding a recombinant receptor... reduction or elimination of expression of TGFBRII... results in improved activity and/or function<br>[RAG anchor: US20240263183A1, US11771718B2, US20250163475A1…] |
| KC5 | 5 | Extensive clinical-ready formulation details: dosing (1×10^6 to 3×10^6 cells), administration routes (adoptive transfer), manufacturing (electroporation, RNP delivery), and GMP-compatible processes for engineered T cells. | administered at a dose of 1×10^6 cells (low dose; top panels) or 3×10^6 cells (high dose; bottom panels) |
| KC6 | 4 | Substantial working program with multiple CAR variants, donors, and delivery methods (W1=5, W2=4). Controlled in vivo xenograft with dose-response, survival, and TIL analysis (W4=4) plus quantitative spheroid killing assays (W3=4) support a solid 4. | FIGS. 1A-1D show the anti-tumor activity of the adoptively transferred anti-ROR1 CAR+ T cells...FIGS. 5A-5B show the changes in caspase 3/7 activity...based on a spheroid killing assay |

*KC4 rag_neighbors_cited (top prior-art neighbours from the corpus that informed the N1–N4 novelty scoring): US20240263183A1, US11771718B2, US20250163475A1, US20230414661A1, US20230060292A1, US20230039418A1, US20250312448A1, US20230381233A1, US12624105B2, US20260098074A1…*

## Top-Decile Assignee Ranking

Top-decile assignees are ranked by frequency in the calibrated top-decile cohort, then by best calibrated patent rank, then by average calibrated ensemble mean.

| Rank | Assignee | Count | Best Patent Rank | Avg Cal Rank | Avg Cal Ens |
|---|---|---|---|---|---|
| 1 | JUNO THERAPEUTICS, INC. (+1) | 1 | 1 | 1.0 | 4.453 |
| 2 | JANSSEN BIOTECH, INC | 4 | 2 | 11.5 | 4.279 |
| 3 | HUMMINGBIRD BIOSCIENCE PTE. LTD. (+1) | 1 | 4 | 4.0 | 4.375 |
| 4 | YALE UNIVERSITY | 1 | 5 | 5.0 | 4.478 |
| 5 | GENMAB A/S | 3 | 7 | 21.0 | 4.282 |
| 6 | DAIICHI SANKYO COMPANY, LIMITED | 2 | 8 | 10.5 | 4.24 |
| 7 | ENOSI THERAPEUTICS CORPORATION | 1 | 9 | 9.0 | 4.35 |
| 8 | ALLIGATOR | 1 | 10 | 10.0 | 4.312 |

| | | | | | |
|---|---|---|---|---|---|
| | BIOSCIENCE AB | | | | |
| 9 | PINOTBIO, INC | 1 | 11 | 11.0 | 4.225 |
| 10 | DAIICHI SANKYO EUROPE GMBH (+1) | 2 | 12 | 13.0 | 4.162 |
| 11 | THE JOHNS HOPKINS UNIVERSITY | 2 | 15 | 21.5 | 4.256 |
| 12 | HUMMINGBIRD BIOSCIENCE HOLDINGS PTE. LTD | 1 | 16 | 16.0 | 4.013 |
| 13 | AMGEN INC | 1 | 17 | 17.0 | 4.225 |
| 14 | BETH ISRAEL DEACONESS MEDICAL CENTER, INC | 1 | 19 | 19.0 | 4.375 |
| 15 | BRISTOL-MYERS SQUIBB COMPANY | 2 | 20 | 32.5 | 4.217 |
| 16 | ANTIKOR BIOPHARMA LIMITED | 1 | 21 | 21.0 | 4.175 |
| 17 | HUMMINGBIRD BIOSCIENCES HOLDINGS LIMITED | 1 | 22 | 22.0 | 4.162 |
| 18 | MERUS N.V | 4 | 23 | 26.0 | 4.108 |
| 19 | DAIICHI SANKYO COMPANY, LIMITED (+1) | 1 | 24 | 24.0 | 4.162 |
| 20 | DAIICHI SANKYO COMPANY, LIMITED (+1) | 1 | 27 | 27.0 | 4.027 |
| 21 | HCW BIOLOGICS, INC | 1 | 29 | 29.0 | 4.125 |
| 22 | DRAGONFLY THERAPEUTICS, INC | 1 | 31 | 31.0 | 4.24 |
| 23 | SALUBRIS BIOTHERAPEUTICS, INC. (+1) | 2 | 32 | 32.5 | 4.09 |
| 24 | SALUBRIS BIOTHERAPEUTICS, INC. (+1) | 1 | 34 | 34.0 | 4.09 |
| 25 | COHERENT BIOPHARMA LIMITED | 1 | 36 | 36.0 | 4.088 |
| 26 | KEZAR LIFE SCIENCES | 1 | 37 | 37.0 | 4.125 |
| 27 | LUMOSA THERAPEUTICS, CO., LTD. (+1) | 1 | 39 | 39.0 | 4.09 |
| 28 | KITE PHARMA, INC | 2 | 40 | 40.5 | 4.114 |
| 29 | SYSTIMMUNE, INC | 1 | 42 | 42.0 | 4.062 |

| | | | | | |
|---|---|---|---|---|---|
| 30 | UBE CORPORATION | 1 | 43 | 43.0 | 4.075 |
| 31 | REVITOPE LIMITED | 1 | 44 | 44.0 | 4.065 |
| 32 | ARRAY BIOPHARMA INC | 1 | 46 | 46.0 | 4.015 |
| 33 | ETUBICS CORPORATION (+2) | 1 | 47 | 47.0 | 4.128 |

## Bottom-Decile Assignee Ranking

Bottom-decile assignees are ranked by frequency in the bottom HER3 biopharma decile, then by weaker average original ensemble score.

| Rank | Assignee | Count | Avg Original Score | Weakest Score |
|---|---|---|---|---|
| 1 | CREATIVE MEDICAL TECHNOLOGIES, INC | 1 | 2.427 | 2.427 |
| 2 | REMEGEN CO., LTD | 1 | 2.553 | 2.553 |
| 3 | UNIVERSITY OF ROCHESTER | 1 | 2.728 | 2.728 |
| 4 | THERAPEUTIC SOLUTIONS INTERNATIONAL, INC | 1 | 2.765 | 2.765 |
| 5 | RNA THERAPEUTICS, INC | 1 | 2.842 | 2.842 |
| 6 | HUMMINGBIRD BIOSCIENCE PTE. LTD | 1 | 2.868 | 2.868 |
| 7 | NARKESHYO LLC | 1 | 2.878 | 2.878 |
| 8 | GAMAMABS PHARMA (+3) | 1 | 2.915 | 2.915 |
| 9 | SYSTIMMUNE, INC. (+1) | 2 | 3.04 | 2.928 |
| 10 | ROSWELL PARK CANCER INSTITUTE CORPORATION | 1 | 2.928 | 2.928 |
| 11 | BENHEALTH BIOPHARMACEUTIC CO., LTD | 1 | 2.987 | 2.987 |
| 12 | THE REGENTS OF THE UNIVERSITY OF CALIFORNIA | 2 | 3.0 | 3.0 |
| 13 | ACTINIUM PHARMACEUTICALS, INC | 3 | 3.116 | 3.018 |
| 14 | H. LEE MOFFITT CANCER CENTER AND RESEARCH INSTITUTE,... | 1 | 3.037 | 3.037 |
| 15 | TRUTINO BIOSCIENCES INC | 1 | 3.04 | 3.04 |
| 16 | ZYMEWORKS INC | 1 | 3.072 | 3.072 |
| 17 | KITE PHARMA, INC | 2 | 3.096 | 3.09 |
| 18 | CHANGCHUN | 1 | 3.09 | 3.09 |

| | | | | |
|---|---|---|---|---|
| | HUAPU BIOTECHNOLOGY CO., LTD | | | |
| 19 | MERUS N.V | 1 | 3.09 | 3.09 |
| 20 | XI'AN YUFAN BIOTECHNOLOGIES CO., LTD | 1 | 3.09 | 3.09 |
| 21 | GENENTECH, INC | 1 | 3.09 | 3.09 |
| 22 | PHOTOQ3 INC | 2 | 3.105 | 3.105 |
| 23 | PHOTOQ3 INC. (+1) | 1 | 3.105 | 3.105 |
| 24 | SHANGHAI FUDAN-ZHANGJIANG BIO-PHARMACEUTICAL CO., LTD | 1 | 3.115 | 3.115 |
| 25 | CHEN (+1) | 1 | 3.115 | 3.115 |
| 26 | HOFFMANN-LA ROCHE INC | 3 | 3.188 | 3.137 |
| 27 | HARPOON THERAPEUTICS, INC | 1 | 3.152 | 3.152 |
| 28 | AETIO BIOTHERAPY, INC | 1 | 3.152 | 3.152 |
| 29 | RAYZEBIO, INC | 1 | 3.152 | 3.152 |
| 30 | CRD PHARMACEUTICALS INC | 1 | 3.163 | 3.163 |
| 31 | RADIUS PHARMACEUTICALS, INC | 1 | 3.163 | 3.163 |
| 32 | SHANGHAI BAO PHARMACEUTICALS CO., LTD | 1 | 3.163 | 3.163 |
| 33 | BIOBRICS LIFE SCIENCE CO., LTD | 1 | 3.175 | 3.175 |
| 34 | NATIONAL CHENG KUNG UNIVERSITY | 2 | 3.177 | 3.177 |
| 35 | NOVOPYXIS INC | 1 | 3.177 | 3.177 |
| 36 | ZHEJIANG JIANFENG-YIEN BIOTECHNOLOGY CO., LTD | 1 | 3.177 | 3.177 |
| 37 | THE TRUSTEES OF THE UNIVERSITY OF PENNSYLVANIA | 1 | 3.177 | 3.177 |
| 38 | JIANGNAN UNIVERSITY | 1 | 3.177 | 3.177 |

## Top 15 Tournament Calibration HER3 Patents

Each top-15 patent below is presented with: (a) the patent number and confirmed assignee, (b) the patent title, (c) the calibrated KC profile and pairwise tournament record, and (d) the analyst narrative. Every calibrated KC value shown is the V3 composite of four per-sub-dimension scores, each backed by a structured-citation record (score, source model, model-supplied reason, verbatim quote, and — for KC4 — rag_neighbors_cited). The complete per-sub-dimension records are persisted in the V3_KC_Subscores.csv and the Top15_Predictions.csv

(kc_score_justification_json column). A worked example of the full structured-output format for one patent is shown in the Top-Decile section above.

**#1 US20220184131A1 — JUNO THERAPEUTICS, INC. (+1)**
*CELLS EXPRESSING A RECOMBINANT RECEPTOR FROM A MODIFIED TGFBR2 LOCUS, RELATED POLYNUCLEOTIDES AND METHODS*

Calibrated KC profile: KC1=5, KC2=5, KC3=5, KC4=3, KC5=5, KC6=4; calibrated ensemble=4.453; pairwise record=45-1.

V3 pairwise tournament: 45W / 1L over top-decile (n=47).

**#2 US12247077B2 — JANSSEN BIOTECH, INC**
*Bispecific EGFR/c-Met antibodies*

Calibrated KC profile: KC1=5, KC2=4, KC3=5, KC4=3, KC5=5, KC6=5; calibrated ensemble=4.312; pairwise record=45-1.

V3 pairwise tournament: 45W / 1L over top-decile (n=47).

**#3 US20200087407A1 — JANSSEN BIOTECH, INC**
*Bispecific EGFR/C-Met Antibodies*

Calibrated KC profile: KC1=5, KC2=4, KC3=4, KC4=4, KC5=5, KC6=5; calibrated ensemble=4.400; pairwise record=42-4.

V3 pairwise tournament: 42W / 4L over top-decile (n=47).

**#4 US20250122303A1 — HUMMINGBIRD BIOSCIENCE PTE. LTD. (+1)**
*TREATMENT AND PREVENTION OF CANCER USING HER3 ANTIGEN- BINDING MOLECULES*

Calibrated KC profile: KC1=5, KC2=5, KC3=4, KC4=3, KC5=5, KC6=5; calibrated ensemble=4.375; pairwise record=42-4.

V3 pairwise tournament: 42W / 4L over top-decile (n=47).

**#5 US20230241172A1 — YALE UNIVERSITY**
*INTERLEUKIN-18 VARIANTS AND METHODS OF USE*

Calibrated KC profile: KC1=5, KC2=4, KC3=5, KC4=4, KC5=5, KC6=4; calibrated ensemble=4.478; pairwise record=40-6.

V3 pairwise tournament: 40W / 6L over top-decile (n=47).

**#6 US20210395373A1 — JANSSEN BIOTECH, INC**
*Bispecific EGFR/C-Met Antibodies*

Calibrated KC profile: KC1=5, KC2=4, KC3=5, KC4=3, KC5=5, KC6=5; calibrated ensemble=4.312; pairwise record=40-6.

V3 pairwise tournament: 40W / 6L over top-decile (n=47).

**#7 US20220169738A1 — GENMAB A/S**
*MONOCLONAL ANTIBODIES AGAINST HER2*

Calibrated KC profile: KC1=5, KC2=5, KC3=5, KC4=3, KC5=5, KC6=4; calibrated ensemble=4.453; pairwise record=39-7.

V3 pairwise tournament: 39W / 7L over top-decile (n=47).

**#8 US20220168438A1 — DAIICHI SANKYO COMPANY, LIMITED**
*COMBINATION OF ANTIBODY-PYRROLOBENZODIAZEPINE DERIVATIVE CONJUGATE AND PARP INHIBITOR*

Calibrated KC profile: KC1=5, KC2=4, KC3=5, KC4=3, KC5=5, KC6=4; calibrated ensemble=4.240; pairwise record=38-8.

V3 pairwise tournament: 38W / 8L over top-decile (n=47).

**#9 US20250388650A1 — ENOSI THERAPEUTICS CORPORATION**
*OLIGO-TRAP FUSION PROTEINS (OFPs) AND USES THEREOF*

Calibrated KC profile: KC1=5, KC2=5, KC3=5, KC4=3, KC5=4, KC6=4; calibrated ensemble=4.350; pairwise record=37-9.

V3 pairwise tournament: 37W / 9L over top-decile (n=47).

**#10 US20220073635A1 — ALLIGATOR BIOSCIENCE AB**
*NOVEL POLYPEPTIDES*

Calibrated KC profile: KC1=5, KC2=4, KC3=5, KC4=3, KC5=5, KC6=5; calibrated ensemble=4.312; pairwise record=36-10.

V3 pairwise tournament: 36W / 10L over top-decile (n=47).

**#11 US20260007760A1 — PINOTBIO, INC**
*CAMPTOTHECIN DERIVATIVES THAT BIND TO DDX5 PROTEIN AND PRODRUGS THEREOF*

Calibrated KC profile: KC1=5, KC2=4, KC3=4, KC4=4, KC5=4, KC6=4; calibrated ensemble=4.225; pairwise record=33-13.

V3 pairwise tournament: 33W / 13L over top-decile (n=47).

**#12 US12139549B2 — DAIICHI SANKYO EUROPE GMBH (+1)**
*Material and methods for treating or preventing HER-3 associated diseases*

Calibrated KC profile: KC1=5, KC2=4, KC3=4, KC4=3, KC5=5, KC6=5; calibrated ensemble=4.162; pairwise record=33-13.

V3 pairwise tournament: 33W / 13L over top-decile (n=47).

**#13 US20230414778A1 — DAIICHI SANKYO COMPANY, LIMITED**
*COMBINATION OF ANTIBODY-DRUG CONJUGATE WITH ANTI-SIRPalpha ANTIBODY*

Calibrated KC profile: KC1=5, KC2=4, KC3=5, KC4=3, KC5=5, KC6=4; calibrated ensemble=4.240; pairwise record=31-15.

V3 pairwise tournament: 31W / 15L over top-decile (n=47).

**#14 US11267900B2 — DAIICHI SANKYO EUROPE GMBH (+1)**

*Antibodies directed to HER-3 and uses thereof*

Calibrated KC profile: KC1=5, KC2=4, KC3=4, KC4=3, KC5=5, KC6=5; calibrated ensemble=4.162; pairwise record=31-15.

V3 pairwise tournament: 31W / 15L over top-decile (n=47).

**#15 US20240158496A1 — THE JOHNS HOPKINS UNIVERSITY**

*MULTIFUNCTIONAL BTLA EXTRACELLULAR DOMAIN CO- INHIBITORY MOIETY TRAPS TO MODULATE IMMUNE TOLERANCE*

Calibrated KC profile: KC1=5, KC2=4, KC3=5, KC4=4, KC5=4, KC6=4; calibrated ensemble=4.375; pairwise record=30-16.

V3 pairwise tournament: 30W / 16L over top-decile (n=47).

## Methodology

The HER3 analysis ingested 1,412 USPTO records via 17 USPTO PPubs full-text discovery queries crossing the gene/protein nouns (HER3, HER-3, ERBB3, ERBB-3) with the inhibition / antagonism / targeting / binding / conjugation vocabulary (inhibitor, antagonist, blocker, antibody, conjugate, target, bind, modulator), HER3 modality language (anti-HER3 antibody, HER3 ADC, HER3 bispecific, HER2/HER3 bispecific, EGFR/HER3 bispecific, HER3 CAR-T), and the marketed-/clinical-asset drug names (patritumab deruxtecan / HER3-DXd / U3-1402; seribantumab, lumretuzumab, MM-121, MM-141, AV-203, elenestinib) across abstract, title, and claim fields, restricted to publication date 2020-01-01 to present. Title- and full-text-based classification yielded 465 Biopharma, 156 Diagnostic, 15 Device, and 776 Non-Biopharma classifications. The 465 biopharma patents with a confirmed assignee were assigned to one of ten HER3 therapeutic-area buckets (ADC, Bispecific_Multispecific, Linker_Payload_Chemistry, Patient_Stratification, Monoclonal_Antibody, CAR_T_Cell_Therapy, Vaccine_Immunotherapy, Combination_Therapy, Formulation_Delivery, Adjacent). The TA buckets are display groupings only in this run; per-bucket multipliers are NOT applied to the patent-level ranking. HER3 has a pseudokinase domain with no demonstrated catalytic activity (unlike HER2, which has a canonical TKI program), so unlike HER2 there is no Small_Molecule_TKI bucket; instead a Linker_Payload_Chemistry bucket captures the substantial ADC-component IP layer (cleavable / non-cleavable linkers, valine-citrulline / PAB self-immolative spacers, topoisomerase-1 inhibitor payloads such as deruxtecan, site-specific conjugation, DAR control). HER3 is also heavily represented in HER2/HER3 and EGFR/HER3 bispecific filings, so the Bispecific bucket is expected to be relatively well-populated.

All KC scoring was performed by Anthropic LLM agents reading the local full-spec corpus (abstract + independent claims + dependent claims + specification body, truncated to fit the 200K-token context window). The per-patent loop uses prompt caching (cache_control=ephemeral on the full patent text) and routes each of the 24 KC sub-dimensions to a per-sub-dim model: Haiku 4.5 for mechanical sub-dims (A1, A3, C1, C3, D1, E3, W1, W4) and Sonnet 4.5 for the remaining 16 sub-dims (including the 7 'holistic' sub-dims A4, C4, D3, N1, N3, N4, E1). Opus 4.7 is used only for the four KC2/KC3/KC4/KC6 composite calls. KC4 sub-dims (N1–N4) additionally receive RAG top-20 nearest-neighbour context from a text-embedding-3-small chunk-level vector index over the entire scored Biopharma corpus. Composite KC scores follow the V2 rules: KC1 and KC5 = median of sub-dimension scores rounded to nearest integer (mechanical, no LLM call); KC2, KC3, KC4, KC6 = holistic Opus composite per the V2-anchored per-KC composite prompt (the corrected V3 variant embeds the V2 sub-dim definitions and a V2-derived 1–5 KC-composite rubric directly into each composite prompt). Ensemble scoring applied four weighting schemes (Meta Baseline / AbbVie / Amgen / Genentech) aggregated into ensemble_mean ± ensemble_std with HIGH /

MODERATE / LOW confidence. Tier thresholds are absolute (TIER 1 PREMIUM ≥ 4.5; TIER 1 HIGH 4.0–4.49; TIER 2 MODERATE 3.0–3.99; TIER 3 SPECULATIVE < 3.0).

Before any KC scoring, a Sonnet 4.5 SS-F (Single-Shot Filter) / OS-S (One-Sided Safe) firewall screened every patent's title + abstract + first 2,000 chars of claims + first 2,000 chars of description against the V3 Quarantine Taxonomy (Q1 weaponization, Q2 illicit drug synthesis, Q3 CSAM, Q4 pseudoscience-asserting-biomed, Q5 hate-speech-jargon-with-biomed). For this corpus 0 of 465 candidate patents were quarantined. The top decile (n=47) was then re-judged via a complete pairwise tournament (Sonnet 4.5 judge) to separate platform composition-of-matter assets from narrower follow-on, delivery-only, or crowded-prior-art filings. Detailed V3 outputs (per-sub-dim scores with verbatim evidence quotes and model attribution; RAG neighbour lists; tournament pairings; calibrated rankings) are available in HER3_V3_KC_Subscores.csv, HER3_Top15_Predictions.csv (with JSON citation-based KC justifications), HER3_Top_Decile_V3_Calibrated_KC_Scores.csv, and the V3 workflow manifest at raw/HER3_V3_KC_Workflow_Manifest.json.

Canonical V3 rubric reference:
/Product_Roadmap/University_IP/_KC_Methodology/V3_Rubric/improved_scoring_prompt_v3.md.