

Introduction to LAMPIRE



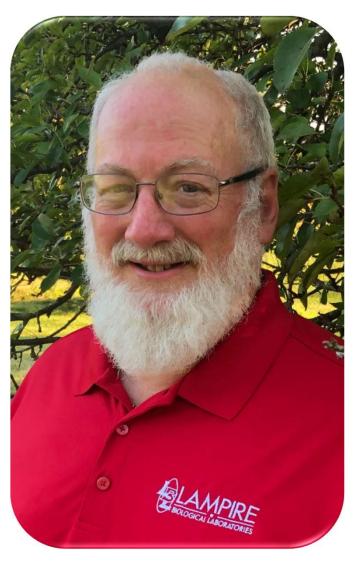
LAMPIRE is a privately held, international, life science company that produces biological reagents and raw materials that are shipped worldwide and used across many applications.

Diagnostics

- Biotechnology
- Pharmaceuticals
- Cosmetics

President, Gregory F. Krug, and his family of employees, have built LAMPIRE into the company it is today. LAMPIRE is comprised of multiple farming campuses and three state-of-theart laboratory facilities, strategically located across the state of Pennsylvania.

Encompassing over 600 acres, LAMPIRE houses over 5,000 animals, representing over 20 unique species. LAMPIRE has over 140 experienced technical and animal husbandry technicians manufacturing our products and services under the guidelines of ISO and AAALAC.



Gregory F. Krug, President

Positively impacting human and animal health around the world for over 40 years!

What does LAMPIRE do?

Blood & Biological Products

- Donor Animal Blood Products and Purified
 Serum Proteins
- Human Blood Products and Purified Serum
 Proteins
- Abattoir Blood Products, Organs, and Tissues

Custom Antibodies

- Project Design, Immunogen Design & Scopes
- Polyclonal Antibody Development and Production
- Monoclonal Antibody Development and Production





Worldwide Expertise

Global Partner

LAMPIRE has dedicated personnel to oversee your shipment

Helping to determine the correct paperwork for your product; research sample or production material

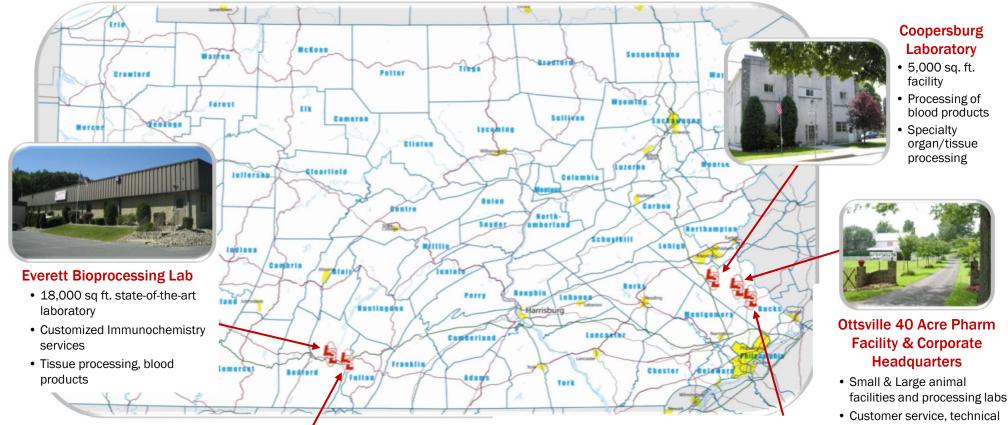
Routinely shipping to the UK, EU, Asia

Timely delivery of your biological raw material needs is our primary focus!





World Class Specialized Facilities





Everett 600 Acre Pharm Facility

- Over 32 unique animal vivariums and housing structures
- Featuring over 20 different species of animals available for production and project needs
- Custom antisera, donor sera, and red cell production programs

Biotech Research & Resource Center

- 18,000 sq. ft. facility
- Certified class 2, 5 and 7 rooms/hoods, cell banking plus tissue culture and purification labs
- Monoclonal Antibody Production
- Hybridoma Development
- Customized Immunochemistry services
- Contract Manufacturing
- High-Tech Full Service Vivarium



We have the capabilities to increase housing for our more than 20 different species of animals including donkeys, llamas, etc. These capabilities allow for continuity of supply and adaptability to our clients' forecasts.



support and client services

Customer Focused: Technical Experts

Project Management & Technical Support munolo, **Team** 1010⁶¹⁵ts Violecular Veterinarians **Biologis**

The foundation of our growth and our client's success is our expert personnel. Comprised of over 140 professionals with a wide array of backgrounds. Our experienced and customer service-oriented teams are what sets LAMPIRE apart from others. As experts in their respective fields they effectively allow LAMPIRE to exceed all needs and expectations of our clients.

Veterinarian and **Animal Care Team** **Manufacturing and Production Team**





Quality Assurance

Customer Service/Project Management

- Conscientious and approachable
- Tech savvy cross-trained team
- **Resolution driven**
- Real-time troubleshooting ٠



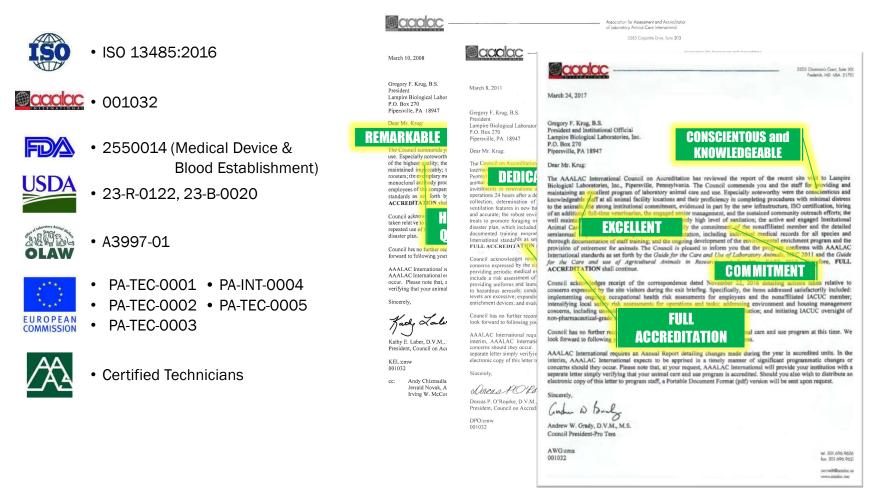
- Custom specification pros
- Rapid turnaround of deliverables
- Small pilot to large production
- Diverse project experience



Quality is LAMPIRE's First Priority

Our Quality Policy

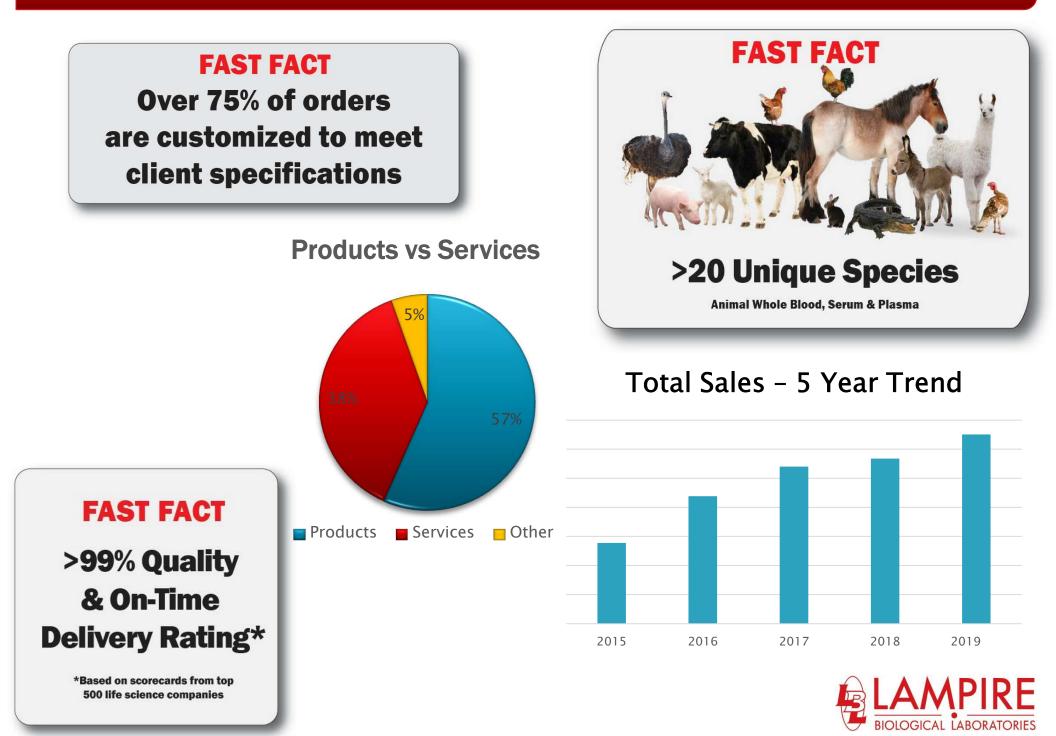
To provide consistently and competitively, high quality reliable products and services in conformity with our customer's requirements, specifications and standards.



Our cGMP compliant Quality Management System drives our production processes and customer services to ensure consistent, high-level performance.



What's Trending @ LAMPIRE



Products @ LAMPIRE

Blood & Biological Products

- Donor Animal Blood Products and Purified Serum Proteins
- Human Blood Products and Purified Serum Proteins
- Abattoir Blood Products, Organs, and Tissues

Purified Proteins & Related Reagents

- BSA; Domestic and New Zealand Sourced
- Primary Antibodies
- Secondary Antibodies
- Antibodies to Drugs of Abuse
- Purified Immunoglobulins and Conjugates

Specialized Products and Services

- OMNI C3[®] Cell Culture Bags
- Custom Cell Culture Media
- Assay Development
- Contract Manufacturing
- Collaborative Research
- Pharmacokinetic Studies

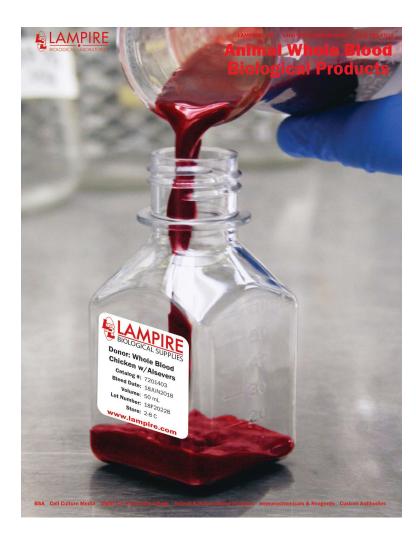








Animal Donor Whole Blood @ LAMPIRE



Animal Donor Whole Blood:

- Large Variety of Host Species
- Off-Site Collection Available
- Abattoir and Managed Herds
- Custom Collections
- Numerous Anticoagulants
- Pooled and Individual Lots
- Gender Specific Lots
- Domestic and Non-Domestic
- Bleed and Ship same day
- QC Tested Material

Over 20 Unique Species:

Alligator, Bovine, Calf, Chicken, Donkey, Emu, Goat, Goose, Guinea Pig, Hamster, Horse, Llama, Mouse, Primate, Porcine, Rabbit, Rat, Rooster, Sheep, Trout, Turkey (Other species available, please inquire)





Applications:

- Specific Donor & Species Material for Medical Research
- Custom Managed Herds for Specific Research Applications
- Application Specific Engineering for Medical Device
- Hematology & Coagulation Controls





Abattoir Materials @ LAMPIRE



Applications:

- Medical Device/Equipment Testing
- Assay & Diagnostics Research
- Hematology & Coagulation Controls
- Study of Cells for Hematology Research

Abattoir Derived Products:

- Experienced LAMPIRE Technicians Collect, Prepare & Process Animal Blood, Glands, Organs & Tissues
- Close Proximity to Major Calf, Chicken, Bovine, Porcine & Ovine Abattoir Facilities
- Established Working Relationships with Abattoir Facilities
- Fully Documented and Recorded Collection Processes
- EU Abattoir Registered for Ease of Shipment to the EU
- Maintain High-Level of Traceability, High-Quality & Consistency
- Large & Small Collections, Bulk & Research Size
- Competitively Priced, Alternative to Donor Material
- Diverse Collection of Species Available
- Collected Fresh, Processed per Specifications
- Attention to Detail for Critical Collection Process

Preparations:

- Extraction & Storage
- Media Perfusion
- Snap Frozen
- Slide Preparation
- Lyophilized
- Custom Processing



BSA @ LAMPIRE



Bovine Serum Albumin (BSA)

LAMPIRE is rated as one of the top leading providers of BSA driving the Bovine Serum Albumin market. LAMPIRE offers a full complement of catalog BSA, available both in liquid and lyophilized.

With superior solubility and filterability, no endotoxin, enzyme or protease activity, LAMPIRE BSA is easy-to-use and ensures assay integrity, component stability and cell culture suitability. The closed loop manufacturing process minimizes contamination and maximizes reproducibility.

- High-Quality & Consistency
- Traceability
- Protease-free, IgG-free
- High-purity, Low Interference
- Superior Solubility & Filterability
- Customized Concentrations
- Available in Lyophilized & Liquid
- Bulk Sizes & Discounts Available



This combines our two high quality products and makes an easy-touse blocking agent.

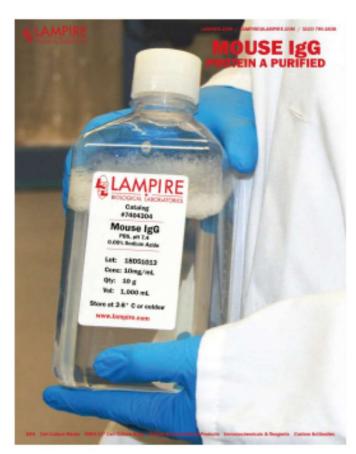
Dharmanoutical and Ticcup Engine

Applications:

Pharmaceutical and Tissue Engineering, Buffers, Blocking Solution for Assays, Immunoassays, Flow cytometry, Assay controls, Western Blot, ELISA

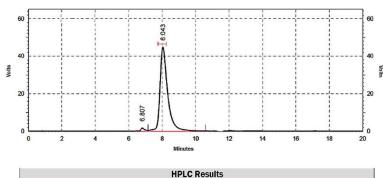


Mouse IgG Protein A Purified @ LAMPIRE



High-Quality • Lot-to-Lot Consistency • Shipped Worldwide Affordably Priced • Research & Bulk Quantities Available

- Passive heterophilic blocker controlling false positives
- HAMA (human anti-mouse antibody) blocker in assays with mouse
- derived antibodies
- Prepare conjugates for immunoassays
- Immunogen to prepare anti-mouse IgG secondary antibodies and secondary antibody conjugates
- Negative control for flow cytometry, Western blotting, IHC, and immunoprecipitation applications
- Standard in assays to quantitate monoclonal production by ELISA
- Bead coatings to sort and separate cells
- All isotypes present IgG1, IgG2a, IgG2b and IgG3 in the purified product



PK #	Name	Retention Time	Area	Area Percent
1	Dimer	6.807	115838	1.97
2	IgG	8.043	5775498	98.03
Totals			5891336	100.00

SDS PAGE ANALYSIS REDUCED			
	1: Molecular Weight Sto		
	e 2: Mouse IgG		
	Lanes 1 2		
	ΤĔ		
250			
150			
100			
75			
50			
37			
25			
20	and a second sec		
15			
10			

Description:	Serum was collected from normal healthy donor animals. Antibody was prepared using Protein A affinity chromatography.
Preservative:	0.09% Sodium Azide
Purity:	\geq 95 % (SDS PAGE and HPLC)
Buffer:	0.01M Sodium Phosphate,
	0.15M NaCl (PBS), pH 7.4
Concentration:	10 mg/mL
Storage:	2-8°C (Extended: -10°C or colder)
Package Sizes:	100 mg, 500 mg, 1 gram, 10 grams, Custom

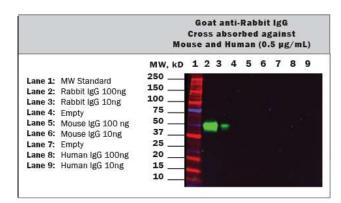


Secondary Antibodies @ LAMPIRE



Secondaries from LAMPIRE: Antisera, Affinity Purified

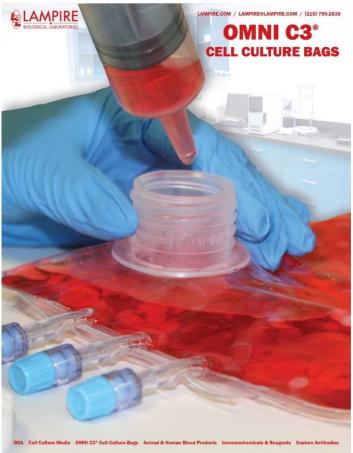
- High purity & specificity
- Low cross-reactivity
- Customizable
- Manufactured in the USA
- Consistent quality standards
- In-house processing
- Wide range of species
- Designated donor animals
- Lot-to-lot consistency
- Custom conjugates & fragments
- Research & bulk packaging
- Shipped worldwide



BIOLOGICAL LABORATORIES

Applications: Immunoassays, Flow cytometry, Assay controls, Western blot, ELISA

Omni C3 Cell Culture Bags @ LAMPIRE



Applications:

- Suspension Cells
- Hybridoma, CHO, HEK293
- Customizable Configurations
- Adherent Cells
- Anchorage Dependent Cells

Omni C3 Cell Culture Bags

LAMPIRE Omni C3 Cell Culture Bags are a simple, single-use device manufactured for the culture, harvest and storage of cells. Gas permeable, the Omni C3 Cell Culture Bag allows for the efficient transfer of gases, making it unnecessary for gassing the cultures. In addition, or in lieu of the screw cap fitment (which facilitates cell harvesting) the bags can be fitted with Luer-lock ports and/or needle ports for aseptic inoculation and sampling. These sterile connections minimize the opportunity for culture contamination.

- Cell Culture & Harvest
- Cryo-Storage
- Centrifugation
- Leak Tested
- Aseptic Inoculation
- Electron Beam Sterilized
- Efficient Transfer of Gases
- Customizable Configurations
- Reduced Biological Waste
- Connect for Production Scale-Up



Cell Culture Media @ LAMPIRE



Consistent, High-Quality, Customizable Tissue Culture Media & Reagents, OEM Labeling



25+ years of expertise formulating media

Collaboration Personalized customization to optimize results

Custom Batch Sizes

Made-to-order volumes and batches

cGMP QMS ensures high quality and consistency

Solutions & Reagents Standard formulations also available

Lobster Hemocyanin @ LAMPIRE



Research has shown:

- LLH is an effective carrier protein
- Low pre-existing immunity to LLH in rabbits
- Comparable antibody titers are elicited between LLH and KLH conjugated protein and peptide antigens
- Animals immunized with LLH conjugates do not produce crossreacting antibodies to KLH
- The immune response to the LLH protein is less than that to KLH; enhancing response to the hapten
- LLH can be alternated in immunization protocols utilizing BSA, OVA, and KLH to reduce immunodominance of the carrier molecule

Lobster Hemocyanin (LLH) Novel Carrier Protein

Introducing a novel carrier protein for the preparation of highly effective immunogens. LLH (Lobster Hemocyanin) is a protein purified from the sustainable American lobster. This product is exclusively distributed by LAMPIRE as a lyophilized powder in phosphate buffer saline and is packaged as 20 mg/vial. Other package sizes, including bulk, available on request.



Manufactured in collaboration with



Contract Manufacturing @ LAMPIRE



Contract Manufacturing Services:

- Pilot batch through fill, tested, labeled, finished product stages •
- Flexibility to accommodate a wide range of manufacturing needs; general lab environments, abattoir processing to certified class 2, 5 and 7 rooms/hoods.
- Impeccable track record of on-time delivery for over 15 years .
- Contract manufacturing, packaging and kitting capabilities for all your needs.
- Specialized in complicated technical transfer projects

Applications:

- Antibody fills for diagnostic controls
- PCR controls; master mix, primers, positive controls, internal controls, buffers
- Raw material manufacturing for injectables
- Full kit assembly

Concept









Finished Product



High-Tech Vivarium

- Accreditations: AAALAC, EC No. 1069/2009 / EU No. 142/2011, NIH-OLAW, USDA.
- 100% HEPA-filtered once-through fresh air
- "Clean-Dirty" corridor system
- Back-up generators and alarmed monitoring systems
- Monitoring of closed-circuit surveillance system on and off premises
- Use of Innovive IVC Rack System

Species Available:

Mice
 Rats
 Hamsters
 Guinea Pigs
 Rabbits

Services Offered:

- Pharmacokinetic/ Drug Metabolism Studies
- Contract Breeding Development and Genotyping for GEMMs
- Xenograft Animal Models
- Monoclonal Antibody Development & Production
- Hybridoma Development
- Ascites Program
- Biorepository Storage
- Routinely Work With Immune Compromised Strains
- PBMC/Buffy Coat isolation, Splenectomy, Bone Marrow Harvest and RNA isolation







Services @ LAMPIRE

Custom Antibodies

- Project Design, Immunogen Design & Scopes
- Polyclonal Antibody Development and Production
- Monoclonal Antibody Development and Production
 - Cell Line Optimization
 - Cell Bank Production
 - Cell Line Storage

Antibody Support & Immunochemistry Services

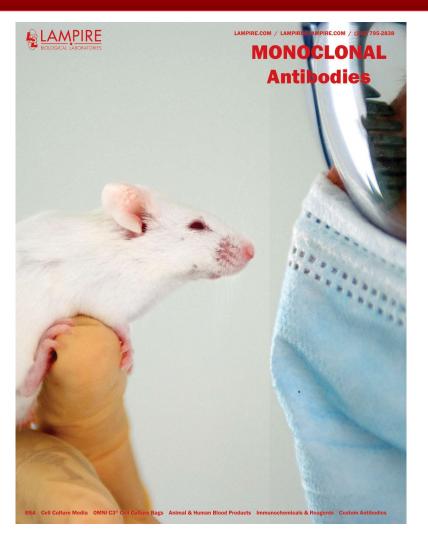
- Peptide Synthesis
 - Peptide Design and Identification Services
- Custom Antigen Preparation
- Antigen Conjugation
 - KLH, OVA, BSA, Lobster Hemocyanin (LLH), Biotin
- Titer and Avidity Monitoring
- Antibody Purification Services
 - Affinity, Protein A, Protein G, IgY Purification from Eggs, Egg Preservation
- QC Testing Services
 - ELISA, HPLC, QPA, IEP, Radial Immunodiffusion, SDS-Page, Western Blot, Cross-Reactivity, BCA Total Protein, Bradford Total Protein
- Protocol Services
 - PBMC/Buffy Coat isolation, Splenectomy, Bone Marrow Harvest, RNA isolation, Tattoo-Needle ID Immunizations, Popliteal Lymph Node Injections, Fab Fragmentation, Antigen Extraction from Gel Slices
- Antibody Tagging
 - Fluorescent, Gold Colloidal, BSA, BIOTIN, Alkaline Phosphatase







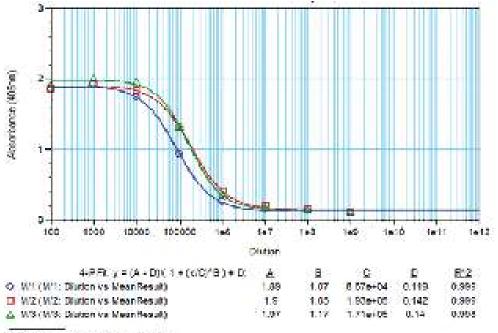
Custom Monoclonal Antibodies @ LAMPIRE



Single source supplier for antibody design, development, production, purification and storage. Our purification specialists ensure maximum yield & quality of your antibody, accommodating large scale production and multi-site storage of your cell lines.

Custom Monoclonal Antibodies

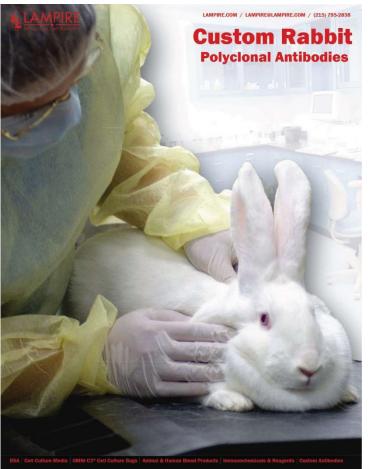
- Proven success rate across a broad range of immunogens (peptides, oligos, cell biomarkers, small drug molecules)
- Well developed and documented production protocols
- Monoclonal antibodies have the highest specificity and reproducibility
- State-of-the-art small animal vivarium with
 AAALAC Accreditation to ensure quality & animal welfare



Carve Hil Colon - Fixed Weight Value



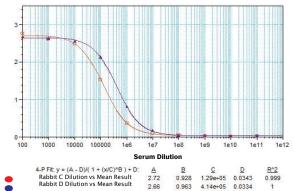
Custom Polyclonal Antibodies @ LAMPIRE



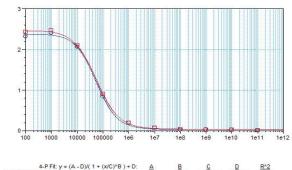
Custom Polyclonal Antibodies:

- High success rate across a broad range of immunogens
- Considerable phylogenetic distance from most animal research models
- Excellent response to human immunogens and haptens
- Well-developed and documented production protocols
- Rabbits generate high affinity antibodies
- AAALAC Accreditation to ensure quality & animal welfare
- Not just rabbits: LAMPIRE has over 20 species available

Two Years Plus - Quality Titer Response for Long-Term Production



Fast, Quality Titer Response in 30 Days



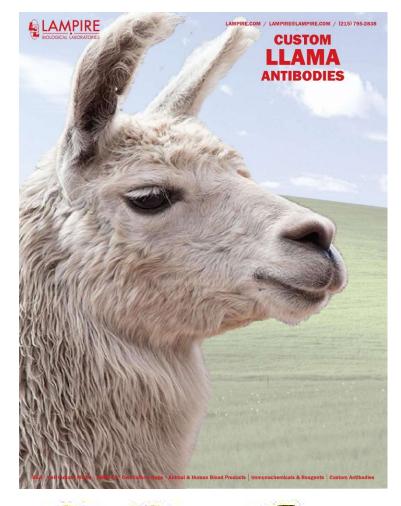
Rabit B Dilution vs Mean Result 2.47 0.991 5.66e+04 0.0355 1





 Design & Immunize Animal with Antigen
 Animal Makes Antibodies
 Bleed the Animal & Collect Antibodies

Llamas @ LAMPIRE



FC CH2 FC CH3 Fragment (15 kDa)

Llama Antibodies

- Unique heavy chain only antibodies
- Antibodies bind to epitopes that are inaccessible to traditional antibodies (enzyme active sites, clefts in membrane proteins)
- Longer shelf life, higher tolerance to conditions and pH
- Recombinant 'nanobodies', or antigen-binding single domain proteins are easily engineered from llama antibodies
- LAMPIRE can provide buffy coats and or RNA suitable for Bcell sorting, phage display or other downstream antibody production

Llama Whole Blood, Serum, Washed Cells & Plasma

LAMPIRE offers llama whole blood, serum, plasma and llama IgGs. LAMPIRE carries a line of non-conjugated and conjugated secondary llama antibodies for use in various applications.

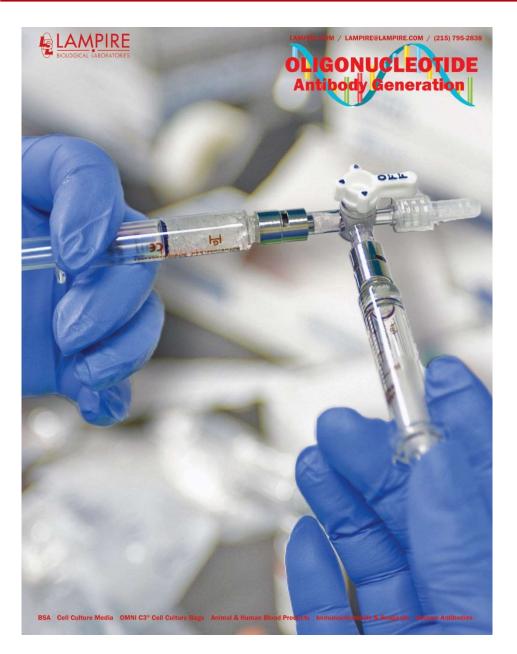
Services Available:

- Buffy coats
- RNA isolation
- Downstream antibody production technologies
- Standard protocols or customized to meet your specific needs





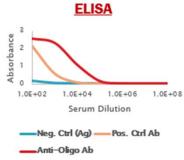
Oligonucleotide Antibodies @ LAMPIRE



Oligonucleotide Antibody Generation

Anti-sense therapies are a growing class of oligonucleotide-based therapeutics designed to treat a variety of diseases. Anti-oligonucleotide antibodies are frequently used to support drug development and monitor anti-sense drug levels. LAMPIRE actively supports these challenging programs with defined and effective protocols developed at LAMPIRE in both monoclonal and polyclonal projects. General strategies include:

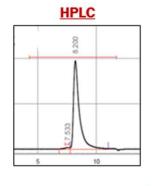
- Oligo conjugation to a variety of carrier molecules
- LAMPIRE's custom oligo immunization protocol
- Titer monitoring via ELISA
- Affinity purification using biotinylated material with Avidin resin coupling.





KDa

150





Custom Antibodies & Purification @ LAMPIRE

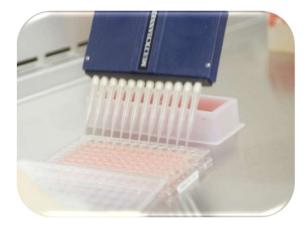
Custom Antibody Generation

- Experience with multiple antigen formats
 - Peptides, proteins, small molecules, nucleic acid oligos, antibody fragments, whole cells/cell lysates, and carbohydrates
 - Antigen design services
- Immunization Protocols
 - Multiple LAMPIRE standard protocols
 - Client provided protocols
 - Customized immunization protocols to match your antigen/ downstream application

Purification Optimization

- Customized Strategies
 - In house column preparation: Control orientation/presentation of antigen
 - Design custom purification strategies in collaboration with our clients
- Unique or difficult purifications:
 - Amino acid modifications (e.g. phospho-specific), anti-idiotype
 - Purify against carbohydrates, steroids, oligonucleotides and whole cell antigens









Beyond the Laboratory

Sustaining the Future – Workforce Development

Leading the workforce development effort to grow interest in the Life Science Industry, turning today's students into tomorrow's experts.

2015 Education Workforce Leadership Award - Given by the PA Department of Education Development of an Education Industry Partnership in the Field of Biotechnology in conjunction with the Bedford County Technical Center.



Giving Back to the Community

Volunteering with multiple local organizations education and service organizations, Gregory F. Krug and LAMPIRE have a strong presence in the community.









2017 Bedford County Development Association Economic Development Award - Given for outstanding support of the economic development of Bedford County, Pennsylvania

2018 Ben Franklin iXchange Partnership Award - Given to an individual whose strong vision, dedication and commitment have helped Ben Franklin Technology Partners accomplish its goals



The LAMPIRE Advantage

Customer Focused: Technical Knowledge and Experience

More than 40 years of collaborating with the research, diagnostic and scientific industries worldwide. We work together with you from concept-to-completion. Our Project Management, Sales Associates, Customer Service Representatives and Technical Support personnel become part of your team.



World Class Specialized Facilities

State-of-the-art facilities designed with efficiencies and redundancies already in place to provide our expert techs every opportunity to make your project a success.

Quality Management System

Complete QMS Documentation System with certification to ISO 13485. In addition to AAALAC, OLAW, and continuous process improvement systems consistent with our Quality Policy.

Expansive Product and Service Offerings with Customization Available

One stop for all your research needs. Our quality products and services can be customized to meet your specifications.

Beyond the Laboratory

LAMPIRE employees are passionate. Passionate about education, family, and community.



