The main idea, behind the organization of this meeting was to have the opportunity to present and discuss some new perspectives on BRAIN PLASTICITY in relation to AGING and NEUROPSYCHIATRIC DISORDERS including DRUG ADDICTION.

Today we know that the brain is a PLASTIC ORGAN which changes constantly as a result of its interaction with the environment, being this physical, emotional or social. Recent research has shown that the expression of GENE-ENVIRONMENT interaction modulates the brain not only during development but also in the adult brain. Also modulates processes such as AGING, PSYCHIATRIC DISEASES AND DRUG ADDICTION.

PLASTICITY has a long history behind. And in fact, it was Ramon y Cajal who already in 1894 used the term PLASTICITY in a Congress in Rome, advancing the idea that as a result of training and mental exercise the connections between neurons could be
changed and also multiplied. Cajal was possibly the first scientist pointing out, from a structural point of view, the influence of the environment on brain development and function through changes in neural connections. He specifically wrote “SUCH PLASTICITY OF THE CELLULAR PROCESSES PROBABLY VARIES AT DIFFERENT AGES: GREATER IN THE YOUNG MAN, DIMINISHED IN THE ADULT AND ALMOST COMPLETELY DISAPPEARED IN THE AGED”. These ideas of Cajal are today reflected in the results of current research on the influence of an enriched environment on the brain, in both young and aged animals. However Cajal was not right in his observation that plasticity disappeared in the aged brain because we know these days that NEURAL PLASTICITY IS STILL PRESENT IN THE AGED BRAIN and even in brains of an advanced age.

AGING OF THE BRAIN, which is one of the topics we are going to address in this meeting in the context of plasticity, is a physiological process that occurs ASYNCHRONOUSLY in different areas of the brain and the rate of that process is very much dependent on the style of life of the individuals. What do we know is that aging is a process that seems to be specific for each area of the brain (coding for specific functions –one or many-) and related to the neuronal-synaptic-molecular substrates of that area. Recent reports have shown differential age-related changes produced in several regions of the brain in the anatomy of neurons, volume tissue density and dynamics of several neurotransmitters and neurotrophic factors and therefore giving support to this suggestion.

In fact the aim of current research on aging is to try to understand the neural mechanisms through which some people age healthy, successfully and “slowly” and
escape the diseases associated with age. Drs. Natale Belluardo, Jesus Flórez and Gregorio Segovia were talking in this meeting about this topic concentrating their talks in neurotrophic factors, neurogenesis, neurotransmitters and neurophatology.

Another topic IN THE CONTEXT OF PLASTICITY OF THE BRAIN is that of DRUG ADDICTION, NEUROPSYCHIATRIC DISORDERS, and also STRESS. Dr Roberts talked on the brain plasticity mechanisms revealed through studies of drug reinforcement and addiction and Dr. Everitt on the plasticity of the neural mechanisms underlying the development of compulsive drug seeking and addiction highlighting the role of prefrontal cortex and neurotransmitters such as dopamine. Dr. Tanganelli talked from a different perspective, that of an early exposure to cannabinoid drugs on glutamate and its effects on cognitive functions. Three very important issues with impacting interest in society.

Also stress is an impacting topic these days which has been long shown to produce neurochemical and behavioural changes associated to the function of many areas of the brain, particularly the prefrontal cortex and also hippocampus, nucleus accumbens and amygdala and on several neurotransmitters particularly the monoamines dopamine and acetylcholine. In fact stress is implicated not only in the physiological process of aging but also has a powerful influence to predispose to suffer mental diseases and drug addiction because it has been shown to change the dynamics of several neurotransmitters and be a potent modulator of learning and memory processes. The study of the neurobiological correlates of stress on different parameters was addressed by Carmen Sandi and Segovia. Also Dr. Del Arco talked about the prefrontal cortex-nucleus accumbens interactions and dysfunctions as an important substrate for mental
diseases such as schizophrenia and Dr. Lopez-Barneo talked on Parkinson disease and cell therapy.

A NEW PERSPECTIVE ON RECEPTORS were the lectures dedicated to the receptor mosaics and their receptor-receptor interactions and their implications in neural plasticity, neuropsychiatric disorders and neurodegeneration. Mosaics refer to the direct interaction between two membrane receptors in which the activation of one of them could influence the molecular expression of both of them. Such mosaics has been possible to be demonstrated for receptor such as Dopamine and GABA, and later on several other neurotransmitters and neuromodulators but perhaps of more significance in this context are the mosaics for Dopamine and Glutamate receptors. For instance Agnati, Fuxe, and Ferre have investigated the heteromers of receptors Adenosine A2A, Dopamine D2, and metabotropic mGlu5 in the enkephalin medium spiny neurons and suggested that the differential stimulation of the units of these receptors determines the predominant signalling pathway and the consequent changes in neuronal excitability and gene transcription, with implications for PLASTIC CHANGES in the glutamatergic synapse involving AMPA receptors.

This research offers a new perspective in NEUROCHEMISTRY AND NEUROPHARMACOLOGY and opens a new window to understand the actions of neurotransmitters in complex functions such as learning and memory. Also their implications in NEUROPSYCHIATRIC DISORDERS AND NEURODEGENERATIVE DISEASES is of crucial importance to understand the neurochemical substrates of diseases such as SCHIZOPHRENIA and other disorders.
This new findings offers a hopeful positive perspective in the treatment of these diseases. Drs. Fuxe, Agnati, Franco were talking about all these topics.

AND FINALLY and as a conclusion what I would like to highlight is that ALL THESE CHANGES DURING AGING, DRUG ADDICTION, NEUROPSYCHIATRIC DISORDERS AND ALSO NEURODEGENERATIVE DISEASES are probably not as much dependent on the GENOME but on the AMBIOME (defined as “the set of non-genetic influences from conception to death (physical, psychological, social and cultural factors) that changes the biochemistry, anatomy and physiology of the brain or could determine the clinical expression of a disease”)

**References.**

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