Joint Workshop IC- IBIOM

Report of Contributions

https://eventi.mlib.ic.cnr.it/e/44

Contribution ID: **1** Type: **not specified**

Discussion and Conclusions

Tuesday, 18 April 2023 12:10 (15 minutes)

Speakers: Dr. Cinzia Giannini (IC-CNR) and Dr. Cesare Indiveri (IBIOM-CNR)

Contribution ID: **2** Type: **not specified**

Welcome and intro IC-CNR & IBIOM-CNR

Tuesday, 18 April 2023 09:00 (30 minutes)

Presenters: Dr GIANNINI, Cinzia (IC-CNR); Dr INDIVERI, Cesare (CNR-IBIOM)

Session Classification: Session

Contribution ID: **3** Type: **not specified**

The genetic asset of seaweed microbiomes encompasses ecologically and biotechnologically prominent functions

Tuesday, 18 April 2023 09:30 (25 minutes)

Seaweeds synthesize a wide range of halogenated metabolites(1-3). The fate of these metabolites remains largely unknown. To address this challenge, the genetic asset encoded by the associated microbiomes of three seaweeds has been annotated. A remarkable gene content potentially active in the degradation of a wide spectrum of halocarbons and haloaromatic molecules has been uncovered. These functional data, which may help in deciphering the still largely unknown role of microbial dark matter(4), support the hypothesis of considering macroalgae as holobionts, capable of managing the metabolism of halogenated compounds. Furthermore, this uncharted genetic diversity encompasses biotechnologically pivotal enzymes(5-8).

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Presenter: Dr PLACIDO, Antonio (CNR-IBIOM)

Session Classification: Session

Contribution ID: **7** Type: **not specified**

TRIM8, a key activator of p53 tumor suppressor activity, as a promising factor in cancer treatment: study of its function and structure

Tuesday, 18 April 2023 11:10 (25 minutes)

TRIM8 plays a key role in controlling the p53 molecular switch that sustains the transcriptional activation of cell cycle arrest genes and response to chemotherapeutic drugs. TRIM8 protein is able to interact with wild type p53 displacing its binding to MDM2 and consequently inducing specific post-translational modifications that stabilize and activate p53 protein. TRIM8 deficit dramatically impairs p53-mediated cellular responses to chemotherapeutic drugs and its re-expression is able to sensitize cells to treatments following p53 pathway re-activation, both in a cellular model of clear cell Renal Cell Carcinoma (ccRCC) and colorectal carcinoma (CRC). Therefore TRIM8 may represent a new promising therapeutic target in the treatment of ccRCC and CRC as well as other tumors that express a wild type p53 protein (but that show the inactivation in the functional p53 network). The study of TRIM8 structure also gives important informations on how it finely supports p53 activity, counteracting tumor progression.

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Presenter: Dr CARATOZZOLO, Mariano Francesco (CNR-IBIOM)

Session Classification: Session

Contribution ID: **8** Type: **not specified**

Role and interplay of copper(II) and related ligands as effectors of α-synuclein

Tuesday, 18 April 2023 10:45 (25 minutes)

The progressive loss of neuronal cells, as well as the decline of cognitive and motor functions are common features of several neurodegenerative disorders, such as Parkinson's disease (PD) and α-synucleinopathies. Other key factors in the development of these disorders should be oxidative stress, dyshomeostasis of metal ions and α-synuclein (αSyn)(1,2). Moreover, the abnormal aggregation process of αSyn is considered a crucial event in the pathogenesis of α-synucleinopathies. Metal-protein interactions play an important role in αSyn aggregation and might represent a link between the pathological processes of protein aggregation, oxidative damage, and neural death. High Copper concentration is detected the cerebrospinal fluid of PD patients, as well as in the Lewy bodies, the intracellular aggregates of αSyn. Moreover, Copper regulates αSyn intracellular localization and cytotoxicity(2). Lipoxidation and carbonylation have also been observed in neurodegenerative diseases. αSyn seems to induce lipid peroxidation and, conversely, αSyn carbonylation has been found in PD. In particular, acrolein (ACR) and 4-hydroxy-nonenal (HNE) have been reported to affect the aggregation process of αSyn(3). The interplay between ACR, copper, and αSyn has been recently investigated(4). Moreover, we comprehensively assessed the interaction with αSyn ability and inhibitory properties in preventing α-Syn aggregation of a series of glyco- and dipeptide-conjugates of 8-hydroxyquinoline, well-known molecules that provide neuroprotection in neurodegenerative disorders.

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Presenter: Dr BELLIA, Francesco (CNR-IC)

Session Classification: Session

Contribution ID: **16** Type: **not specified**

Freshwater microalgae: a natural source of compounds for medical and nutraceutical applications & the development of biosensors for the environmental/agri-food protection

Tuesday, 18 April 2023 09:55 (25 minutes)

The microalga Chlamydomonas reinhardtii is a widely known model system around the world, fully sequenced in its three genomes, easy and inexpensive to grow in the laboratory, and recently recognized by the FDA organism GRAS (generally recognized as safe)(1,2). The strong potential of this photosynthetic single-cell algae has been extensively studied related to the cell division, photosynthesis, cilia biogenesis, carbon-concentrating mechanism, responses to excess light and the dissipation of light energy, metabolism, biosynthetic pathways, and chloroplast gene expression(3). Moreover, thanks to the different gene transformation protocols available in the literature, is possible obtain genetic libraries with different kind of mutant strains (e.g. site-specific and random mutated)(4). For all these reasons, the utilisation of C. reinhardtii cells found over the years many applications. In particular, in the nutraceutics field as natural source of secondary metabolites(5), as well as in medical applications with the extraction of polysaccharides(6,7). Moreover, intriguing results derive from the exploitation of whole C. reinhardtii cells as biorecognition element in the design of biosensors for the detection of specific class of herbicides with harmful effects on environment and human health(8,9). Finally, noteworthy future prospects include these unicellular heterologous systems as a platform for the heterologous expression of proteins for different applications.

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Presenter: Dr ANTONACCI, Amina (CNR-IC)

Session Classification: Session

Contribution ID: **17** Type: **not specified**

Multi-scale structural investigations for integrative structural biology

Tuesday, 18 April 2023 11:35 (25 minutes)

X-ray based techniques are considered among the most powerful tools for the structural investigation of matter. Depending on the physical phenomenon on which the technique relies on, X-rays enable probing the matter down to atomic resolution, recovering information on the electronic structure, chemical coordination, and even about size and shape of large particles in solution. The combination of such information allows generating complete structural description for the systems of interest, a very interesting opportunity for several research fields and integrative structural biology, particularly. Here, some examples from our previous research about obtaining multiscale structural information by using such techniques will be shown. Firstly, two structural studies about the interaction between inhibitors and their protein targets (thrombin and acetylcholinesterase)(1) will be shown, as an example of the fine details about ligand-protein interaction, information that is precious for rational drug design, that can be provided by X-ray crystallography. A study about ubiquitin oligomer formation(2) will be reported to show the ability of the same technique in recovering insights about protein-protein interaction. Moreover, the structural investigation of the anti-CD20 protein molecule performed by combining Small Angle X-ray Scattering and molecular modelling techniques(3) will provide an example of investigation of large and flexible biological systems by X-ray based techniques. Finally, a X-ray Absorption Spectroscopy investigation about the interaction between metal ions and very large systems such as bacterial cells will be reported(4). Although they are limited with respect to the opportunities given by X-ray based techniques in the field of structural biology, the examples here shown allow appreciating the ability of such techniques in providing multiscale information, whose integration has become increasingly important for the understanding of biological systems.

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Presenter: Dr BELVISO, Benny Danilo (CNR-IC)

Session Classification: Session

Contribution ID: **18** Type: **not specified**

FoRever(se) complex I of mitochondrial respiratory chain

Tuesday, 18 April 2023 10:20 (25 minutes)

The mammalian complex I is the largest mitochondrial respiratory chain enzyme composed of 45 constituent subunits. It is the point of entry in the mitochondrial electron transport chain for NADH reducing equivalents, and it behaves as an adaptable pacemaker of respiratory ATP production(1). Mitochondrial respiratory chain complex I is a site of superoxide production during forward electron transfer from NADH to ubiquinone, but it produces more superoxide during reverse electron transfer (RET)(2). Recently, in the mouse liver and heart(3) and in HEK cell lines(4), metabolic labeling studies showed that soluble matrix arm subunits of complex I had shorter half-lives than membrane arm subunits. This is in agreement with the hypothesis that matrix arm subunits might exist as free monomers(5) or in a less stable, smaller sub-complex I(6). We have identified, in the mitochondrial matrix of bovine heart, a soluble part of complex I (sub-complex I) that presents both forward and RET activities. Preliminary results on the activity of the sub-complex I in primary human fibroblast cell cultures from subjects of different ages suggest a possible involvement in aging.

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Presenter: Dr DE RASMO, Domenico (CNR-IBIOM)

Session Classification: Session