Prof. Salvatore Passarella
Ordinario di Biochimica presso la Facoltà di Economia
dell'Università degli Studi del Molise

Since 1990 Professor Salvatore Passarella is full professor of Biochemistry in the University of Molise where he is coordinatore of the PhD course in Applied Biochemistry and Chemistry.

He was Dean of the Faculty of Agriculture (1993-1996) and since 1995 he is Prorettore of the University of Molise. Prof. Passarella has published more than 125 papers.
The recent Passarella\'s research topics include:
1. Energy metabolism in animal, plant and yeast mitochondria
1.1 Mitochondrial transport of metabolites and vitamins
1.2 Novel pathways and enzymes
1.3 The laser light sensitivity of isolated cells, mitochondria, enzymes and molecules
A review on the role of mitochondrial transport in energy metabolism has been recently published.

In particular, Professor Passarella has shown the occurrence of the malate/oxaloacetate shuttle aimed at transferring reducing equivalents from cytosol to mitochondria. Such a shuttle has been shown to play a major role in the oxidation of NADH by mitochondria isolated from plants, with a minor role to the external NAD(P)H dehydrogenases; this provides a novel metabolic pathway in plant biochemistry. That malate/oxaloacetate shuttle largely contributes to the oxidation of externally added NADH with respect to other shuttles including the malate/aspartate shuttle was also shown by reconstructing these shuttles with mitochondria from heart left ventricular from rats subjected to hypertension/hypertrophy.

The capability of both yeast and mammalian mitochondria to synthesise FAD from taken up riboflavin and to export it has been shown as well as the existence of mitochondrial enzymes devoted to FAD and FMN catabolism. In this regard, the occurrence of the riboflavin/riboflavine derivative cycle was shown to account for localization and recovery of these compounds in mammalian mitochondria.

A major contribution was given to shed light on the mitochondrial metabolism of the lactate isomers: D-lactate metabolism was discovered in mammalian, yeast and plant mitochondria as due to a putative D-lactate dehydrogenase localized in the inner mitochondrial compartments where D-lactate is transported both in a proton compensated symport and via a variety of antiporters. L-lactate was show to contribute to gluconeogenesis via its matrix metabolism and export of oxaloacetate in the extramitochondrial phase in exchange with further L-lactate.

The capability of He-Ne laser irradiation to improve the quality of turkey semen has been shown (6).
2. Cell death in animal, plant and yeast cells
2.1 The role of mitochondria in the necrosis and apoptosis in granule cerebellar cells
2.2 The bioenergetics of the programmed cell death in heat shocked tobacco cells
2.3 Yeast and apoptosis

A review on the glutamate neurotoxicity in cerebellar granule cells has been published.
The role of mitochondria in the necrosis and apoptosis in cerebellar granule cells: this field of research concerns the manner by which cerebellar granule cell die via apoptosis/necrosis with a special emphasis on the role played by mitochondria in theseprocesses. In rat cerebellar granule cells it was shown that cytochrome c release takes place during both glutamate toxicity and apoptosis due to deprivation of depolarizing levels of potassium. In both cases, the released cytochrome c, present in the cytosolic fraction obtained from cerebellar granule cells undergoing apoptosis, can operate as a ROS scavenger and as a respiratory substrate. Thus proposal was made that in cerebellar granule cell death, the released cytochrome c can contribute per se to provide

ATP required to prevent energy deficit in necrosis and for the cell programmed death to occur. Consistently it was shown that cellular ATP content increases in cerebellar granule cell apoptosis, that the role of oxidative phosphorylation is facultative, i.e. ATP can also derive from anaerobic glycolysis, and that the type of cell death depends on the ATP availability.

In the early phase of apoptosis the production in the extramitochondrial phase of ATP as synthesised via oxidative phosphorylation and exported outside mitochondria via the adenine nucleotide carrier (ANT) is impaired due to reactive oxygen species, but not to caspase. Later due to caspase action on proteins different from the ADP/ATP translocator, ANT becomes a component of the permeability transition pore which itself is dispensable for apoptosis to occur.

Some features of the programmed cell death in plants has been shown including the ROS production, the involvement of mitochondria and the cytochrome c release.

3. Oxidative/environmental stress in plant cell

3.1 The role of potassium channel, uncoupling protein and alternative oxidase in mitochondrial bioenergetics

3.2 The role of mitochondria in the plant defence against environmental stresses causing excess reactive oxygen species (ROS) production

The existence of the potassium channel in plant mitochondria has been discovered, moreover a novel property of the plant uncoupling protein as been shown in aged-dehydrated mitochondria from Jerusalem artichoke, namely the sensitivity to ROS.

Citation Year Score

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Supplemental Publications
(the ones we missed)

Vacca RA, Valenti D, Bobba A, Merafina RS, Passarella S, Marra E.

Cytochrome c is released in a reactive oxygen species-dependent manner and is degraded via caspase-like proteases in tobacco Bright-Yellow 2 cells en route to heat shock-induced cell death.
Plant Physiol. 2006 141(1):208-19.

Di Martino C, Pizzuto R, Pallotta ML, De Santis A, Passarella S.

Mitochondrial transport in proline catabolism in plants: the existence of two separate translocators in mitochondria isolated from durum wheat seedlings.

Planta. 2006 223(6):1123-33.

Paventi G, Pastore D, Bobba A, Pizzuto R, Di Pede S, Passarella S.

Plant uncoupling protein in mitochondria from aged-dehydrated slices of Jerusalem artichoke tubers becomes sensitive to superoxide and to hydrogen peroxide without increase in protein level.

Biochimie. 2006 (2):179-88.

Giannattasio S, Atlante A, Antonacci L, Guaragnella N, Lattanzio P, Passarella S, Marra E.

Cytochrome c is released from coupled mitochondria of yeast en route to acetic acid-induced programmed cell death and can work as an electron donor and a ROS scavenger.

FEBS Lett. 2008, 582(10):1519-25.

Valenti D, Vacca RA, Guaragnella N, Passarella S, Marra E, Giannattasio S.

A transient proteasome activation is needed for acetic acid-induced programmed cell death to occur in Saccharomyces cerevisiae.

FEMS Yeast Res. 2008

3: Guaragnella N, Antonacci L, Giannattasio S, Marra E, Passarella S.

Catalase T and Cu,Zn-superoxide dismutase in the acetic acid-induced programmed cell death in Saccharomyces cerevisiae.

FEBS Lett. 2008 582(2):210-

Atlante A, de Bari L, Bobba A, Marra E, Passarella S.

Transport and metabolism of L-lactate occur in mitochondria from cerebellar granule cells and are modified in cells undergoing low potassium dependent apoptosis.

Biochim Biophys Acta. 2007 (11):1285-99.

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PMID: 17418088 [PubMed - indexed for MEDLINE]

Vacca RA, Valenti D, Bobba A, de Pinto MC, Merafina RS, De Gara L, Passarella

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Proteasome function is required for activation of programmed cell death in heat shocked tobacco Bright-Yellow 2 cells.

FEBS Lett. 2007 Mar 6;581(5):917-22.

Valenti D, Vacca RA, de Pinto MC, De Gara L, Marra E, Passarella S.

In the early phase of programmed cell death in Tobacco Bright Yellow 2 cells the mitochondrial adenine nucleotide translocator, adenylate kinase and nucleoside diphosphate kinase are impaired in a reactive oxygen species-dependent manner.

Biochim Biophys Acta. 2007 1767(1):66-78.

Guaragnella N, Pereira C, Sousa MJ, Antonacci L, Passarella S, Côrte-Real M,

Marra E, Giannattasio S.

YCA1 participates in the acetic acid induced yeast programmed cell death also in a manner unrelated to its caspase-like activity.

FEBS Lett. 2006 Dec 22;580(30):6880-4.