

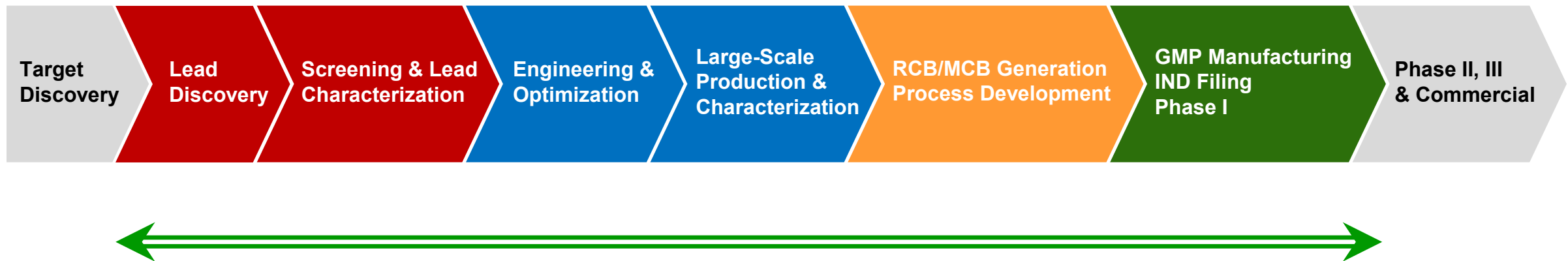


# Custom Protein Labeling and Bioconjugation Services

Protein Chemistry Group at LakePharma



# Protein Labeling & Bioconjugation are Needed in Every Stage of Biologics Development



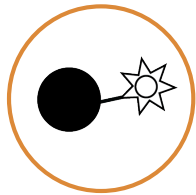
LakePharma recognizes this need and has established the Protein Chemistry Group to support it.

# LakePharma Protein Chemistry Group and Facility

- Located in SF Bay Area with 38,000+ sq. ft of production capacity
- Team composition
  - 4 members with 4 PhDs in Biochemistry, Biophysics, Chemistry, and Cell Biology
  - 80+ collective years of expertise in
    - Protein conjugation
    - Protein labeling
    - Protein purification (affinity & tagless)
    - Protein fragmentation
    - *In vitro* enzymatic activity assays, cell-based, assays, and immuno-assays

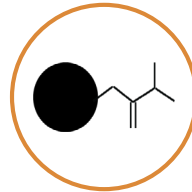


# Protein Chemistry Group's Core Capabilities



## Custom Protein Labeling

- Fluorophore labeling
- Biotinylation
- PEGylation



## Custom Protein Conjugation

- Oligonucleotide-protein conjugation
- Protein-protein conjugation
- Peptide-protein conjugation
- Protein conjugation to resins
- Antibody fragmentation

The group can accept stand-alone requests  
or combine with other biologics discovery or production services.

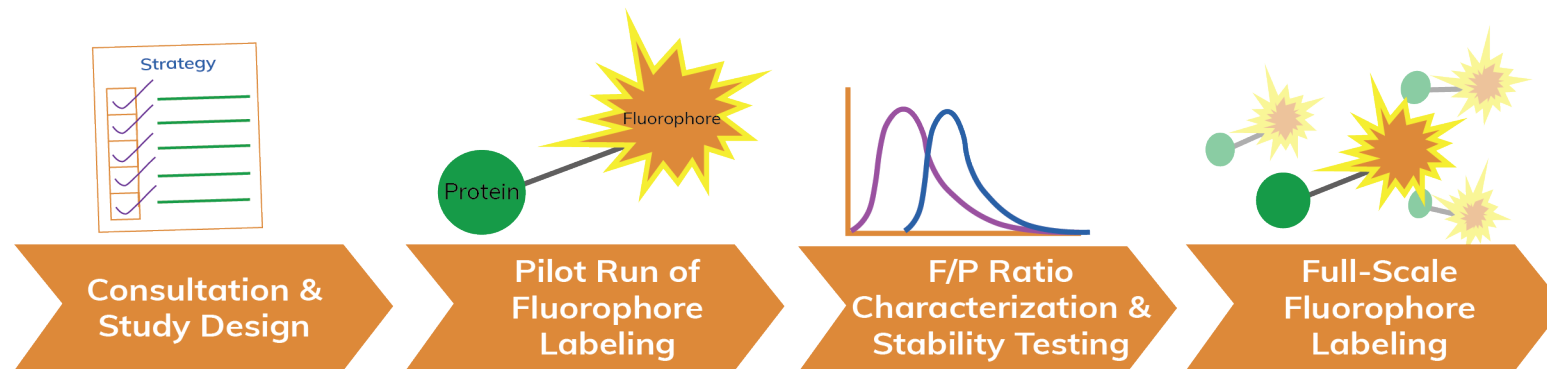


# **Protein Labeling Services**

# Custom Fluorophore Labeling Service

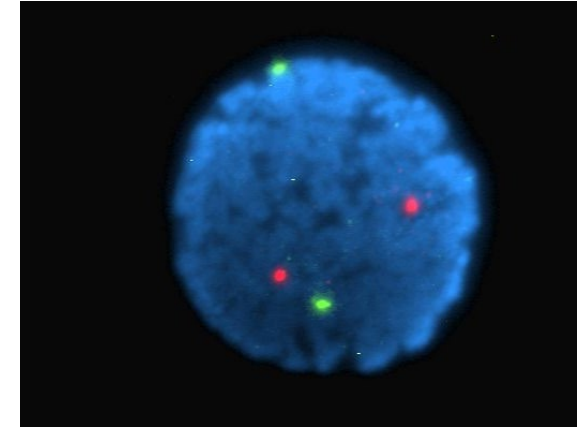
Applications include FACS, Western Blot, and ELISA.

## LakePharma Fluorophore Labeling Service Workflow



Timeline: 1 week

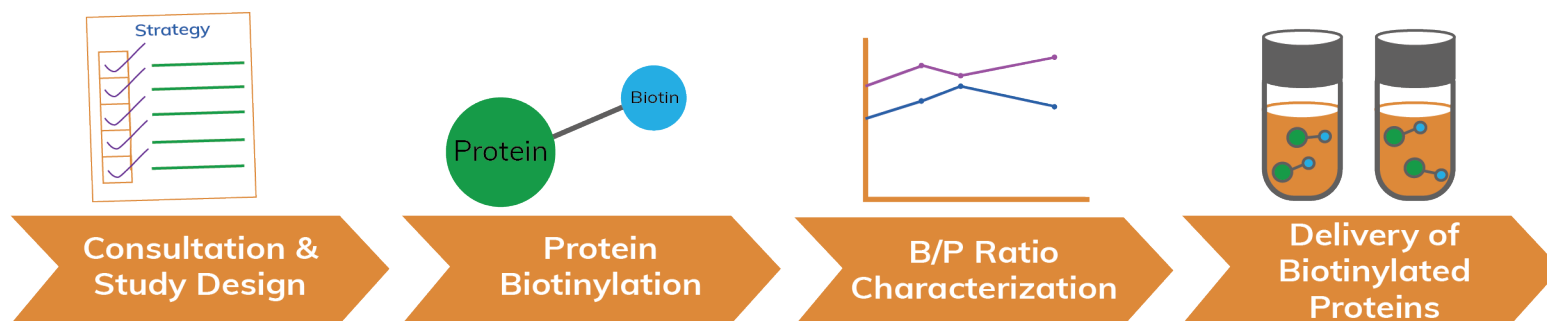
Starting material can be as little as 0.5 – 1 mg.



# Custom Biotinylation Service

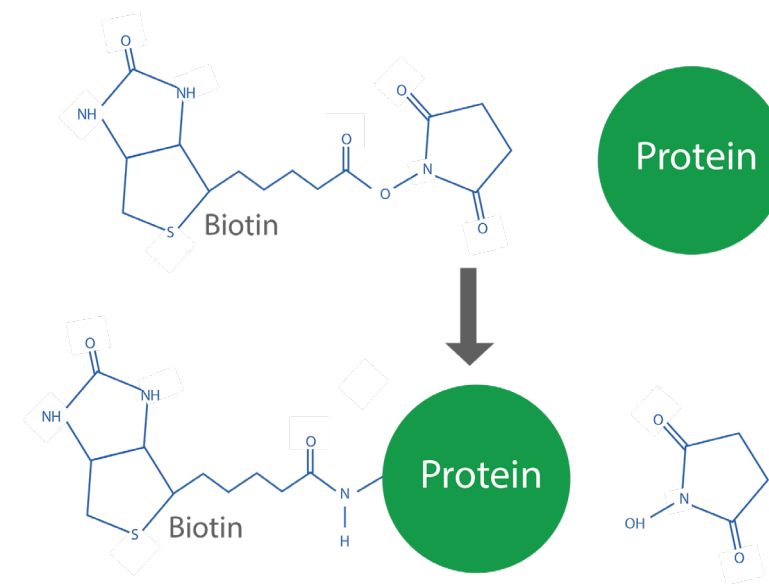
Applications include immuno-assays and panning assays.

## LakePharma Biotinylation Service Workflow



Timeline: 1-2 weeks

Starting material can be as little as 0.5 – 1 mg.



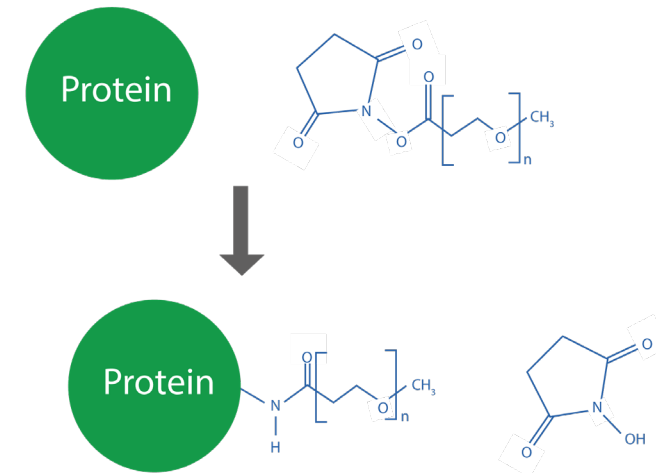
# Custom PEGylation Service

Applications include drug formulation and pharmacokinetic (PK) studies.

## LakePharma PEGylation Service Workflow



Timeline: 1-2 weeks



# Bioconjugation Services

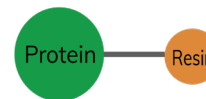


# Custom Bioconjugation Services



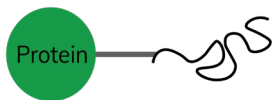
## Protein-Protein Conjugation

- HRP/APC/PE conjugation

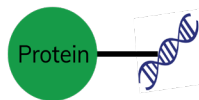


## Protein-Resin Conjugation

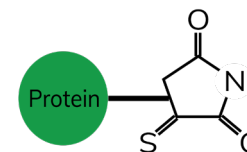
- Custom beads preparation
- Resin conjugation with small molecules, peptides, and oligonucleotides is also available



## Protein - Peptide Conjugation



## Protein – DNA Oligo Conjugation

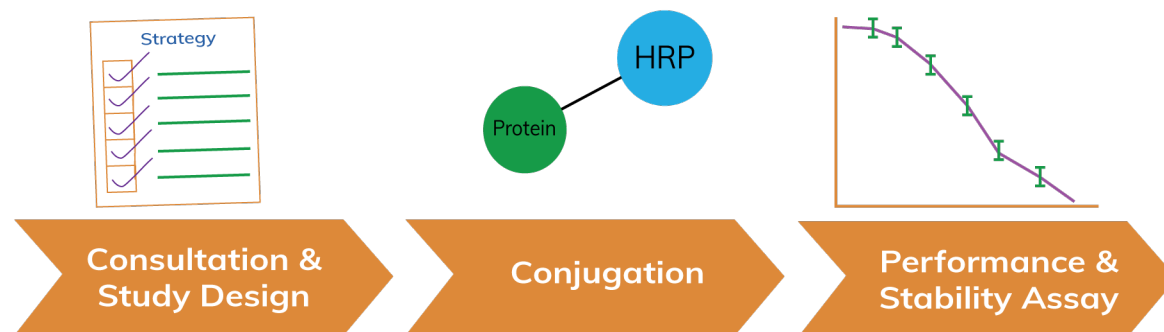


## Protein – Small Chemical Conjugation

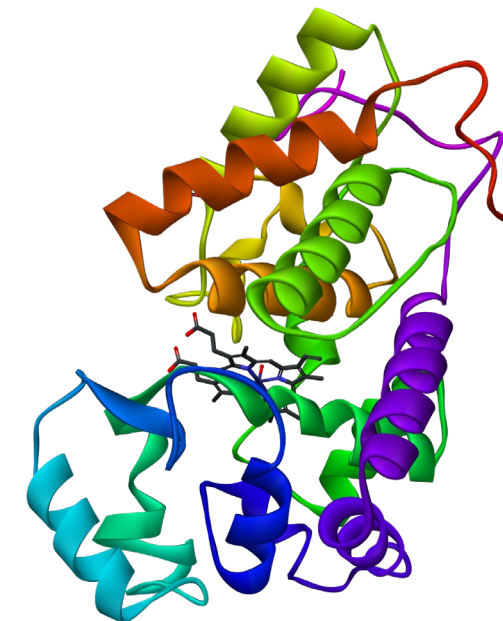
# Custom HRP Conjugation Service

Applications include ELISA, Western Blot, and immunohistochemistry (IHC) assays.

## LakePharma HRP Conjugate Service Workflow



Timeline: 2-3 weeks

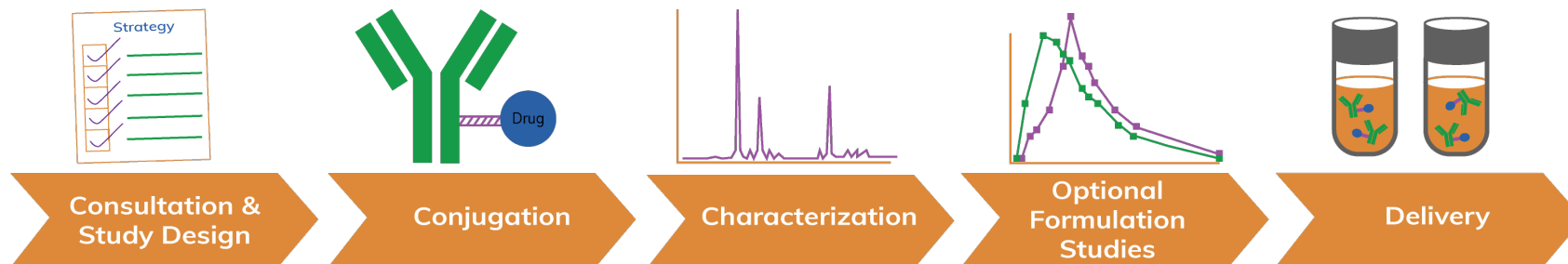


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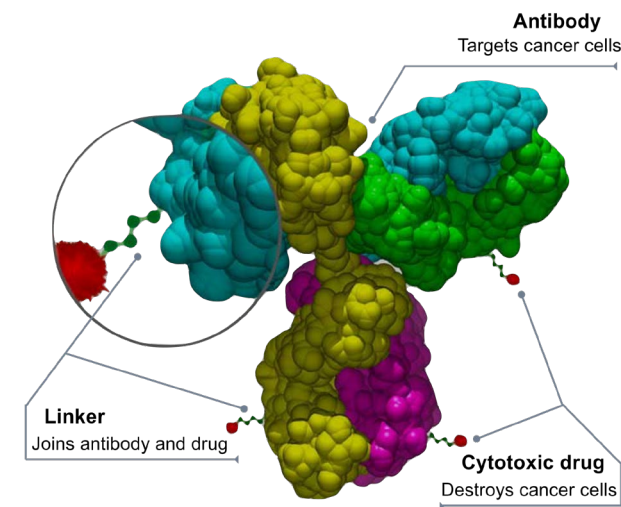
# Custom Antibody-Drug Conjugate Service

Applications include drug formulation and pharmacokinetic studies as well as potency and safety studies.

## LakePharma Antibody-Drug Conjugate Service Workflow



Timeline: 2-3 weeks



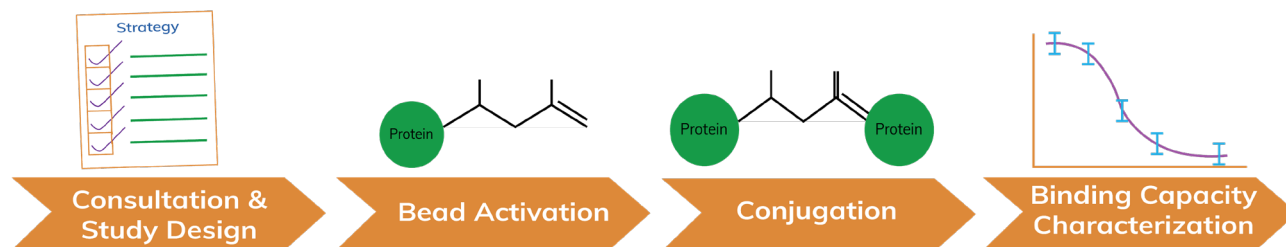
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# Custom Resin Bead Preparation Services

Custom beads prepared from conjugation of protein, peptide or small chemicals are used to perform immunoprecipitation assays and protein purification at various scales.

Timeline: 2 weeks

## LakePharma Resin Bead Service Workflow



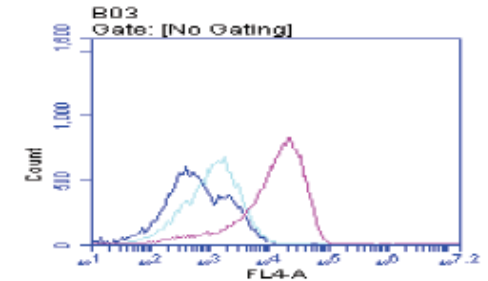
## Types of Beads

- Protein A beads
- Protein G beads
- Heparin beads
- Protamine beads
- Anti-FLAG IgG beads
- Ni-NTA beads
- HIC beads
- Streptavidin Beads
- Magnetic affinity beads

# Developing HRP-Conjugated Anti-M13 Antibodies for ELISA and Western Blot Assays

- **Problem:** GE Healthcare has discontinued the production of HRP-anti-M13, which is needed for ELISA and Western Blot assays in antibody discovery
- **Work Performed:**
  - The LakePharma Discovery Immunology group generated monoclonal anti-M13 using hybridoma approach
  - The LakePharma Bioproduction group generated anti-M13 in big quantities
  - The LakePharma Protein Chemistry group conjugated anti-M13 to HRP and APC, respectively
- **Outcome:** FACS and ELISA results showed superior performance of APC and HRP conjugates of anti-M13.


FACS Anti M-13 binding



# Workflow Support Modalities

LakePharma can initiate customer projects from a variety of starting points

- **Literature references**
- **Develop assays for drug target and desired experimental readout**
- **Stability studies**
- **Protein labeling and conjugation**

- 
- Higher level of complexity & ambiguity
  - Longer project length, higher overall cost
  - Lower level of complexity, defined endpoint
  - Shorter project length, lower overall cost

# Workflow Support Modalities

LakePharma can collaborate with clients in various ways

- **Full Time Equivalent (FTE) Workflows**

- One or more LakePharma staff dedicated to client workflow
- Typically longer term relationships, full development/discovery campaigns with multiple projects
- Ideal for mix of development and routine assay execution
- Ultimate flexibility for client workflow with true scientific partnership from dedicated LakePharma team resource

- **Fee-for-Service Workflow**

- Typically the entry point with clients new to LakePharma
- Small projects, commercial kit-based sample endpoint testing to larger development projects
- Each workflow custom quoted to meet project goals

- **Blanket PO and/or À la carte Quote**

- Ideal for optimized workflows following purification or conjugation projects
- Also applicable for “as-needed” testing at varying times throughout the year.

- Increased workflow flexibility
- Increased level of scientific partnership

- Iterative testing workflows with defined endpoints

**We will build capacity and add instrumentation to suit your workflow.**

# Select Instruments & Systems

LakePharma utilizes a wide range of industry-leading systems to support protein work.

## Protein Purification Systems

- AKTA Pilot, Explorer, Purifier and Start
- Resin types/chromatography
  - Immobilized metal affinity
  - Protein A/G affinity
  - FLAG affinity
  - Size exclusion
  - Ion exchange
  - HIC
  - Multimodal resins
  - Blue sepharose
  - Heparin



## Analytical Equipment

- Agilent 1100
- Simple Western
- Nano-Drop One
- ChemiDoc MP Gel Imaging System
- Synergy HTX Biotek Platereader



## Key Summary of LakePharma Services

- Broad experience in protein labeling and bioconjugation workflow
- Large portfolio of technologies, formats, and readouts
- Demonstrated record of success in recurrent support and developmental workflows
- Flexibility in capacity, assay design, and execution to meet your data requirements

**Ultimately, your protein, your way.**

## Contact Us Today



888-406-5658 (Toll free)



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