

The 57th International Conference on the Bioscience of Lipids (ICBL) Chamonix - Mont Blanc, France, September 4-8.

Social Report

The Chamonix valley is located in the heart of the Alps, on the Italian and Swiss borders. Being 88 km from the international airport of Geneva, most people from abroad arrived to Geneva and reached Chamonix by shuttle bus. As we approached our final destination, the mountains grew more and more fascinating, especially for someone coming from a so-called “flatland”. We finally arrived in a beautiful small town enclosed by huge snow and ice covered summits, full of tourists, and a sky full of colorful gliders. Above all, there was the Mont Blanc, which for most of us was the symbol of inaccessibility. As the weather was wonderful, pleasant, and sunny, the beauty of the surrounding nature was just too obvious.

The conference itself was held at the beautiful congress center LE MAJESTIC and the hotels we stayed at were at walking distance.



The building was very much suitable for organizing meetings, had a good audio-visual equipment, several smaller halls to organize poster sessions, coffee breaks and lunch-time meals as well as a very efficient and friendly staff. It promised to be a comfortable and enjoyable 4 days.

The meeting was officially opened at Sunday evening by Michel Lagarde and Laszlo Vigh They introduced the van Deenen lecturer, Professor Charles N Serhan (Boston) who spoke about previously unrecognized chemical mediators derived from polyunsaturated fatty acids which were shown to control the acute inflammatory response by activating local resolution programs. Among these are the so-called specialized pro-resolving lipid mediators that include lipoxins, resolvins, protectins, and maresins. After this excellent presentation, we had a welcome cocktail with deservedly world-famous wines, the special drink kir (Crème de Cassis with dry white wine), and snacks.

The scientific program on Monday morning started at 9 and did not end until 7 pm. At the beginning and end of both morning and afternoon sessions there was an invited lecture and oral presentations in between. During one hour coffee breaks in the morning, during lunchtime, and in the afternoon, there was the poster session (altogether around 3 hours). The lunch was delicious and very well organized. During the coffee breaks and lunchtime we all enjoyed the beautiful view and sunshine at the terrace of the congress center.

The structure of Tuesday's scientific program was the same as on the previous day except that before the poster session at evening Christian Wolfrum presented the plan of the 58th ICBL, held in Zurich in 2017.

Wednesday's scientific program was planned as a half-day session since we planned to visit one of the summits, the Brévent. At only a few minutes' walk from the Congress center there were the lifts which took us fast to the middle station "Plan Praz" at 2000 m, which offered a small buffet as well as nice possibilities for a short walk. Most of us took the lift to go even one level higher, to peak Brévent at 2525 m which offered us a

beautiful view on the other side of the valley, the Mont Blanc, and the Aiguille du Midi. The gorgeous view was something that most of us never had experienced before. The weather was bright, sunny, and very pleasant. As there were different tracks to go, everybody decided which way to wonder around, and at every turn the mountains showed different faces, whereas at some point another summit (Aiguille du Midi, altitude above 3800 m) appeared. At some shady corners there was snow under our feet; however we all wore sleeveless tops.



Views from Mont Brévent

From the top, there was a path leading down to Plan Praz and quite some people enjoyed walking back. The ones who preferred to stay enjoyed the views and, at 5 o'clock, took the last lift heading back to town. We went to the hotels, changed until when the buses were waiting to take us to Les Praz, a village close to Chamonix. There, the Conference dinner was organized in a beautiful local house which also functioned as the restaurant of the Chamonix golf club. In the garden we had welcome drinks (first of all exquisite champagne) accompanied by the beautiful views of the sun lighted Aiguille du Drus and Aiguille Verte.



The restaurant was very spacious and vibrated a warm and friendly atmosphere; the delicate food and wines served surpassed our expectations of the *French Cuisine*.

During the dinner, awards for the best posters and young speakers were announced. The president of the ICBL thanked the organizers for all their efforts to make the 57th ICBL such a well-organized meeting.

Thursday's scientific program was scheduled with invited lectures, oral presentations, and posters similar as during the previous days.

At 17:40 the conference was concluded and closed. After thanking the local organizers Professor Michel Lagarde and his colleagues, Nathalie Bernoud-Hubac and Marie-Caroline Michalski and Mrs Evelyne Roudier from Bureau des Congrès de Chamonix for arranging a great and interesting meeting, we all said goodbye and look already forward to participate at the next ICBL next year.

László Vígh
President of ICBL

57th International Conference on the Bioscience of Lipids (ICBL)
Chamonix – Mont-Blanc, France, September 4-8, 2016
Scientific Report: “Lipidomics: from Structures to Functions”

The 57th ICBL was held in Chamonix, located at the extreme eastern part of the Auvergne-Rhône-Alpes region of France, very close to the Italian and Swiss borders. This ten thousand people city, just at the foot of Mont Blanc, the highest summit of Western Europe, is well equipped with hotels to receive the mountaineers and hikers from around the world, and the scientific delegates as well! The ICBL delegates met for four days at the Convention Centre LE MAJESTIC, facing the Mont Blanc massif, clearly visible due to the great weather this week.

The local Scientific Committee was representative of the French Institute for Multidisciplinary Biochemistry of Lipids mainly based in Lyon, with Michel Lagarde (Chair), Nathalie Bernoud-Hubac & Marie-Caroline Michalski (Co-Chairs), Catherine Calzada (Lyon), Frédéric Carrière (Marseille), Thierry Durand (Montpellier), Agnès Girard-Egrot (Lyon), Toshihide Kobayashi (Strasbourg/Tokyo).

The Conference was attended by around 150 scientists and accompanying persons from 35 countries, including 17 European Countries, the others being Japan, USA, Argentina, Canada, China, Australia, Korea, Taiwan, Armenia, Brazil, Chile, Iran, Israel, Koweit, Pakistan, Russia, Singapore, and Thailand, by decreasing numbers of delegates.

After a brief welcome address given by Professor Lagarde, the Conference opened on the evening of September 4th with the 20th Laurens van Deenen Lecture entitled “Resolving Inflammation in the 21st Century: Novel Lipid Mediators and Mechanisms”, delivered by Professor **Charles N Serhan** from Harvard Medical School in Boston. Professor Serhan reported her research on oxygenated metabolites from the long-chain n-3 fatty acids DHA, DPA and EPA, so-called specialized pro-resolving mediators (SPM), and new glutathione conjugates like the well-known peptide-leukotrienes from arachidonic acid. All mediators were assessed with a metabololipidomics approach, and their pathophysiological relevance tested in various human tissues.

The award, sponsored by BBA Molecular and Cell Biology of Lipids, was presented by both the President of ICBL Laszlo Vigh, and Michel Lagarde.



This introductory lecture was followed by a welcome reception to all attendees.

The scientific program continued for the next four days with seven sessions similarly organized. Each one started with an invited lecture, followed by three or four oral communications selected from submitted abstracts, ending with a second invited lecture (14 invited lectures and 27 oral communications in total). A one-hour coffee break cut the session in two parts to allow visiting posters. Over 80 posters were continuously displayed to facilitate exchanges between presenters and attendees, then offering at least 12h for specific discussions. Among posters, 19 competed for the final 3 posters awarded to PhD students by a specific jury chaired by Professor Makoto Ito, from the ICBL Steering Committee. Also, 9 PhD students were selected for oral communications and were eligible for 2 awards after selection by a jury chaired by Professor Laszlo Vigh, President of ICBL.

Session 1 (Monday 5th morning): “*Membrane lipids*”. Chairs – Agnès Girard-Egrot (Lyon) & Gabor Balogh (Szeged).

The session started with an Invited Lecture from **Joke Bouwstra** (Leiden, Netherlands) who reviewed the function of various skin lipids, in the frame of inflammatory skin diseases. The numerous ceramides were enlightened as well as the major enzymes involved in sphingolipid metabolism. Then, **Ludovic D’Auria** (Chicago, USA) presented his work on erythrocyte plasma membrane subdomain re-organization in response to the neurotoxin psychosine. **Marielle Köberlin** (Vienna, Austria) talked about the perturbation of membrane lipid composition and organization related to Toll-like receptor (TLR)-induced inflammatory phenotypes. **Albert Maimo-Barcelo** (Palma, Spain) reported the profound impact of tumorigenesis on the lipidome in colorectal cancer and derived exosomes, especially at the phospholipid class level. **Gabor Balogh** (Szeged, Hungary) described the relationship between altered membrane and storage lipids in response to heat stress in yeast. He pointed out the lipid droplet biogenesis as a survival strategy. Finally, **Bruno Antony** (Nice, France) in his Invited Lecture presented the specific role of phospholipid unsaturation in cell organelle function, discussing the impact of polyunsaturated phospholipids on membrane

curvature and fluidity of nanodomains. Synaptic vesicles were presented as a relevant situation.

Session 2 (Monday 5th afternoon): “*Plasma lipoproteins*”. Chairs – Catherine Calzada (Lyon) & Xavier Collet (Toulouse).

This session started by the Introductory Lecture from **Kazumitsu Ueda** (Kyoto, Japan) who reviewed the formation of nascent high-density lipoproteins (HDL), describing how the protein ATP binding cassette A1 (ABCA1) transiently stores lipids (essentially cholesterol and phospholipids) within its outer cell membrane domains to ultimately load these lipids onto apolipoprotein A-1 (apoA-1). This was followed by **Evelyn Orso** (Regensburg, Germany) who reported on the reversal of platelet aggregation and release vesicles occurring during storage by mildly oxidized HDL. This protection might be associated with phospholipid and sphingolipid remodeling. Then, **Jerome Hendriks** (Diepenbeek, Belgium) discussed the loss of immunomodulatory effects of HDL in multiple sclerosis patients as an alteration of their apoA-1 aromatic amino-acid residues. **Gerhard Liebisch** (Regensburg, Germany) presented the abnormal lipoprotein X found in cholestasis, and its various lipids. He pointed out the unusual high content of monounsaturated PC and PE. **Agata Sowinska** (Lodz, Poland) focused on the biological activity of different lysophosphatidylcholines (LPCs) acting through the G protein-coupled receptor 119 expressed in Langerhans islets, using oleoyl-LPC as a reference. Finally, the Invited Lecture from **Anatol Kontush** (Paris, France) discussed the multiple atheroprotective effects of HDL through several biological targets, likely due to HDL heterogeneity. However, he underlined the failure in decreasing the cardiovascular risk by raising HDL-cholesterol.

Session 3 (Tuesday 6th morning): “*Lipolytic enzymes*”. Chairs – Frédéric Carrière (Marseille) & George Carman (New Brunswick).

The first Introductory Lecture was given by **Dominique Langin** (Toulouse, France) who talked about the hormone-sensitive lipase (HSL), which degrades diacyl- and further monoacyl-glycerol, in the adipocyte and insulin sensitivity. A focus was done on the insulin sensitivity with a link between HSL, the carbohydrate response element binding protein (ChREBP) and the fatty acid elongase ELOVL6. **George Carman** (New Brunswick, USA) then reported on the regulation by phosphorylation (by several kinases)/dephosphorylation of the phosphatidate phosphatase, which produces DAG from PA, which is crucial for triacylglycerol accumulation and lipid droplet formation. **Margaret Holme** (London, UK) reported a colorimetric method to detect sphingomyelinase (SMase) activity at high sensitivity (pM range). The advantages for rapid measurements and application for screening SMases inhibitors were pointed out. **Kazuo Kanehara** (Taipei, Taiwan), continued in presenting his research on plant phosphoinositide-specific phospholipase C2 (among 9 isoforms in Arabidopsis) acting upon several species of PIP and PIP₂ in response to tunicamycin-induced ER stress. **Vincent Rioux** (Rennes, France) reported on a preduodenal lipase releasing the medium chain fatty acid octanoic acid, then available for octanoylation of ghrelin to make it an active ligand of a hypothalamic growth hormone. The second Invited Lecture was given by **Gérard Lambeau** (Nice, France), talking about various secreted venom and mammalian PLA2 acting on specific membrane receptors together as phospholipid cleavage enzymes. Their number and complex activities allows them to exhibit several physiological and pathophysiological functions.

Session 4 (Tuesday 6th afternoon): “*Oxygenated metabolism of PUFA*”. Chairs – Nathalie Bernoud-Hubac (Lyon) & Hiroyuli Arai (Tokyo).

The Invited Lecture given by **Paula Patrignani** (Chieti, Italy) reviewed the last data available on cyclooxygenases (COX-1 and COX-2) and their inhibitors. These bifunctional homodimer enzymes generate prostaglandin H₂ in many animal cells. Among the well-known non-steroidal anti-inflammatory drugs acting upon COX, aspirin is the only irreversible inhibitor, acting by acetylation of the enzyme active site. Beyond that, aspirin is now recognized in preventing colon cancer, and to exhibit epigenetic action by acetylating histones. **Takehiko Yokomizo** (Juntendo, Japan) reported on the action of 12-HHT, the C₁₇ PGH₂ cleavage product, especially formed in blood platelet by thromboxane synthase, through the leukotriene B₄ receptor BLT2 expressed in skin keratinocytes. 12-HHT accelerates skin wound healing *via* BLT2 activation. **Charlotte Jouvène** (Lyon, France) measured the various oxygenated metabolites of arachidonic and docosahexaenoic acids in rat brain by LC-MS/MS. The most representative are mono-hydroxylated derivatives followed by di- and tri-hydroxylated compounds, with around equal amounts in free form and esterified in phospholipids. **Magdalena Kiezel-Tsugunova** (Manchester, UK) reported a lipidomic assessment of long-chain omega-3 PUFA (DHA and EPA) in human skin. DHA and EPA supplementation increased production of anti-inflammatory oxygenated derivatives. DHA was preferentially metabolized in dermis and EPA in epidermis. **Wananit Wimuttisuk** (Pathum Thani, Thailand) talked about arachidonic acid-derived eicosanoids in shrimps. COX products (PGs), and lipoxygenase products were identified and found associated to the ovarian maturation, with the highest amounts at the early stages. Finally, **Hiroyuki Arai** (Tokyo, Japan) presented his Invited Lecture on Platelet-activating factor acetyl-hydrolases (PAF-AHs), of which three types have been identified in mammals. In addition of degrading PAF, these enzymes cleave the sn-2 position of oxidized phospholipids, then releasing oxygenated fatty acid products. It was reported that such products, characterized by a lipidomic approach, may be involved in IgE-mediated mast cell activation.

Session 5 (Wednesday 7th morning): “*Non-enzymatic lipid oxidation*”. Chairs – Thierry Durand (Montpellier) & Jetty Lee (Hong Kong).

Barry Haliwell (Singapore) started the session with his Invited Lecture. He reviewed the non-enzymatic lipid peroxidation process with the special role of “catalytic” iron. The classical deleterious lipid peroxidation was also mentioned regarding beneficial aspects reported for some stable end-products such as isoprostanes. The measurement of oxidative biomarkers was discussed relating to the numerous isomers requiring a specific lipidomic approach. **Jetty Lee** (Hong Kong, China) continued with the assessment of diverse non-enzymatic oxygenated products of n-3 and n-6 PUFA in food and tissues. Several isoprostanes/ dihome-isoprostanes and isofurans/dihome-isofurans were detected and measured by LC-MS/MS in the food chain. **Mikhail Shchepinov** (Los Altos, USA) spoke about lipid peroxidation-resistant PUFA. Interestingly, deuteration of PUFA at the bis-allylic positions slows down the rate limiting step of hydrogen abstraction required to initiate the peroxidation. **Kin Sum Leung** (Hong Kong, China) reported a mild effect of UVA on isoprostanes and isofurans formation (from arachidonic acid) in human keratinocytes, but the lipoxygenase products from DHA were measurable. It was supposed that the production of the latter could protect against that of the former. **Valery Bochkov** (Graz, Austria) reported anti-inflammatory and cell-protective action of oxidized phospholipids, contrary to the deleterious effects usually reported. Although Insights in

the mechanisms remain to be described, these results may explain some switch from acute to chronic inflammation. **Luisa Minghetti** (Rome, Italy) delivered her Invited Lecture on alpha-linolenic acid-derived phytoprostanes on the brain. The effect of such derivatives on undifferentiated nerve cells revealed some protective action against oxidant injury, likely through the activation of PPAR α , which could preferentially affect the brain cell maturation.

Session 6 (Thursday 8th morning): “*Lipid structures of nutritional interest*”. Chairs – Marie-Caroline Michalski (Lyon) & David Julian McClements (Amherst).

Charlotte Jacobsen (Lingby, Denmark) gave her Invited Lecture on functional lipid foods. Taking the example of n-3 PUFA that are susceptible to oxidation, she pointed out the role of the oil-water emulsions regarding the environmental factors involved in that oxidation. Controlling the homogenization and delivering conditions, together with appropriate antioxidants, are improvements to prevent lipid oxidation. **Sophie Ayciriex** (Dresden, Germany) exposed her results on the effect of food on the lipidome of *Drosophila melanogaster* eye. Saturated triacylglycerols led to major phospholipids with less than 2 double bonds whereas highly unsaturated diet led to phospholipids with 3 to 5 double bonds. In contrast, sphingolipids were not affected. **Philippe Legrand** (Rennes, France) reported that intake of linoleic acid (LA) induced pro-inflammatory and steatogenic effects in rats. The LA-rich diet increased plasma interleukin 1 and tumor necrosis factor alpha, the expression of vascular cell adhesion molecules in aortas, and altered the stearoyl-CoA desaturase activity. **Valerija Vezocnik** (Ljubljana, Slovenia) showed her results in characterization of nanoemulsions of lipid droplets made of trioleoylglycerol coated with a sphingomyelin/cholesterol monolayer of different compositions in terms of size and shape. Finally the Invited Lecture from **David Julian McClements** (Amherst, USA) enlightened the various aspects related to bioavailability of oil-soluble agents, such as nutrients and vitamins, incorporated into nanoscale lipid droplets (d<200 nm) dispersed in water. These nanoemulsions increase the bioavailability of the considered bioactive agents. The physicochemical principles behind this was discussed.

Session 7 (Thursday 8th afternoon): “*Lipid imaging*”. Chairs – Toshihide Kobayashi (Strasbourg/Tokyo) & Donatienne Tyteca (Brussels, Belgium).

The session started with the Invited Lecture from **Christoph Thiele** (Bonn, Germany). He showed the use of alkyne labeled various lipids (fatty acids, glycerolipids, sphingolipids,...) to look at their localization in cultivated cells and tissues during cell metabolism. Highly sensitive and quantitative analysis of lipid turnover could be assessed by fluorescence. **Pooja Gusain** (Ishikawa, Japan) reported on the effect of chirality in membrane heterogeneity (especially lipid rafts), based on d- and l-menthol. The two chiral isomers clearly showed different affinities with membrane lipids, with d-menthol showing stronger affinity for unsaturated lipids. **Vivien Walter** (Strasbourg, France) focused on influence of the membrane charge on cell penetrating peptides. These short peptides may have drug delivery applications. It was shown that increasing both the temperature and membrane charge density facilitate peptide affinity. **Motohide Murate** (Saitama, Japan) reported the observation of trans-bilayer lipid distribution in plasma membranes by immune-electron microscopy. This was applied to confirm the asymmetric distribution of phospholipids in several cell types including erythrocytes, fibroblasts, neutrophils and thrombin-activated platelets. **Mélanie Carquin** (Brussels, Belgium) described the distribution of fluorescent Bodipy-ceramide in submicrometric domains of the yeast membrane. This revealed the presence of

sphingolipid domains in relation to specific membrane proteins. Then **Donatiene Tyteca** (Brussels, Belgium) delivered the final Invited Lecture. She focused on the role of membrane lipid heterogeneity in cell deformation, which is critical in many biological processes. Red blood cells were used as a model because of its unique deformability when passing through capillaries. The use of fluorescent toxin fragments and the atomic force microscopy allowed to evidence sphingomyelin- and cholesterol-rich submicrometric domains.

In addition to these sessions summarized above, three flash oral presentations were given by three of the most generous sponsors: delegates from Waters in session 4, from AB Sciex in session 5, and from Nutricia in session 6.

David Heywood, from Waters talked about: “Markers of health: molecular phenotyping unveils the healthy biosignature of “omega-3” transgenic mice”; **Cyrus Papan**, from AB Sciex presented “The lipidyzer™ platform – a revolutionary tool for understanding the role of lipids in disease”; and **Dennis Acton**, from Nutricia reported “An innovative infant milk formula mimicking the human milk fat globule structure affects lipid hydrolysis and postprandial metabolism”.

The three poster awards were given on Wednesday evening, in the course of the Conference Dinner. The awardees were:

- **Peter Tibor Dancs** (Budapest, Hungary): “Reconciliation of the vascular and vasoconstrictor actions of lysophosphatidic acid in the mouse aorta”.
- **Francesca Di Bartolomeo** (Graz, Austria): “Functional characterization of the putative substrate recognition motif of phosphatidylserine decarboxylase 1 (Psd1P) from *Saccharomyces cerevisiae*”.
- **Amanda Lo Van** (Lyon, France): “Study of the effects of docosahexaenoic acid (DHA) and a structured phospholipid containing DHA on an *in vitro* model of neurogenesis and stroke”.

Two oral communication awards were given on Thursday evening at the end of session 7. The awardees were:

- **Mélanie Carquin** (Brussels, Belgium): “Segregation of fluorescent ceramide analogs into submicrometric domains at the yeast surface and relationship with proteins” (session 7).
- **Magdalena Kiezel-Tsugunova** (Manchester, UK): “Lipidomic assessment of oxygenated n-3 PUFA metabolites in human epidermis and dermis” (session 4).

Then Michel Lagarde concluded the Conference with many thanks to all the scientific contributors, presenters and discussants, to technicians for their help in logistics, and especially to Evelyne Roudier who managed with “fluidity” the relationships between all the attendees and the Convention Centre, and facilitated the social events, particularly on Wednesday afternoon with the excursion to the mount Brévent followed by the Conference Dinner to “La Cabane”.

Sponsors of the Conference were once more acknowledged for their support, and Michel Lagarde wished all the best to delegates with hope to see them next year in Zurich for the 58th ICBL.