

Position Frequency Analysis (PFA)

Repertoire Statistical Likelihoods, Language Model Evaluations, and 3D Structural Gating

Guide antibody engineering with positional statistics and large language models. PFA unites human repertoire positional distributions from >127 million antibody sequences with four complementary antibody language models (Sapiens, AbLang, AbLang2, and IgBert), mapped directly onto 3D atomic structures.

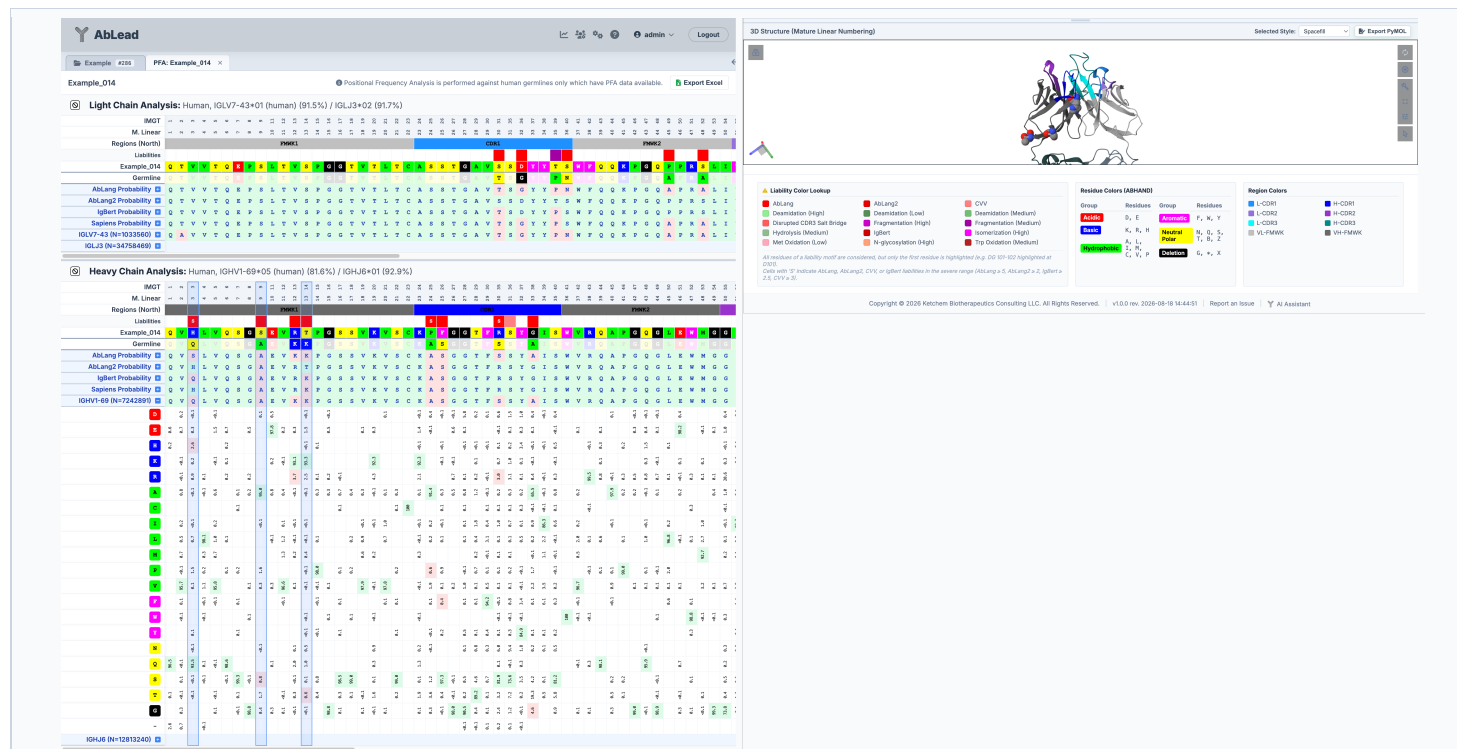


Figure: PFA Workspace showing per-residue repertoire probabilities, multi-model AI likelihood scores, and synchronized PDBe Mol* 3D structure viewer.

CORE CAPABILITIES

- **Massive Repertoire Distributions:** Evaluates positional amino acid frequencies derived from millions of light and heavy chains against closest human germlines.
- **4 Integrated AI Language Models:** Combines Sapiens, AbLang, AbLang2, and IgBert.
- **Delta-Likelihood Defect Spotting:** Measures differences between parental residues and AI-preferred amino acids to flag destabilizing framework mutations.
- **Synchronized PDBe Mol* 3D Viewer:** Interactive 3D ribbon rendering with CPK element highlighting for selected positions and adjustable split-pane sizing.

DEVELOPABILITY ADVANTAGE and IMPACT

- **Data-Driven Residue Selection:** Replaces speculative mutagenesis with statistically validated, human B-cell preferred amino acid substitutions.
- **Paired Interface Evaluation:** Captures cross-chain VH-VL interface cooperativity using paired deep learning models (AbLang2 and IgBert).
- **Integrated Germline and Liability Tracking:** Displays germline deviations, severe stability violations, and potential PTMs directly above the sequence track.
- **1-Click Engineering Handoff:** Click any position in the probability grid to view 20-amino-acid scores and queue mutation designs into engineering sets.

The AbLead Advantage: By coupling massive natural repertoire statistics with modern paired antibody transformers, PFA guides engineering decisions toward mutations that naturally maximize conformational stability and expression.

Accelerate Your Antibody Lead Optimization and De-Risk Development

Request a Live Demo: ablead@ketchemconsulting.com | Explore Platform: ablead.ketchemconsulting.com

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