



ISFSI



*The 4th Congress of the
International Society of
Fish & Shellfish Immunology*

December 12-15, 2022 // Bodø, Norway

WELCOME!

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PROGRAMME AT A GLANCE

4 th ISFSI (DECEMBER 12-15, 2022)					
	SUNDAY 11	MONDAY 12	TUESDAY 13	WEDNESDAY 14	THURSDAY 15
8:00-8:30	ARRIVAL	REGISTRATION			
08:30-9:00		OPENING 4th ISFSI	REGISTRATION		
09:05 to 10:00		Plenary Ikuo Hirono	Plenary Irene Salinas	Plenary Kim Thompson	Plenary Kenneth Söderhäll
10:00-10:15		BREAK			
10:15 to 12:00		CRUSTACEAN & MOLLUSCAN IMMUNOLOGY (Chairperson: Peter Bossier)	STRESS & IMMUNE FUNCTION (Chairperson: Felipe Réyes-López)	IMMUNOSTIMULANTS, ADJUVANTS, & VACCINES (Chairperson: Simona Picchiatti)	PATHOGENS & IMMUNE INTERACTIONS (Chairperson: Beatriz Novoa)
12:00 to 13:00		LUNCH			
13:00 to 15:00		FISH & SHELLFISH FUNCTIONAL GENOMICS (Chairperson: Gregory D. Wiens)	NEW TECHNOLOGIES FOR IMMUNE EVALUATION I (Chairperson: Gyri Teien Haugland)	ADAPTIVE IMMUNITY I (Chairperson: Ingvill Jensen)	NUTRITIONAL MODULATION OF IMMUNITY (Chairperson: Daniel Montero)
15:00-15:15		BREAK			
15:15 to 16:15		REGISTRATION OPEN (Quality Ramsalt Hotel)	MYELOID CELLS (Chairperson: Jorge Galindo-Villegas)	II (Chairperson: Magdalena Chadzińska)	II (Chairperson: Irene Salinas)
16:15-16:45		WELCOME DRINK (Salmon Center)	Featured N. Steinel	Featured E. Villablanca	NETWORKING
16:45-17:00	BREAK				
17:00 to 18:00		POSTER FLASH TALKS I <small>Moderated by: Tosca A. van Gelderen.</small>	POSTER FLASH TALKS II <small>Moderated by: Joshua Superio</small>		
	FREE				
20:00 to 23:30		Northern Lights SAFARI I & II (Guided by: Polar Tours) *Both tours are complimentary for Delegates		President's RECEPTION (Quality Ramsalt Hotel) *Dress code: Smart Casual	
				4th ISFSI Closing & ISFSI Assembly	

SUNDAY

- 15:00-16:00 Registration Open at Congress Venue. (Quality Ramsalt Hotel -Lobby)
- 16:15 Welcome Drink at Salmon Center. (Sjøgata 21, 8006 Bodø). Five minutes walking from the Congress Venue.

MONDAY

- 08:30-09:00 **Opening Ceremony**
- **Jorge Galindo-Villegas** (Chair of the 4th ISFSI Congress)
 - **Mette Sørensen** (Dean, Faculty of Biosciences and Aquaculture. Nord University)
 - **Ida Pinnerød** (Bodø Mayor)
 - **Beatriz Novoa** (President, International Society of Fish & Shellfish Immunology)

PLENARY LECTURE

- 09:00-10:00 **K-1 Using beneficial bacteria and its products for development of prevention methods against infectious diseases in shrimp aquaculture** Ikuo Hirono

10:00-10:15 **BREAK**

CRUSTACEAN & MOLLUSCAN IMMUNOLOGY

(Chairperson: Peter Bossier)

- 10:15 **O-01** The evolutionary particularity of expanded immune gene families in mussel and their relationship with functional specificity
Amaro Saco, Marco Gerdol, Magalí Rey-Campos, Beatriz Novoa, Antonio Figueras
- 10:30 **O-02** Characterization of plasma neutralizing factor(s) in shrimp survivors from white spot disease outbreak
Phasini Buathongkam, Jiraporn Srisala, Suparat Taengchaiyaphum, Kallaya Sritunyalucksana, Siripong Thitamadee
- 10:45 **O-03** White Spot Syndrome Virus Infection was aided in Glutamic-Pyruvic Transaminase
Shu-Wen Cheng, Han-Ching Wang
- 11:00 **O-04** Involvement of WSSV proteins in regulating shrimp LDH
Yen Siong Ng, Saengchan Senapin, Pakkukul Sangsuriya, Han-Ching Wang
- 11:15 **O-05** The pathological changes in the hepatopancreas are mediated by cathepsin L in EHP (*Enterocytozoon hepatopenaei*)-infected white shrimp (*Litopenaeus vannamei*)
Yun-Ru Chiang, John Han-You Lin
- 11:30 **O-06** The presence and differential expression of mucin in the digestive tract of the female freshwater prawn, *Macrobrachium rosenbergii*, during the ovarian cycle
Warinthip Vetkama, Ruchanok Tinikul, Prasert Sobhon, Yotsawan Tinikul
- 11:45 **O-07** Epigenetic Mechanisms Regulate Adaptive-Like Innate Immune Responses to Pathogen Encounter in Farmed Crustaceans: Lessons Learned from the Artemia Model
Parisa Norouzitallab, Suvra Roy, Kartik Baruah, Peter Bossier, Daisy Vanrompay

12:00-13:00 **LUNCH**

FISH & SHELLFISH FUNCTIONAL GENOMICS

(Chairperson: Gregory D. Wiens)

- 13:00 **O-08** Linking increased thermotolerance to disease resistance in *Artemia franciscana*
Wisarut Junprung, Parisa Norouzitallab, Daisy Vanrompay, Stephanie De Vos, Anchalee Tassanakajon, Nguyen Viet Dung, Gilbert Van Stappen, **Peter Bossier**
- 13:15 **O-09** RNA-Seq analysis reveals that spring viraemia of carp virus induces a broad spectrum of PIM kinases in zebrafish kidney that promote viral entry
Patricia Pereiro, Margarita Álvarez-Rodríguez, Valentina Valenzuela-Muñoz, Cristian Gallardo-Escárate, Antonio Figueras, Beatriz Novoa
- 13:30 **O-10** Transcriptome-wide mapping of immune responses in lumpfish leukocytes upon in vitro Poly I:C exposure
Shreesha Rao, Harald S. Lunde, Amanda KS. Fond, Kjell Petersen, Tomasz Furmanek, Gyri T. Haugland
- 13:45 **O-11** Single cell analysis of immunological responses in Atlantic salmon liver and the conservation of immune cell repertoires across organs
Richard S. Taylor, Rose Ruiz Daniels, Ross Dobie, Jianxuan Sun, Carl Milton, Shahmir Naseer, Thomas C. Clark, Neil C. Henderson, Pierre Boudinot, Samuel A.M. Martin, Daniel J. Macqueen

- 14:00 **O-12** Assessing immune-related roles of dre-miR-210-5p by a gonadal primary cell culture of zebrafish
Tosca A. van Gelderen, Laia Ribas
- 14:15 **O-13** Uncovering immune biomarkers of proliferative kidney disease: First insights into the early gill transcriptomic response following parasite exposure
Marc N. Faber, Davina Derous, Konstantinos Apostolakis, Nicole Strepparava, Helmut Segner, Christopher J. Secombes, **Jason W. Holland**
- 14:30 **O-14** Transcriptome studies of viral hemorrhagic septicemia resistant and susceptible rainbow trout strains give insight into resistance associated immune pathways
Torben Krebs, Clemens Falker-Gieske, Marek Matras, Alberto Falco, Michal Reichert, Christian Lodder, Jens Tetens, Dieter Steinhagen, Mikolaj Adamek
- 14:45 **O-15** A transcriptomic atlas of Atlantic salmon spleen cells and their responses to challenge by *Aeromonas salmonicida*
Jianxuan Sun, Richard S. Taylor, Rose Ruiz Daniels, Ross Dobie, Neil C. Henderson, Samuel A. Martin, Daniel J. Macqueen

15:00-15:15

BREAK

MYELOID CELLS

(Chairperson: Jorge Galindo-Villegas)

- 15:15 **O-16** Melano-macrophages and their relation to muscle inflammation in the Atlantic salmon (*Salmo salar*)
Håvard Bjørgen, Espen Rimstad, Ivar Hordvik, Erling Olaf Koppang
- 15:30 **O-17** Doing the impossible: common carp *Cyprinus carpio* red blood cells as modulators of the immune response in parasitic infections with the myxozoan *Sphaerospora molnari*
Jovana Majstorović, Amparo Picard-Sánchez, Justin T. H. Chan, Gema Alama-Astrid, Astrid S. Holzer, Tomáš Korytář
- 15:45 **O-18** The role of neutrophils and macrophages in resistance against a fish parasite in zebrafish (*Danio rerio*)
Heidi Mathiessen, Moonika Haahr Marana, Sebastian Nintemann, Sara Gelskov, **Louise von Gersdorff Jørgensen**
- 16:00 **O-19** Neutrophil polarization in fish
Magdalena Maciuszek, Ewa Bucon, Magdalena Chadzińska
- 16:15-16:45 **F-1;** **Featured:**
O-20 Evolutionary gain and loss of fibrotic immune response to parasitism
Natalie C. Steinel, Jesse N. Weber, Foen Peng, Kum Chuan Shim, Brian K. Lohman, Lauren Fuess, Swapna Subraminian, Stephen de Lisle, Daniel I. Bolnick

16:45-17:00

BREAK

17:00-18:00 POSTER, FLASH TALKS I

(Moderator: Ph.D. cand., Tosca A. van Gelderen)

TUESDAY

PLENARY LECTURE

- 09:00-10:00 **K-2** **The emerging field of neuroimmune communication in fish: From mucosal barriers to the CNS and back** Irene Salinas

10:00-10:15

BREAK

STRESS & IMMUNE FUNCTION

(Chairperson: Felipe E. Reyes-López)

- 10:15 **O-21** A multi-omics approach provides a deeper understanding of the immune response of sea cucumber coelomocytes to lipopolysaccharides
Noé Wambreuse, Jérôme Delroisse, Vanessa Tagliatti, Igor Eeckhaut, Laura Borrello, Guillaume Caulier
- 10:30 **O-22** Effects of stress on the antiviral response in Atlantic salmon red blood cells
Thomas Tsoulia, Randi Faller, Maria K. Dahle
- 10:45 **O-23** Cooperation between ER stress, autophagy, mitochondrial stress, and vesicle trafficking in the RBCs response to vaccines
Maria Elizabeth Salvador-Mira, Alba Manso Aznar, Paula Gimenez Moya, Ester Sánchez Córdoba, Ivan Nombela, Sara Puente-Marin, Veronica Chico, Luis Perez, Ana Joaquina Perez-Berna, Maria del Mar Ortega-Villaizan

- 11:00 **O-24** Chronic thermal stress effects on innate immune response induced by bacterial challenge in Russian sturgeon
Marcio Aversa-Marnai, Mauricio Castellano, Ana María Benitez, Ignacio Quartiani, Daniel Conijeski, Alejandro Perretta, Andrea Villarino, Valeria Silva-Álvarez, Ana María Ferreira
- 11:15 **O-25** Mechanisms regulating stress-induced redistribution of fish neutrophils
Katarzyna Klak, Magdalena Maciuszek, Lukasz Pijanowski, Magdalena Marcinkowska, Joanna Homa, Krzysztof Rakus, Magdalena Chadzińska
- 11:30 **O-26** Immune response in southern sand flathead, *Platycephalus bassensis*, affected by muscle melanisation from Deceitful Cove in the Tamar Estuary (Tasmania, Australia)
Khattapan Jantawongsri, Chun Kit Ooi, Trevor Lewis, James Haddy, Amanda L. Patchett, James W. Wynne, Kelli C. Anderson, Ruth Eriksen, Barbara F. Nowak
- 11:45 **O-27** The molecular identification of *glucocorticoid receptor 1 (gr1)* and *gr2* reveals their differential modulation to stress in gilthead sea bream (*Sparus aurata*) mucosal tissues
Eva Vallejos-Vidal, Beatriz Sanz-Milián, Ali Reza Khansari, Mariana Teles, Sebastián Reyes-Cerpa, Juan Miguel Mancera, Lluís Tort, Felipe E. Reyes-López

12:00-13:00

LUNCH

NEW TECHNOLOGIES FOR IMMUNE EVALUATION I

(Chairperson: Gyri Teien Haugland)

- 13:00 **O-28** CRISPR-Cas induced IRF3 and MAVS knockouts in a salmonid cell line disrupt PRR signaling and affect viral replication
Yorick A. van der Wal, Allan Akandwanaho, Henriette Nordli, Linn Greiner-Tollersrud, Jaap Kool, **Jorunn B. Jørgensen**
- 13:15 **O-29** Aquatic plastic contaminants and the fish immune system: Nanoplastics and surgical masks (the COVID-19 effect).
Beatriz Novoa, Marta Sendra, Patricia Pereiro, Antonio Figueras
- 13:30 **O-30** Plasma proteome and cellular responses in zebrafish following λ -carrageenan-induced inflammation
Joshua Superio, Ives Charlie-Silva, Natália M. Feitosa, Andrea C. Perez, Thiago M. Cunha, Marco A.A. Belo, Jorge Galindo-Villegas
- 13:45 **O-31** Electrochemical detection of white spot syndrome virus using a homemade disposable electrode composed of graphene quantum dots and gold nanoparticle-embedded polyaniline
Kenshin Takemura, Jun Satoh, Jirayu Boonyakida, Sungjo Park, Ankan Dutta Chowdhury, **Enoch Y. Park**
- 14:00 **O-32** Plasma Proteomic Profiling of Bacterial Cold-Water Disease Resistant and Susceptible Rainbow Trout Lines and Identification of a Novel Disease Biomarker
Gregory D. Wiens, David P. Marancik, Christopher C. Chadwick, Ross M. Reid, Keira Osbourn, Timothy D. Leeds
- 14:15 **O-33** Is ADAR-mediated RNA editing during Ostreid herpesvirus-1 infection pro- or anti-viral?
Umberto Rosani, Enrico Bortoletto, Adnan M. Niazi, Lu-Sheng Xin, Eivind Valen, Paola Venier, Chang-Ming Bai
- 14:30 **O-34** Development and characterization of primary contracting salmonid heart cell cultures: A new tool for cardiac virus studies?
Sarah Graff, Julia Bauer, Torben Krebs, Dieter Steinhagen, Mikolaj Adamek, Henrike Seibel, Marina Gebert
- 14:45 **O-35** Proteomics and flow cytometry give new insight into immunosuppression observed during carp edema virus-induced gill disease
Mikolaj Adamek, Justin T.H. Chan, Mariola Dietrich, Maria Zawisza, Felix Teitge, Natalia Kodzik, Verena Jung-Schroers, Magdalena Chadzińska, Alberto Falco, Andrzej Ciereszko, Krzysztof Rakus, Tomas Korytar, Dieter Steinhagen

15:00-15:15

BREAK

NEW TECHNOLOGIES FOR IMMUNE EVALUATION II

(Chairperson: Magdalena Chadzińska)

- 15:15 **O-36** Brain and immunity in teleost fish: new insights from *Dicentrarchus labrax*
Valeria Pianese, Andrea Miccoli, Anna Maria Fausto, Giuseppe Scapigliati, Simona Picchiatti
- 15:30 **O-37** Evaluation of eDNA concentration of *Vibrio anguillarum* correlated with infection and immune response in zebrafish (*Danio rerio*)
Cyril Henard, Hanxi Li, Manuel Blonç, Yajiao Duan, Louise von Gersdorff Jørgensen
- 15:45 **O-38** VHSV propagation, gene expression pattern and morphology of Viperin knockout zebrafish
K.A.S.N Shanaka, K.P. Madushani, Sumi Jung, Myoung-Jin Kim, Jehee Lee
- 16:00 **O-39** Antibacterial and cytotoxic activities of a NK-lysin homologue from the Antarctic teleost *Trematomus bernacchii*
Simona Picchiatti, Laura Guerra, Anna Rita Taddei, Paolo Roberto Saraceni, Marco Gerdol, Fernando Porcelli, Francesca Bugli, Andrea Miccoli, Anna Maria Fausto, Giuseppe Scapigliati, Francesco Buonocore

16:15-16:45

F-2; Featured:

O-40 Devising zebrafish models to study genetic-environment interactions leading to the initiation of autoimmunity

Rodrigo A. Morales, Bianca C. Kern, Oscar E. Diaz, Srustidhar Das, **Eduardo J. Villablanca**

16:45-17:00

BREAK

17:00-18:00

POSTER, FLASH TALKS II

(Moderator: Ph.D. cand., Joshua Superio)

WEDNESDAY

PLENARY LECTURE

09:00-10:00 K-3 Addressing novel nanovaccine strategies for Tilapia

Kim Thompson

10:00-10:15

BREAK

IMMUNOSTIMULANTS, ADJUVANTS & VACCINES

(Chairperson: Simona Picchiatti)

- 10:15 O-41 Does the protection by essential oils or their components against vibriosis in *Artemia* depend on immunostimulation?
Xiaoting Zheng, Daisy Vanrompay, **Peter Bossier**
- 10:30 O-42 Functional feed additives favor vaccine effectiveness against *Vibrio anguillarum* in sea bass (*Dicentrarchus labrax*) juveniles
Daniel Montero, Jorge Galindo-Villegas, Antonio Serradell, Artem Nedoluzhko, Álvaro Fernández-Montero, Alex Makol, Luis Monzón-Atienza, Victoria Valdenegro, Félix Acosta, Silvia Torrecillas
- 10:45 O-43 Antigen persistence and antibody responses in vaccinated Atlantic salmon (*Salmo salar* L.) throughout a commercial production cycle
Marwa Mechlaoui, Endre Nordstrand, Ingvill Jensen, Tore Seternes
- 11:00 O-44 Antibody responses to salmonid alphavirus (SAV) in Atlantic salmon immunized against pancreas disease (PD) using licensed vaccines
Ragnar Thorarinnsson, Hilde Sindre, Øystein Evensen
- 11:15 O-45 Molecular identification, pathogenesis, and functional genomics of *Edwardsiella piscicida* as a basis for rational design of a live attenuated vaccine against edwardsiellosis in fish
Rakesh Das, Cheng Xu, Zhen Tao, Saurabh Dubey, Hetron M. Munang'andu, Øystein Evensen
- 11:30 O-46 Development and testing of a VLP-based vaccine against furunculosis in rainbow trout
Jeong In Yang, Dagoberto Sepulveda, Jakob Skov, Niels Lorenzen
- 11:45 O-47 B cell distribution in the gills of juvenile and adult Atlantic salmon and the effects of systemic vaccination on B cell abundance
Fran Barac, Pedro Luis Castro Alonso, Tom Hansen, Per Gunnar Fjellidal, Ivar Hordvik, Håvard Bjørgen, Erling Olaf Koppang

12:00-13:00

LUNCH

ADAPTIVE IMMUNITY I

(Chairperson: Ingvill Jensen)

- 13:00 O-48 Effect of seasonal photoperiod on the antigen-dependent immune response in rainbow trout (*Oncorhynchus mykiss*) head kidney
Merari Golstein, Eva Vallejos-Vidal, Valentina Wong-Benito, Lluís Tort, Felipe E. Reyes-Lopez, **Mónica Imarai**
- 13:15 O-49 Development of monoclonal antibody against non-classical MHC class I, L-lineage, in Rainbow trout *Oncorhynchus mykiss*
Megumi Matsumoto, Goshi Kato, Uwe Fischer
- 13:30 O-50 Two diverse T cell receptor beta regions in Atlantic salmon potentially serving different functions
Unni Grimholt, Arvind Y. M. Sundaram, Cathrine Arnason Bøe, Maria K. Dahle, Morten Lukacs
- 13:45 O-51 IgM⁺ B cells proliferate and differentiate in a spatiotemporal manner, producing antibodies that protect the common carp against infection by the myxozoan *Sphaerospora molnari*
Justin T. H. Chan, Amparo Picard-Sánchez, Astrid S. Holzer, Tomáš Korytář
- 14:00 O-52 Teleost fish IgM⁺ plasma-like cells possessing IgM-secreting, phagocytosis, and antigen-presentation capacities
Liting Wu, Yanjian Yang, Along Gao, Jun Li, Jianmin Ye
- 14:15 O-53 Regulatory responses of two non-classical major histocompatibility L-lineage complexes following SAV3 challenge and interferon stimulation in Atlantic salmon (*Salmo salar*)
Maryam Imam, Shripathi Bhat, Vishesh Dubey, Mehrdad Sobhkhaz, Linn Greiner-Tollersrud, Balpreet Singh Ahluwalia, Eva-Stina Edholm
- 14:30 O-54 Identification of the impact of carp edema virus (CEV) infection on T and B cell responses and vaccination success in common carp
Maria Zawisza, Justin T.H. Chan, Miriam Mojzesz, Walter Fuchs, Magdalena Chadzińska, Tomas Korytar, Mikolaj Adamek, Krzysztof Rakus

14:45 O-55 Structure and expression of the polymeric Ig receptor gene from Antarctic teleosts
Alessia Ametrano, Simona Picchiatti, Laura Guerra, Stefano Giacomelli, Umberto Oreste, **Maria Rosaria Coscia**

15:00-15:15

BREAK

ADAPTIVE IMMUNITY II

(Chairperson: Irene Salinas)

- 15:15 O-56 Diversification and conservation of non-classical MHC I genes in Salmonids provides clues to the function of potential lipid presenting MHC in fish
Agata T. Gondek-Wyrozemska, Eva-Stina I. Edholm
- 15:30 O-57 Ontogeny of the thymus and T cell receptors in Ballan wrasse (*Labrus bergylta*)
Angela Etayo, Kai K. Lie, Ivar Hordvik, Øystein Sæle
- 15:45 O-58 The B-cell response to salmonid alphavirus 3 in Atlantic salmon
Ingvill Jensen, Shiferaw Jenberie, Ma. Michelle D. Peñaranda, Henriette Nordli, Guro Strandskog, Linn Greiner-Tollersrud, Jorunn B. Jørgensen
- 16:00 O-59 Development and characterization of monoclonal antibodies against zebrafish IgM
Fumio Takizawa, Hiroumi Ueno, Kazuya Yamamoto, Yuto Shimizu, Maki Ohtani, Toshiaki Miyadai, Hiroaki Suetake

16:15-17:00

NETWORKING

19:00-23:30

Conference Dinner (Quality Hotel Ramsalt)

THURSDAY

PLENARY LECTURE

09:00-10:00 K-4 Blood cells formation in crustaceans

Kenneth Söderhäll

10:00-10:15

BREAK

PATHOGENS & IMMUNE INTERACTIONS

(Chairperson: Beatriz Novoa)

- 10:15 O-61 Responses towards eyefluke (*Diplostomum pseudospathaceum*) in different genetic lineages of rainbow trout
Asma M. Karami, Yajiao Duan, Per W. Kania, Kurt Buchmann
- 10:30 O-62 LsLGP3 from Salmon Louse (*Lepeophtheirus salmonis*) Causes Cell Death in Atlantic salmon (*Salmo salar*) Leukocytes
Helena Marie Doherty Midtbø, Gyri Teien Haugland, Andreas Borchel, Craig Morton, Aina-Cathrine Øvergård
- 10:45 O-63 A comparative study on gene expression in rainbow trout (*Oncorhynchus mykiss*, Walbaum 1792) challenged with five pathogens in five parallel experiments
Per Walter Kania, Kurt Buchmann
- 11:00 O-64 Experimentally induced immunity against red mark syndrome in rainbow trout, *Oncorhynchus mykiss*
Jacob G. Schmidt, Valentina L. Donati, Niels Lorenzen
- 11:15 O-65 Comparison of whole blood transcriptome responses of Atlantic salmon infected by three Piscine orthoreovirus variants
Thomais Tsoulia, Arvind Y.M. Sundaram, Espen Rimstad, Øystein Wessel, Maria K. Dahle
- 11:30 O-66 Red and melanized focal changes in white skeletal muscle in Atlantic salmon (*Salmo salar*): Analysis of farmed, wild and hybrid fish kept under identical rearing conditions
Malin Brimsholm, Erling Olaf Koppang, Tom Hansen, Håvard Bjørgen, Per Gunnar Fjelldal
- 11:45 O-67 Susceptibility and immunological status of Atlantic salmon parr, persistently infected with piscine orthoreovirus (PRV-1), following superinfection with salmonid alphavirus (SAV3)
Dhamotharan Kannimuthu, Hyeonjin Roh, Ma. Michelle D. Peñaranda, Stig Mæhle, Bjørn Olav Kvamme, Søren Grove, **Hugh Craig Morton**

NUTRITIONAL MODULATION OF IMMUNITY

(Chairperson: Daniel Montero)

- 13:00 **O-68** Bidens pilosa as a multifunctional additive of feedstuff to enhance disease resistance and growth performance in farmed aquatic animals
Che-Chun Chen, Wen-Yi Lin, Hsin-Yun Lu, Zhong-Fu Zhang, Chyng-Hwa Liou, Ying-Ning Ho, Chang-Wen Huang, Wen-Chin Yang, Li-Li Chen, Hong-Yi Gong
- 13:15 **O-69** Glucose and Glutamine Contributed to De Novo Nucleotide Synthesis to Support White Spot Syndrome Virus Pathogenesis
Cong-Yan Chen, Der-Yen Lee, Shih-Shun Lin, Chun-Hung Liu, Han-Ching Wang
- 13:30 **O-70** Effects of fermented black soldier fly (*Hermetia illucens*) larvae solubles to substitute soybean meal on growth performance and immune response of tilapia (*Oreochromis* sp.)
Kuan-Yu Chen, Han-Ju Ho, Jenn-Kan Lu
- 13:45 **O-71** Dietary supplementation of *Bacillus velezensis* improves *Vibrio anguillarum* clearance in European sea bass by activating essential innate immune mechanisms
Luis Monzón-Atienza, Jimena Bravo, Álvaro Fernández-Montero, Ives Charlie-Silva, Daniel Montero, José Ramos-Vivas, Jorge Galindo-Villegas, Félix Acosta
- 14:00 **O-72** Long-term evaluation of black soldier fly larvae meal on Atlantic salmon health in net pens
Gopika Radhakrishnan, Antony Jesu Prabhu Philip, Nina Sylvia Liland, Marianne Wethe Koch, Erik-Jan Lock, Ikram Belghit
- 14:15 **O-73** Bile salts as a potential dietary supplement in aquaculture: Effect on regulation of lipid metabolism, intestinal immunity, and gut microbial communities
Alberto Ruiz, Karl B. Andree, Dolores Furones, Ignasi Sanahuja, Paul G. Holhorea, Josep Calduch-Giner, Marc Viñas, Jaume Pérez-Sánchez, Enric Gisbert
- 14:30 **O-74** Modulating Shrimp Gut Health to Explore the Microbiota Resilience in Response to the Shift Between Health and Disease
Han-Ching Wang

E-POSTERS

*The 4th ISFSI will conduct all the e-Posters displays and discussions online. However, some authors selected to pitch their work in a live serial session. At the end of the full session, authors and attendants will discuss emerging questions at a single round table led by the moderator.

3 min
(Flash
Talks)

MONDAY

FISH IMMUNOLOGY

- P-01** Zebrafish: Generation of MyD88 knockout model to understand the viral recognition and the immune gene expression against VHSV
K.P. Madushani, K.A.S.N Shanaka, Sumi Jung, Myoung-Jin Kim, Jehee Lee
- P-02** Host-pathogen interactions of two breeds of common carp on koi herpesvirus infection
Radek Machat, Lubomir Pojezdal, Jan Gebauer, Radek Tesarik, Jan Matiasovic, Hana Minarova, Nikola Hodkovicova, Martin Faldyna
- P-03** Immune response induced by recombinant interleukin-22 (IL-22) in primary gill cells of Japanese medaka, *Oryzias latipes*
Mika Watanabe, Yo Okamura, Tomoya Kono, Masahiro Sakai, Jun-ichi Hikima
- P-04** Comparison of phagocytic activity in different European fish species
Hana Minarova, Ivana Papezikova, Hana Bandouchova, Jiri Pikula, Martin Faldyna, Miroslava Palikova
- P-05** Characterization of IL-12p40 paralogues and IL-12 receptor subunits in lumpfish
Patrick A. Nelson, Håvard Ø. Eggsetøl, Sara A. Straumsnes, Harald S. Lunde, Gyri T. Haugland
- P-06** Inhibition of lysozyme lytic activity by Ivy derived from *Photobacterium damsela* subsp. *piscicida* and prediction of its lysozyme-binding ability
Aki Nishihara, Takechiyo Sumiyoshi, Shinya Yasumoto, Masakazu Kondo, Tomoya Kono, Masahiro Sakai, Jun-ichi Hikima
- P-07** Characterization of the turbot (*Scophthalmus maximus*) interleukin-18: Identification of splicing variants, phylogeny, synteny and expression analysis
Patricia Pereiro, Raquel Lama, Antonio Figueras, Beatriz Novoa
- 01 -1** **P-08** Specific antibody production in common carp (*Cyprinus carpio*), gibel carp (*Carassius gibelio*) and F1 hybrids after infection with carp Sprivirus
Lubomir Pojezdal, Stanislava Reschova, Lukas Vetesnik, Andrea Simkova
- 02 -1** **P-09** Isolation of antigen-capturing cells from spleen elipsoids in Tiger puffer
Yuto Shimizu, Fumio Takizawa, Toshiaki Miyadai, Hiroaki Suetake

- P-10** Emergence of *Enteromyxum leei* (Myxozoa, Myxosporea) in seawater and infection dynamics of cultured olive flounder in farms on Jeju Island, South Korea
Hanchang Sohn, Chang Nam Jin, Bong Jo Kang, Sang Phil Shin, Jehee Lee
- P-11** Cd63 knockout in zebrafish enhances immune defense against VHSV infection
Sumi Jung, Myoung-Jin Kim, Jehee Lee
- P-12** Identification and functional characterization of TNFSF15 receptors (death receptor 3 and decoy receptor 3) in rock bream (*Oplegnathus fasciatus*)
Sungjae Ko, Suhee Hong
- P-13** Atlantic Cod (*Gadus morhua*) MHC I localizes to lysosomes independently of sorting signals
Synne Arstad Bjørnstad, Monica Hongrø Solbakken, Kjetill S Jakobsen, Sissel Jentoft, Oddmund Bakke, Cinzia Progida
- 03 -I** **P-14** Understanding zebrafish resistance to white spot disease through transcriptomic analysis
Heidi Mathiessen, Miyako Kodama, Morten Tønnsberg Limborg, Louise von Gersdorff Jørgensen
- 04 -I** **P-15** Catch me if you can: Elucidating the importance of antibody responses in the prevention of myxozoan parasite *Sphaerospora molnari*
Tomáš Korytá, Justin T. H. Chan, Jovana Majstorovič, Astrid S. Holzer
- P-16** Eye fluke effects on Danish freshwater fish: Field and experimental investigations
Yajiao Duan, Louise von Gersdorff Jørgensen, Per Walter Kania, Asma M. Karami, Azmi Al-Jubury, Kurt Buchmann
- P-17** The role of European Sea Bass red blood cells in nervous necrosis virus infection
Celia García-Quintanilla, Maria Elizabeth Salvador-Mira, Veronica Chico, Manuel Solivella, Luis Perez, Miguel Ángel García-Álvarez, Alberto Cuesta, María del Mar Ortega-Villaizán
- P-18** Protection of skin and gill functions is essential for the survival of fish from infections caused by epitheliotropic viruses
Mikolaj Adamek, Krzysztof Rakus, Marek Matras, Alexander Rebl, Maria Zawisza, Magdalena Stachnik, Muhammad Abdullah, Torben Krebs, Verena Jung-Schroers, Lars Schröder, Walter Fuchs, Michal Reichert, Dieter Steinhagen
- 05 -I** **P-19** Modulation of immune genes in skin wound repair of pre-smolt Atlantic salmon (*Salmo salar*)
Bárbara Robles-Planells, Camila Arancibia-Carvalho, Loreto P. Araos, Silvana Guerra-Arredondo, Rodrigo Zañartu-Mellado, Fernanda Jeria, Mabel Vidal, Eva Vallejos-Vidal, Felipe E. Reyes-López
- P-20** Conserved function of zebrafish (*Danio rerio*) Gdf15 as a sepsis tolerance mediator
Patricia Pereiro, Marta Librán-Pérez, Antonio Figueras, Beatriz Novoa
- 06 -I** **P-21** The biological clock polarization of carp macrophages
Mikolaj Mazur, Magdalena Maciuszek, Lukasz Pijanowski, Magdalena Chadzińska
- 07 -I** **P-22** Modulation of the expression of i1/i2 axis genes in Atlantic salmon head kidney induced by IL 4/13A and antagonized by IFN γ
Daniela Ruiz Higgs, Ana María Sandino, Mónica Imarai, Eva Vallejos-Vidal
- P-23** Evaluation of immune gene expression during co-infection with *Piscirickettsia salmonis* genogroups in Atlantic salmon
Gabriela Carril, Marie Løvoll, Hanne Winther-Larsen, Henning Sørum
- 08 -I** **P-24** Correlation between IL-6, IL-6r, and gp130 and mRNA expression profiles in orange-spotted grouper (*Epinephelus coioides*) under immune stimulation
Yun-Ru Chiang, Hao-Chun Chang, John Han-You Lin

CRUSTACEAN IMMUNOLOGY

- P-25** Pyrimidine synthesis after virus infection of white shrimp
Chih-Ling Chen, Han-Ching Wang
- P-26** Crayfish Hemocyte Proteins – effects of injection
Charlotta Ekblom, Kenneth Söderhäll, Irene Söderhäll
- P-27** Development and application of immune markers for immunotoxic hazard assessment of continental water bodies
Melissa Palos Ladeiro, Damien Rioult, Magalie Charlé, Olivier Geffard, Marc Bonnard, Alain Geffard
- P-28** Single-cell RNA sequencing of hematopoietic cells and hemocytes in freshwater crayfish
Irene Söderhäll, Erik Fasterius, Charlotta Ekblom, Kenneth Söderhäll
- 09 -I** **P-29** Studies on pathogenic mechanisms in *Tenacibaculum mesophilum* isolated from the gills of kuruma shrimp *Penaeus japonicus* with Fusarium disease
Yohei Sakamoto, Satoshi Kawato, Kentaro Imaizumi, Miho Furukawa, Kayo Konishi, Reiko Nozaki, Keiichiro Koiwai, Hidehiro Kondo, Ikuo Hirano
- 10 -I** **P-30** Behavioral fever in shrimp (*Litopenaeus vannamei*) in response to white spot syndrome virus infection can suppress mortality rate
Mostafa Rakhshaninejad, Liping Zheng, Hans Nauwynck
- 11 -I** **P-31** Comparison of performance between a rapid test kit and QPCR method for white spot syndrome virus (WSSV)
Jeff Chia-Kai Hsu, Te-Ken Hsu, Li-Li Chen
- 12 -I** **P-32** The effect of starvation on mucin expression and its association with neuropeptide F in the digestive organs of the female freshwater prawn, *Macrobrachium rosenbergii*
Warinthip Vetkama, Ruchanok Tinikul, Prasert Sobhon, Yotsawan Tinikul

MOLLUSCAN IMMUNOLOGY

- P-33** Differential expression of long non-coding RNA (lncRNA) in Mediterranean mussel (*Mytilus galloprovincialis*) hemocytes under immune stimuli
Antonio Figueras, Patricia Pereiro, Rey-Campos Magalí, Beatriz Novoa
- P-34** Genomic and transcriptomic identification of the cathepsin superfamily in the Mediterranean mussel *Mytilus galloprovincialis*
Alejandro Romero, Beatriz Novoa, Antonio Figueras
- P-35** The freshwater snail *Pomacea canaliculata* immunity relies on hemocyte- and organ-dependent responses
Davide Malagoli, Giulia Bergamini, Francesco Demetrio Lofaro, Alice Montanari, Agnese Ferrari, Federica Boraldi

3 min
(Flash
Talks)

TUESDAY

INTERACTIONS BETWEEN MICROBIOTA AND THE IMMUNE SYSTEM

- P-36** Effects of heat treatment on environmental microbiota dynamics and host responses in farmed fish in Singapore
Tze Hann Ng, Thiviya Nair D/O Madhavan, M. Sobana, Giana Bastos Gomes
- P-37** The Immunoregulatory Role of Fish Specific Type II SOCS via Inhibiting Metaflammation in Gut-Liver Axis
Junwei Shan, Guangxin Wang, Heng Li, Xuyang Zhao, Weidong Ye, Qingsong Zhu, Yuhang Liu, Yingyin Cheng, Nan Wu, Xiao-Qin Xia
- P-38** Gallic Acid Relieves Fish Gut-Liver Symptom via Enhancing PPAR γ -Mediated Anti-inflammation and Lipid Metabolism
Xuyang Zhao, Lei Zhang, Jiayuan Xie, Yuhang Liu, Lian Su, Weidong Ye, Yingyin Cheng, Wanting Zhang, Nan Wu, Xiao-Qin Xia

STRESS AND IMMUNE FUNCTION

- P-39** Immune and physiological responses of clams (*Polititapes rhomboides*) under sediment mobilization and seawater warming conditions
María M. Costa, Camino Gestal, Jose MF Babarro, Miguel Gilcoto, Nicolás Villaceros-Robineau, Luc A. Comeau, Susana Darriba, Elsa Silva, Lourdes Nieto, Hugo Feio, Jaime Pérez, Sonia Dios
- P-40** GOT1/2 may be involved in WSSV-induced glutamine metabolism
Guan-Lun Huang, Chun-Hung Liu, Han-Ching Wang
- P-41** Transcriptomic responses of European sea bass (*Dicentrarchus labrax* L) and zebrafish (*Danio rerio*) against a nodavirus infection
Raquel Lama, Patricia Pereiro, Antonio Figueras, Beatriz Novoa
- P-42** Deciphering how chronic heat stress alters Russian sturgeon (*Acipenser gueldenstaedtii*) liver response to bacterial infection
Alicia Costábile, Mauricio Castellano, Marcio Aversa-Marnai, Ignacio Quartiani, Daniel Conijeski, Alejandro Perretta, Andrea Villarino, Valeria Silva-Álvarez, Ana María Ferreira
- P-43** Assessing the impact of oxidative stress and antioxidants on the spotted wolffish (*Anarhichas minor*) immune-reproductive axis
Joshua Superio, Bjørnar Eggen, Jorge Galindo-Villegas
- 01 -II** **P-44** Motility of bivalve immune cells: a new potential biomarker of immunotoxicity?
Héloïse Gendre, Mélissa Palos-Ladeiro, Alain Geffard, Agnès Poret, Frank Le Foll, Yosra Ben Cheikh
- 02 -II** **P-45** Time course and dynamics of fecal corticoid metabolites (FCM) in Atlantic salmon (*Salmon salar* L.) post-acute stress exposure.
Jingwen Ding, Anne Stene, Bengt Finstad, Grete Hansen Aas, Lars Christian Gansel, Stig Atle Tuene, Snorre Bakke, and Yanran Ca

FISH AND SHELLFISH FUNCTIONAL GENOMICS

- P-46** Expression of Vascular and Immune System Markers in Eyes of North Atlantic Lumpfish
Tatiana Hyde, Helene Paradis, Robert Gendron

NEURO-IMMUNE INTERACTIONS

- P-47** Effect of African basil (*Ocimum gratissimum*) on orexigenic factors and zootechnical performance of African catfish (*Clarias gariepinus*)
Ojo P. Oke, Oluyemi K. Gbadamosi, Tosin S. Olayeni

IMMUNOSTIMULANTS, ADJUVANTS & VACCINES

- 03 -II** **P-48** Silkworm pupa as a vehicle for delivering VP15-derived products through oral administration for immunization of kuruma shrimp
Jirayu Boonyakida, Takafumi Nakanishi, Jun Satoh, Yoshiko Shimahara, Tohru Mekata, Enoch Y. Park
- 04 -II** **P-49** Evaluation of a Chitosan-PLGA encapsulated trivalent vaccine complex containing inactivated VHSV, *Streptococcus parauberis* and *Miamiensis avidus* in *Paralichthys olivaceus*
Sajal Kole, Young-Hyeok Kwon, Su-Mi Shin, Sung-Ju Jung

- P-50** Natural extracts for application as antivirals in aquaculture against Red Grouper Nervous Necrosis Virus
Celia García-Quintanilla, Veronica Chico, Miguel Ángel García-Álvarez, Jose Antonio Girau, David Verdiell, Luis Perez, Alberto Cuesta, María del Mar Ortega-Villaizán
- P-51** Phloroglucinol treatment of brine shrimp induces transgenerational epigenetic inherited resistance against *Vibrio parahaemolyticus*
Suvra Roy, Vikash Kumar, Peter Bossier, Parisa Norouzitalab, Daisy Vanrompay
- P-52** Ccombody, a next-generation antibody as passive immune vaccine against acute hepatopancreatic disease (AHPND) in shrimp
Jaesung Kim, Junghyun Kim, Dennis Bela-ong, Kim D. Thompson, Tae Sung Jung
- P-53** *Laminaria hyperborea*-derived laminarin-immunomodulatory effects in Atlantic salmon cells
Ruth Montero, Veronica F. Blihovde, Lele Fu, Olav A. Aarstad, Finn L. Aachmann, Anne Tøndervik, Håvard Sletta, Liv T Mydland, Margareth Øverland
- 05 -II** **P-54** Efficacy of a novel glycovaccine for protection against *Aeromonas hydrophila* infection in Nile tilapia (*Oreochromis niloticus*)
Sreeja Lakshmi, Sivakumar S, Anbazhagan V, Baskaralingam Vaseeharan, Nopadon Pirarat, Sean J. Monaghan, Andrew Desbois, Kim Thompson, Preetham Elumalai

NUTRITIONAL MODULATION OF IMMUNE FUNCTION

- P-55** Fabrication of electrospun nanofibers loaded with piscidin for antibacterial applications
Rocío Díaz-Puertas, Enrique Rodríguez-Cañas, Marta Fernández-Oliver, Patricia Pereiro, Beatriz Novoa, Alberto Falcó, Ricardo Mallavia
- P-56** Study of toxicity of potential immunomodulating compounds for the development of oral metabolic therapies
Marta Fernández-Oliver, Rocío Díaz-Puertas, Patricia Pereiro, Beatriz Novoa, Ricardo Mallavia, Alberto Falcó
- P-57** Effect of prolonged administration of β -glucan on the innate immunity of tilapia, *Oreochromis niloticus*
Camino Fierro-Castro, Ingrid Camargo dos Reis, Basia Schlichting Moromizato, Jaqueline Dalbello Biller
- P-58** Therapeutic Role of Hemp (*Cannabis sativa*) Against Copper Induced Toxicity in *Labeo rohita* and *Cirrhinus mrigala*
Azam Jan Afridi, Amina Zuberi, Ali Muhammad Yousafzai
- P-59** Dietary *Debaryomyces hansenii* promotes the integrity and immune response of the skin in gilthead sea bream (*Sparus aurata*): an interactome study
Ignasi Sanahuja, Laura Fernandez-Alacid, Joana P. Firmino, Felipe E. Reyes-Lopez, Alberto Ruiz, Eva Vallejos-Vidal, Lluís Tort, Dariel Tovar-Ramírez, Antoni Ibarz, Enric Gisbert
- 06 -II** **P-60** Interactions of predominantly plant-based feeding and handling stress on the expression of selected immune markers in rainbow trout (*Oncorhynchus mykiss*)
Henrike Seibel, Finn-Thorbjörn Fichtner-Grabowski, Marvin Suhr, Alexander Rebl, Carsten Schulz, Stéphanie Céline Hornburg
- P-61** Potential probiotic *Lactococcus lactis* isolated from the intestinal content of Nile tilapia regulates immune-related genes on tilapia alevins
Javier Fernando Melo-Bolívar, Ruth Yolanda Ruiz-Pardo, María Ximena Quintanilla Carvajal, Luis Eduardo Díaz, Juan F. Alzate, Howard Junca, Jorge Alberto Rodríguez Orjuela, Luisa Villamil
- 07 -II** **P-62** Fucoidan fractions from Sugar kelp (*Saccharina latissima*) modulated immune-related biomarkers in Atlantic salmon head kidney cells
Byron Morales-Lange, Ruth Montero, Leszek Michalak, Sergio Rocha, Liv Torunn Mydland, Margareth Øverland

NEW TECHNOLOGIES FOR IMMUNE SYSTEM EVALUATION

- P-63** Optimization of CRISPR-Cas protocols for precise genome editing in salmon cell lines
Miroslav Bobrik, Eva-Stina Edholm, Ole Morten Seternes
- 08 -II** **P-64** Validation of ADDIGENE-BKD kit as a tool for early *Renibacterium salmoninarum* diagnostics in field
Verónica García, María José Barra, Alexis Martínez, Jaime A. Tobar
- P-65** Elucidating the roles of viral pattern recognition receptors in antiviral immunity in Atlantic salmon using CRISPR/Cas9 technology
Atefeh Kianian, Ole Morten Seternes, Eva Stina Edholm
- P-66** Innate immune responses as markers for viral replication in long-lasting salmonid cardiac primary cultures
Torben Krebs, Sarah Graff, Julia Bauer, Marina Gebert, Øystein Wessel, Espen Rimstad, Dieter Steinhagen, Mikolaj Adamek
- 09 -II** **P-67** In vitro models for virus infections in salmonids
Sarah Graff, Torben Krebs, Dieter Steinhagen, Mikolaj Adamek, Henrike Seibel, Marina Gebert
- 10 -II** **P-68** Gut transcriptome in Atlantic salmon (*Salmo salar*) after nutritional programming with a plant rich diet
Marwa Mamdouh Tawfik, Marlene Lorgen-Ritchie, Monica Betancor, Stuart McMillan, Elżbieta Król, Alex Douglas, Samuel A. M. Martin
- 11 -II** **P-69** Characterization of the branchial cavity lymphoid organization using 3D high-resolution imaging in zebrafish and other fish
Julien Rességuier, Mai-Eva N'Guyen-Chi, Martin Gross, Alf Dalum, Irene Salinas, Erling Koppang, Geert Wiegertjes, Pierre Boudinot and Gareth Griffiths
- 12 -II** **P-70** Determining the liver immune microenvironment in fibrolamellar carcinoma by non-invasive live imaging in zebrafish
Francisco Juan Martínez-Navarro and Sofía de Oliveira

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ORGANIZING SECRETARIAT

CONTACT

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ADDRESS

Storgata 11, 6413 Molde

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