

ENDOTOXIN
NEWSLETTER



14th Biennial Meeting
22-24 September 2016 Curio-Haus/Hamburg, Germany



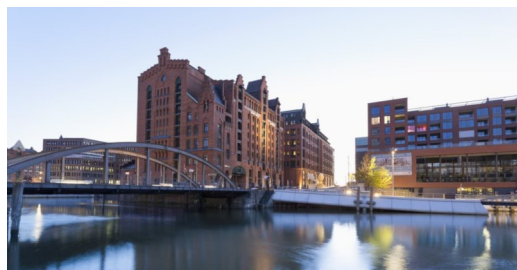
Hamburg's historic label, 'The gateway to the world', might be a bold claim, but Germany's second-largest city and biggest port has never been shy. Hamburg has engaged in business with the world ever since it joined the Hanseatic League back in the Middle Ages. Its role as a centre of international trade in the late 19th and early 20th centuries brought it great wealth (and Unesco World Heritage recognition in 2015), a legacy that continues today: it's one of Germany's wealthiest cities.

Hamburg's maritime spirit infuses the entire city; from architecture to menus to the cry of gulls, you always know you're near the water. The city has given rise to vibrant neighbourhoods awash with multicultural eateries, as well as the gloriously seedy Reeperbahn red-light district. Hamburg nurtured the early promise of the Beatles, and today its distinctive live- and electronic-music scene thrives in unique harbourside venues. Hamburg has 2,300 bridges -- more than Venice and Amsterdam combined.*

(*reference: www.LonelyPlanet.com)

*The city's attractions are only matched by its inherent tempting spirit.
Come, Hamburg says, have a ball.*

And, we, the International Endotoxin and Innate Immunity Society, invite you to join us now if you have not already committed. The Society is hosting its 14th biennial meeting 22-24 September 2016. The Scientific Program is on the following page. Honorees and awardees are also showcased in this issue. For additional information and details on the meeting, visit our website at www.IEIS.org which contains a link on its home page to the symposium.



August 2016

NEWSLETTER EDITOR

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*See you in
Hamburg!*

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14th Biennial Meeting: Scientific Program

OPENING LECTURE:

Ernst Th. Rietschel (Germany)

"Molecular decryption of the secret of bacterial endotoxin – a tribute to Otto Lüderitz"

MAIN TOPICS AND KEYNOTE SPEAKERS:

Lipopolysaccharide Transport
Changjiang Dong (UK)

"Lipopolysaccharide from the inner membrane to the outer membrane surface of Gram-negative bacteria"

Regulation of LPS biosynthesis and mechanisms of LPS and innate immunity ligand intracellular transport and trafficking.

Structures of Lipopolysaccharides
M. Stephen Trent (USA)

"The power of asymmetry: architecture and assembly of the Gram-negative outer membrane lipid bilayer"

Manifestations and mechanisms of lipid A/LPS heterogeneity; application of combinatorial bioengineering to advance understanding of structure-activity relationships.

MAIN TOPICS AND KEYNOTE SPEAKERS, cont'd:

Targeting Innate Immunity
Mihai Netea (Netherlands)

"Immunometabolic circuits in innate immune responses"

Novel immunomodulators derived from natural and synthetic sources.

Plant Innate Immunity
Antonio Molinaro (Italy)

"Microbial glycoconjugates as elicitors or suppressor of plant innate immunity"

Plant innate immune recognition and effector systems.

Outer Membrane Vesicles (OMV)
Meta Kuehn (USA)

"Roles of outer membrane vesicles in endotoxin dissemination and remodeling"

Delivery of bioactive bacterial products via OMV and interactions with host factors.

MAIN TOPICS AND KEYNOTE SPEAKERS, cont'd:

Epigenetic Control of Innate Immunity
Charles E. McCall (USA)

"Epigenetics inform metabolism during acute inflammation: Novel ways to treat sepsis"

Mechanisms of epigenetic regulation of gene expression and cellular phenotypes

Antimicrobial Peptides and (Gram-negative) Sepsis
Karl Lohner (Austria)

"Development and potential application of lactoferrin-derived peptides to combat sepsis induced by bacterial pathogenicity factors"

Development and application of novel test systems and bioactive products and combinations.

Endotoxin Detection
Friedrich von Wintzingerode (Germany)

"Low endotoxin recovery"

Importance, challenges and advances in endotoxin detection in various biological and environmental settings. ▲

Conference Dinner: Friday Evening, September 23, 2016

We like to invite you to register for the conference dinner to the restaurant "Parlament", which is located in the city hall of Hamburg. Enjoy a classy three-course-dinner and meet colleagues and friends in a historical ambience with a magnificent room, an impressive arched roof and even a chimney.



Parlament

Later you can dance to the music of the band "Comedian Scientists", who will entertain you with swinging songs. The band "Comedian Scientists" has been entertaining audiences at conference dinners since the year 1994. Powerfully eloquent, with a disrespectful charm and swinging music, the band looks on the bright side and plays songs that tackle all days' life, in particular that of physicians and scientists. The musicians know very well what they are singing about, since four of them are physicians and/or scientists too, and for cases of emergency the drummer is in charge, as he is a lawyer. The band assures a casual and



The Comedian Scientists

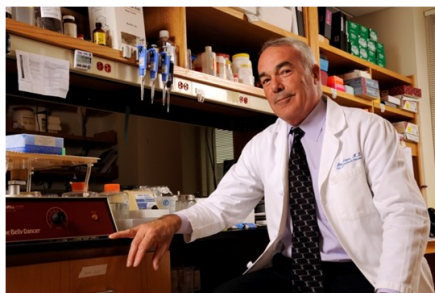
relaxed atmosphere at dinner or welcome parties, presenting a special program which fits to the topic of a particular symposium. ▲

Awards for the 14th Biennial IEIIS Meeting Hamburg, Germany September 2016

by Jerrold Weiss

HONORARY LIFETIME MEMBERSHIP: *Awarded in recognition of outstanding career contributions to the knowledge and understanding of bacterial endotoxins and innate immunity. Recipients are granted a permanent exemption from dues and meeting registration fees. Nominations are reviewed by a group of past, current, and future IEIIS presidents.*

Dr. Alan Cross, M.D., is currently Professor of Medicine at the University of Maryland School of Medicine where he arrived in 1994 after 20 years at the Walter Reed Army Institute of Research/ Walter Reed Army Medical Center.



At the latter, Alan established himself as both a clinical and basic science expert in infectious diseases and an expert in vaccine development, as well as rising to the rank of Colonel and receiving a meritorious Service Medal and Legion of Merit awards. He is the consummate physician/scientist/teacher, mentoring pre-doctoral medical and PhD students as well as post-doctoral fellows and young clinicians. He has published nearly 50 invited chapters and 200 peer-reviewed research publications including studies on pathogenicity of *Pseudomonas*, *Klebsiella*, *E. coli*, and *Bacillus anthracis* and, particularly, on therapeutic interventions in sepsis. He has long been an active member of the IEIIS and its predecessor the IES, serving as President of the IEIIS from 2008-2010.

Alan remains actively engaged in research with funded projects directed at studies of: 1) the role of TLR4 sialylation

in negatively regulating LPS-induced TLR4 dimerization and signaling and the ability of neuraminidase treatment to increase TLR4 responsiveness to LPS and host-derived oxidized lipids; and 2) the use of peptidomimetic agents that block B7-CD28 signaling as novel prophylactic and therapeutic agents in Gram-positive toxic shock and necrotizing soft tissue infection and Gram-negative bacterial peritonitis and sepsis.

ALOIS H. NOWOTNY AWARD: *Awarded to a young investigator who has shown excellence in research, made a significant contribution to the study of endotoxins, and shows potential for further scientific development, in particular concerning the chemical and biochemical bases of endotoxin structure and function that were a focus of Dr. Alois Nowotny's interest and research.*

Dr. Alba Silipo is an extremely talented carbohydrate chemist who has made many important and highly recognized contributions to the structural elucidation of bacterial (lipo)polysaccharides and glycoconjugates. Most recently, she has extended application of specific and non-ordinary NMR approaches to the study of interactions of microbial glycoconjugates (such as LPS or peptidoglycan) and eukaryotic protein receptors. She has helped catalyze instigation of an international collaboration network with colleagues in the fields of glycol-chemistry, glycobiology, and micro-biology as well as initiate bilateral projects between Poland and Italy and France and Italy.

Dr. Silipo received her PhD in Chemistry in 2004 ("Primary structure of glycolipid from Gram-negative bacteria") at the University of Naples Federico II where she is now Professor of Organic Chemistry.



SHELDON E. GREISMAN AWARD: *This award is made to honor the memory of Dr. Sheldon E. Greisman, M.D. His contributions helped provide a foundation for understanding host responses to endotoxin. Many of his observations provided a conceptual basis for current clinical innate and adaptive immunity research. This award is given to an investigator who has made substantial and original contributions which have led to an increased understanding of the interactions between microorganisms and innate immunity and helped provide new opportunities and directions for development of diagnostic and therapeutic approaches.*



The research of **Dr. Marina Freudenberg**, spanning four decades, has contributed greatly to the remarkable advances that occurred during that period in knowledge of interactions between microorganisms and innate immunity, especially

as they relate to endotoxins. Together with Chris Galanos at the Max Planck Institute for Immunobiology, as both scientific and life partners, they developed improved extraction and purification methods for isolation of a broader range of endotoxin species that also helped lead to the identification of the lipid A portion of LPS as the moiety most responsible for the potent immune-stimulatory activity of endotoxins. Their original studies of endotoxin-macrophage interactions were pivotal to recognition of the prominent role of macrophage-derived pro-inflammatory cytokines in host responses to endotoxins that could contribute to development of septic shock. Their studies were also instrumental to recognition of the phenomenon of endotoxin tolerance, both its manifestations and possible mechanistic bases. Their studies and collaboration with Bruce Beutler helped lead to the identification of TLR4 as the key pro-inflammatory signaling receptor to LPS. Subsequent studies helped implicate a

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Awards from the 14th Biennial IEIIS Meeting Hamburg, Germany September 2016

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pro-inflammatory role of TLR4 in response to host-derived products mobilized in the apparent absence of LPS. These findings have helped provide a rationale for testing of TLR4-blocking agents such as eritoran in a variety of settings of “sterile inflammation” (e.g., ischemia/reperfusion and trauma-induced injury) as well as acute lung injury caused by influenza-induced tissue damage.

During this time, Dr. Freudenberg has been a valued member of the endotoxin and innate immunity research community, generously helping many others both in sharing of unique experimental reagents and in critical scientific review and encouragement.

IEIIS TRAVEL AWARDS: *IEIIS Travel Awards are chosen on the basis of review of the abstracts submitted and are directed toward student members of the IEIIS. Those selected this year are:*



Nicoló Paracini

Nico is a 2nd year PhD student at the Institute for Cell and Molecular Bioscience of the University of Newcastle with Professor Jeremy Lakey. The main goal of his current work is to create a realistic mimic of *E. coli* outer membrane for antimicrobial studies under physiologically relevant conditions.

OP 21 (oral presentation)

Session on Antimicrobial Peptides and (Gram-negative) sepsis

Saturday, 24 September 14:55-15:15

“Realistic bacterial outer membrane models for antimicrobial research”



Mark Guillotte

Mark is a PhD candidate at the University of Maryland Baltimore, Department of Molecular Microbiology and Immunology, laboratory of Prof. Abdu Azad. Research is focused on mechanisms of *Rickettsia* pathogenicity. In mouse infection models, control of rickettsial burden and disease resolution depends upon inflammatory cytokine production driven in part by TLR4. Mark will report structure of lipid A of *Rickettsia*, its ability to trigger TLR4 signaling, and remodel its lipid A in response to temperature shifts that mimic vector-to-host transition.

PO 04 (poster presentation)

Saturday, 24 September

“Structure and characterization of lipid A from Rickettsia”



Toshihiko Aiba

Toshihiko is a 3rd year PhD candidate, mentored by Prof. Koichi Fukase (Dept. Chemistry, Osaka University) and Prof. Yukari Fujimoto (Dept. Chemistry, Keio University). His current focus includes synthesis of glyco and lipid analogues of inositol phospholipids to better define the structural requirements for their immunomodulatory activity.

PO 58 (poster presentation)

Saturday, 24 September

“Synthesis and immunostimulatory activity of inositol phospholipid as NKT cell modulator”

Awards from the 14th Biennial IEIIS Meeting Hamburg, Germany September 2016

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THERESA L. GIOANNINI TRAVEL AWARDS FOR WOMEN IN SCIENCE: *Theresa L. Gioannini Travel Awards for Women in Science began at the 2014 biennial meeting in memory of Dr. Theresa L. Gioannini: scientist, teacher, mentor, wife and mother extraordinaire. Her creativity and rigor made possible several seminal contributions concerning opiate and MD-2/TLR4 receptors. The awards are used to support the attendance and participation of women graduate students, post-docs, and junior faculty at IEIIS-sponsored meetings. Those selected this year are:*



Aude Breton

Aude is a 3rd year PhD student at the Institute of Integrative Biology of the Cell, University of Paris-Saclay, Orsay, France. Her thesis work “Endotoxins, Extraction, Characterization and Detoxification for Human Applications” is supported by CIFRE funding under the auspices of an academic laboratory of “Endotoxins, structures and host responses” and the company “LPS-Biosciences”. She will present her studies of the structure and functions of LPS of *Vitreoscilla filiformis*, bacteria isolated from spa waters that are used in treatment of atopic dermatitis.

PO 05 (poster presentation)

Friday, 23 September

“Vitreoscilla filiformis lipopolysaccharides – structure to activities relationship”



Alison J Scott

Dr. Alison Scott is a Research Associate in the Department of Microbial Pathogenesis at the University of Maryland, Baltimore School of Dentistry. As part of her graduate studies she developed methods to spatially resolve bacterial lipids, including lipid A, within host and vector tissues. Her work has expanded to include understanding the role of host lipid accumulation and metabolism in the innate immune response and this has led to unique insights into bacterial pathogenesis.

OP 23 (oral presentation)

Saturday, 24 September (session on endotoxin detection) 16:50-17:10

“Simultaneous characterization of lipid A structure and the host innate lipid response in a Francisella infection model using 3D Mass spectrometry imaging”



Ryne Chentouh

Dr. Ryne Chentouh is an internal medicine and intensive care medicine resident in Paris. Last year she joined the laboratory of Prof. Jean-Marc Cavaillon at the Pasteur Institut (“Cytokines and Inflammation” unit) to do research on reprogramming of human monocytes induced by TLR4 selective agonists and pursue a master degree. The experience has been so positive – even with being on call during the night at the ICU – that Ryne has decided to continue her research efforts and pursue a PhD in Immunology. Current work to be presented at the IEIIS meeting is focused on reprogramming of human monocytes induced by the vaccine adjuvant monophosphoryl lipid A (MPLA). Results to be presented indicate distinct reprogramming effects of MPLA vs. LPS in human monocytes that are apparently species-specific (i.e., not manifest in MPLA-treated murine macrophages).

PO 31 (poster presentation)

Friday, 23 September

“Specific features of monophosphoryl lipid A activation of human monocytes”



LPS-Biosciences: From Academic Roots to Industrial Applications

by Martine Caroff

Academic Roots

In the early seventies, three students from the Paris South University in Orsay, Nicole Haeffner, Jean-Marc Cavaillon and myself, were looking for a laboratory where they could explore what scientific research really was. They found a group in the University Biochemistry Department, where one Director accepted to give some of his time. This Director was Dr. Ladislav Szabo. He was a visionary who very early on created a multidisciplinary program including both biochemists and immunologists, together with the group of chemists he headed. Three years later, we had found our way in research thanks to him. Jean-Marc went to the Pasteur Institute to prepare his PhD thesis in Immunology, supervised by Anne-Marie Staub. Nicole became an immunologist at the Medical Research INSERM, in a group headed by Pr. Kazatchine, working on AIDS, in the Broussais Hospital in Paris. I was highly motivated by early efforts to decipher LPS structures and thus decided to stay in Orsay working on *Bordetella pertussis* endotoxin structure-activity relationships. Later, I accepted a position at the National Scientific Research Center, CNRS.

Very early during my DSc thesis work (1980), I discovered the adjuvant and non-toxic properties of *Bordetella pertussis* MPLA. This finding supported our conviction that LPS and LPS (lipid A)-related compounds could provide beneficial therapeutic molecules, if we could better understand the structural and functional bases of their protective vs. toxic actions.

Important progress was achieved in 1989 by obtaining the first mass spectra of native (non-chemically modified) LPS. These findings helped advance knowledge of LPS structures and appreciation of structural heterogeneity and complexity of LPS. These structural data also opened the way to studies of LPS biosynthesis and helped define the smallest fragments of these molecules responsible for toxic or beneficial properties. This structural work was realized with great help from Dr. Doris Karibian who had joined my group, as well as physicists giving us access to their mass spectrometers. We collaborated for 30 years, and I continue to collaborate with Dr. Serge Della-Negra on a project using innovative SIMS techniques

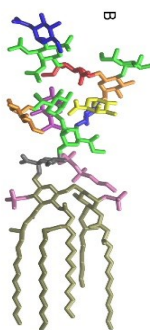
with accelerated ions for LPS characterization of micro scale samples. We hope and expect these new efforts will make possible a better understanding of native, *in vivo* LPS structures.



Drs. Szabo (left) and Perry (right) in the "Endotoxins" laboratory in Univ of Paris Sud, Orsay, 1979

Dr. Malcolm B. Perry was a Canadian chemist, who specialized in endotoxin structures that could be exploited for human and veterinary vaccines and pathogen detection. I joined his group during my post-doctoral stay in Ottawa at the NRC in 1982. A major focus of Dr. Perry's laboratory was the structural characterization of the capsular polysaccharides of *Streptococcus pneumoniae* thought to be relevant to antigen cross reactivity studies directed at improving the 23-valent US vaccine. We worked together on the characterization of the type 15A structure and reactivity. Other collaborative projects included the structural characterization of *Brucella abortus* O-chains and those of *Yersinia enterocolitica* O9 and the cross reactivity between these bacteria. Later Malcolm studied the O-chain structures of *Escherichia coli* O157:H7 and other major cross-reactive antigens. He was an amazing scientist, a living encyclopedia, a mentor and a great friend, and we continued our interactions and collaborations for 30 years.

He worked at the bench at NRC until he died, at 82, four years ago, after a long and fruitful career.



Bordetella pertussis LPS 3-D structure (adapted from Carbohydr. Res. 378 (2013) 56)

The studies of *Bordetella* LPS structure-activity relationships involved many different collaborators including from the very beginning my friends from high school and University, Nicole Haeffner and Jean-Marc Cavaillon. Thanks to other collaborators, like Dr. Nicole Guiso who was Head of the *Bordetella* Laboratory from the Paris Pasteur Institute, we were able to define the structures of LPS of several different *Bordetella* isolates (*bronchiseptica*, *parapertussis*, *petrii*, and *holmesii*) and compare virulence, genetics and inflammatory capacities. Among the novel findings we made in Orsay were new structural elements (two glucosamines) present on the lipid A phosphate groups of different *Bordetella* species. More recently collaborative studies with Dr. Rachel Fernandez, from the University of British Columbia in Vancouver, Canada have confirmed this substitution in *B. pertussis* LPS as well, using strains and mutants selected and grown in Vancouver. These studies also helped define criteria for non-toxic potential vaccine strains.



From the left to the right:
Dr. Nicole Guiso,
Pr. Jean-Marc Cavaillon,
Dr. Martine Caroff, and
Dr. Serge Della-Negra

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LPS-Biosciences: From Academic Roots to Industrial Applications

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One deep and lasting lesson from my 40 years of research in the Paris-South University in Orsay was the importance of collaboration between different researchers representing different disciplines, including Immunology, Physics, Chemistry, Bacteriology, and also industry.

During all these years, I was driven, like many, by the need and desire to find new ways to explore endotoxin structures from various species, to better understand the structural basis of their biological activities and of bacterial pathogenicity or resistance. A key to our success was our ability to develop new tools and procedures needed for extraction, characterization and structural analysis of these complex molecules. We worked and innovated by the slogan: “yes, we can!”

Our efforts began with MPLA. Hydrolysis methods were also developed and tested for their ability to preserve native lipid A structures, especially the glycosidic phosphate group in lipid A while splitting the lipid and core polysaccharide moieties of LPS apart. The first successful method was SDS-promoted pH 4.5 sodium-acetate buffer which helped disaggregate LPS molecules and facilitate the mild hydrolysis. A second method using Isobutyric-ammonium hydroxide reagent made possible direct bacterial cell hydrolysis, lipid A extraction and MS characterization in a single day from a bacterial pellet. More recently, a third micro-method was developed which employed MALDI-MS analysis in triethylamine-citrate reagent, following heating of the LPS suspension at 100°C to split the lipid and core moieties apart.

The application of MS analyses to LPS was initially limited to dephosphorylated or methylated lipid A species. We reasoned that the propensity of LPS molecules to aggregate in aqueous solutions impeded MS analyses and led to a year-long effort to reduce the LPS aggregates. A microwave treatment, combined to disaccharide used as matrices provided the solution. Light-scattering analyses demonstrated that the aggregates were reduced and MS spectra were finally

obtained. These technical breakthroughs accelerated solutions of multiple lipid A structures and, in the case of the structure of *Yersinia enterocolitica* lipid A revealed differences with *Escherichia coli* lipid A that had not previously been appreciated. Development of a new alkaline sequential liberation method was instrumental in resolving different *Yersinia* species structures, including that of *Y. pestis* whose fatty acyl composition fluctuated with changing temperature of bacterial growth and markedly altered mammalian innate immune recognition and defense against *Y. pestis* infection. All these methods were also applied to the analysis of different *Helicobacter* species lipid A structures.

The development of these different analytical techniques and treatments of LPS, including methods for recovery of lipid A without the use of phenol for extracting LPS provided methods that were safer for the environment and more broadly applicable to diverse LPS species including those more hydrophobic species that are lost to the phenol phase. These advances opened the way to the creation of LPS BioSciences, together with the adjuvant R&D project and others to come.

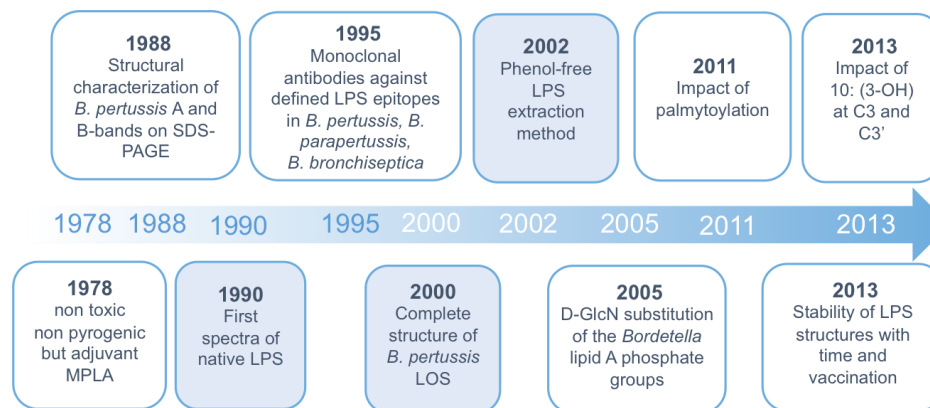
Start-up History

During one of my collaborations with an industrial partner, I was advised to patent the extraction method. He saw great potential applications in obtaining LPS (lipid A) without toxic manipulations or having the risk of remnants of those manipulations in therapeutic products.

I had to persuade my research council to pursue a patent, which was not easy, but eventually the University patented the method. This method led to a business project which was first granted in 2006 with the University and regional prize for development, and then in 2007 and 2011 with 3 national grants for start-up creation projects.

Meanwhile, the FDA approved MPLA as an adjuvant. Having missed this first business adventure, our focus was shifted to producing other molecules of detoxified LPS that retained beneficial immunostimulatory properties of endotoxins without the deleterious ones. The University, with three successive Presidents, and their Deans helped me to maintain and develop my specialty on the campus. I am really grateful to Pr. Anita Bersellini, Pr. Guy Couarraze, and Pr. Jacques Bittoune, as well as to the Vice President of Research, Pr. Alexandre Revcolevschi, who all supported our research and our efforts to create a start-up company dedicated to endotoxins. The University Service for Innovative and Commercial Activities (SAIC) helped us with patent development and human professional support, as well as searches for funding.

In 2008, the Paris-Saclay University funded the construction of brand new laboratories to welcome the start-up in the Microbiology Department. Professional hires followed, and the academic group also benefited from this environment.



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LPS-Biosciences: From Academic Roots to Industrial Applications

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Five years were necessary to officially create « LPS-BioSciences ».

The Ministry of Research, with BPI France, first granted the Start-Up project in 2007 as a platform to produce, characterize diverse LPS and offer expertise. The start-up company was founded in 2011, after another grant obtained from the Ministry of Research, supporting our R&D project to develop new adjuvant molecules based on LPS detoxification. Scientipole Initiative gave us the opportunity to compete and obtain 5-years interest-free loans for helping us to fund the company's capital. The company was incubated at Genopole, one of the largest health clusters in France, which helped us organizing the structure of the company and obtaining visibility.

LPS-BioSciences is organized with a board of directors including Pr. Jean-Marc Cavailon for immunology expertise and myself for biochemistry, and an operational team including people from the industrial and academic world. Frederic Caroff, our CEO, was a manager in the industry, before joining the company. He has a degree in engineering from the Paris Ecole Centrale and also graduated from Essec business school. The challenge of growing the company from laboratory to industrial scale, encouraged the idea of initiating a start-up and creating technological value, a path today favored by younger investigators and investors.

Dr. Alexey Novikov, our R&D manager provided a very helpful interdisciplinary expertise developed in the academic world that combined chemistry, biochemistry and physics. His roots were in Russia and, for the past 15 years, in France working first with physicists and then with me on *Bordetella* and other projects. Two young PhD are group leaders for the services activity, Dr. Stephanie Thébault for Research and Vaccine fields and Dr. Flavien Dardelle for the Diagnostic and LPS Removal fields. Flavien also is project leader for our collaboration with BioRad concerning sepsis detection.

I had to retire in 2015 from the National Scientific Research Center, but I am still working as a volunteer for the University in

order to finish directing my academic projects and last thesis. The academic laboratory could not keep the specialized structural focus, and is instead now composed of a group of immunologists and MDs. Within the company, I am working as the Chief Scientific Officer and I am training young researchers. I always enjoy the fact we encounter new people from other companies interested in endotoxins, and all the corresponding new challenges ahead. The applications seem to be unlimited.

Today's Company

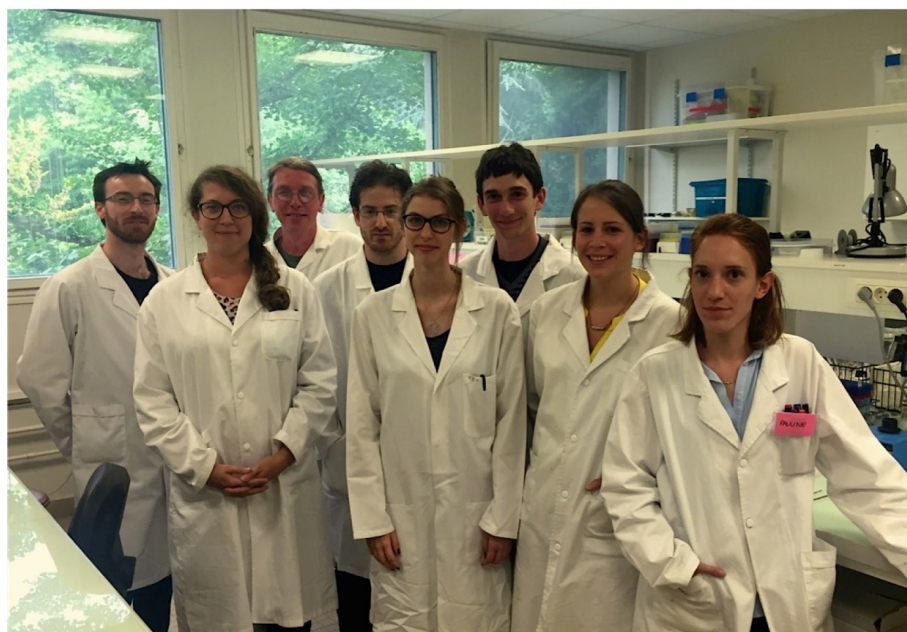
LPS-BioSciences is now a small company with 8 permanent positions, and also 2 non-permanent technical positions for students. The company is growing and recruiting. The aim of the company is to offer expertise in handling of endotoxins and to improve human and animal health. Our goal is to offer a consistent range of services and developments to meet the needs and challenges associated with endotoxins. The company offers LPS production, structural and biological characterization, detoxification, quantification and R&D collaborations, to academic and industrial

companies from the vaccine and diagnostic domains.

The Company quickly expanded to the international market in Europe and in North America. This has included working with well-known industrial companies from the vaccine and diagnostic world. Endotoxins are potentially very useful as adjuvants in vaccines and also as immunostimulants in other domains such as dermatology and cosmetics.

In the vaccine field, we have helped industrial companies to select and characterize the best LPS adjuvants to include in their bacterial vaccines. We have been purifying endotoxins to be used as reference adjuvants for quality control matters.

In the diagnostic field, we are collaborating with BioRad to develop diagnostic tests against sepsis and we are working with other industrial companies, such as Charles River, to improve endotoxin or bacterial detection.



From left to the right: Dr. Flavien Dardelle, Dr. Stéphanie Thébault, Dr. Alexey Novikov, Grégoire Jullien, Anaïs Boutserin, Alexis Jobbard, Aude Breton (PhD student) and Pauline Besalduch

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New IEIIS Members

Dr. Christian Alexander
Research Center Borstel
Borstel, Schleswig-Holstein GERMANY

Joseph Boll, PhD
Univ of Texas at Austin
Austin, TX USA

Francesco Borriello, MD
CISI
Naples, ITALY

Michael Chen, BS
Loyola Univ Chicago
Maywood, IL USA

Alexander Crofts
Univ of Texas at Austin
Austin, TX USA

Richard Davis
Univ of Iowa
Iowa City, IA USA

Erica Di Pierro
Univ of Texas at Austin
Austin, TX USA

Dr. Katarzyna Duda
Research Center Borstel
Borstel, Schleswig-Holstein
GERMANY

Katherine Farrar, MA
Univ of Calif., San Francisco
San Francisco, CA USA

Latha Ganesan, PhD
Ohio State Univ
Columbus, OH USA

Dr. Juan Garcia
Univ de Extremadura
Merida, Badajoz SPAIN

Kelsey Gregg
Univ of Maryland
Baltimore, MD USA

Mark Guillotte, MSc
Univ of Maryland, Baltimore
Baltimore, MD USA

Carmen Herrera, PhD
Univ of Texas at Austin
Austin, TX USA

Shankar Iyer, PhD
Univ of Iowa
Iowa City, IA USA

Samira Khakpour
Univ of California, San Francisco
San Francisco, CA USA

Mohd M Khan, MS, PhD
Univ of Maryland
Baltimore, MD USA

Welcome to our newest members.



*We look forward to your
continued participation in our
Society and invite you, along with
our current membership,
to share your studies
on our website, in our newsletter,
and at our 2016 biennial meeting.*

Arwa Kurabi, PhD
UCSD
San Diego, CA USA

Yasmina Laouar, PhD
Univ of Michigan
Ann Arbor, MI USA

Yelena Lerman, MS
Univ of Rochester
Rochester, NY USA

Lisa Leung
Univ of Maryland, Baltimore
Baltimore, MD USA

Antonio Molinaro, PhD
Univ of Naples Federico II
Naples, ITALY

Emily Nowicki
Univ of Texas at Austin
Austin, TX USA

Nicoló Paracini
Framlington Place
Newcastle upon Tyne, Tyne and Wear UK

Darren Perkins, PhD
Univ of Maryland, Baltimore
Baltimore, MD USA

Rajesh Rajaiah, PhD
Univ of Maryland, Baltimore
Baltimore, MD USA

Johannes Reich
Univ Regensburg
Bernried, Bavaria GERMANY

Allen Ryan, PhD
Univ of California at San Diego
La Jolla, CA USA

Alison Scott, BS
Univ of Maryland, Baltimore
Baltimore, MD USA

Feng Shao
Nat'l Inst of Biological Sciences, Beijing
Beijing, CHINA

Jianjin Shi
Nat'l Inst of Biological Sciences, Beijing
Beijing, CHINA

Rodney Shively, MA
Edmonds, WA USA

Alba Silipo, PhD
Univ degli Studi di Napoli Federico II
Naples, ITALY

Cherilyn Sirois, PhD
Center for Translational Research
Quito, Pichincha ECUADOR

Mark Wacker
Univ of Iowa
Coralville, IA USA

Dr. Guenther Weindl
Freie Univ Berlin
Berlin, GERMANY

Alberto Yanez Boyer, PhD
Regenerative Medicine Institute
Los Angeles, CA USA

Wei Zhang
Universite Paris Sud
Orsay, Essonne FRANCE

LPS-Biosciences: From Academic Roots to Industrial Applications

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For regulatory matters, we have been developing new methods for LPS quantification and removal, helping companies to produce polysaccharides or other therapeutic molecules that are devoid of pyrogenic endotoxins.

LPS-BioSciences runs its own R&D projects and aims at developing new classes of adjuvants based on detoxified LPS technology. By stimulating the immune system, lipopolysaccharides can be used as immune adjuvants. The adjuvant capacity of detoxified Lipid A molecules is well known and gained FDA approval in 2009 to boost the efficiency of several GSK vaccines. For many years, mono-phosphoryl lipid A has shown its efficiency and safety as an adjuvant in many vaccines. It has now become a reference for new adjuvants. Our goal is to go further and provide more effective adjuvants with the same safety as MPLA

has shown over the past 10 years. LPS-BioSciences thus developed a new platform enabling the detoxification of endotoxins.

The possible role of endotoxin in many diseases, including but not limited to septic shock, is increasingly recognized. This includes obesity, diabetes and atherosclerosis, with many other examples of endotoxin contribution to diseases possible. Therefore, maintaining LPS expertise and developing it for help in all the medical specialties is an important goal for health and security. Interest and need for this specialty will remain due to the potent bioactive properties of endotoxin, its abundance and ubiquity, diverse structural presentations and complex physical chemistry. ▲

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