DIPARTIMENTO DI FARMACIA E BIOTECNOLOGIE

Il giorno mercoledì 18 Aprile 2018
alle ore 14.30,
presso l' Aula A
di ex-Farmacologia via Irnerio 48

Il Prof. Antonello Bonci, MD

Scientific Director
National Institute on Drug Abuse
Baltimore, MD 21224 USA

(ospite Romualdi)

terrà un seminario dal titolo:

Neurobiologia delle dipendenze: Dalla plasticità sinaptica all'optogenetica

Subito dopo il Prof. Bonci è lieto di incontrare studenti, dottorandi e ricercatori per un dibattito aperto sulle tematiche trattate.

Siete invitati a partecipare e a diffondere tra i collaboratori.
La Commissione Ricerca

Abstract:

The ventral tegmental area (VTA), nucleus accumbens (NAC) and prefrontal cortex (PFC) are all part of the limbic system and are involved in reward- and drug-dependent behaviors. A few years ago, my laboratory has shown that drugs of abuse such as cocaine can produce long-term synaptic plasticity and that the duration of such plasticity is dependent upon the modality of drug or reward administration. Thanks to the recent discovery of optogenetic techniques, my laboratory has now started a series of studies aimed at defining the pathways that control and modulate reward and drug-dependent behaviors. During my presentation, I will discuss recent work aimed at defining the cellular mechanisms underlying long-term

plasticity in the limbic system, and the properties of non-neuronal populations in the basal ganglia. Finally, I will present evidence regarding the potential of transcranial magnetic stimulation as a novel optogenetic-based therapy against cocaine use disorders.

Brief Biosketch

I joined the National Institutes of Health (NIH) in 2010 as Scientific Director of the National Institute on Drug Abuse (NIDA). I was professor in residence in the Department of Neurology at the University of California, San Francisco (UCSF) and held the Howard J. Weinberg Endowed Chair in Addiction Research; as well as Associate Director for Extramural Affairs at the Ernest Gallo Clinic and Research Center. My laboratory was the first to demonstrate that drugs of abuse such as cocaine produce long-lasting modifications on the strength of the connections between neurons. This form of cellular memory is called long-term potentiation (LTP.) This finding cast a new light on the phenomenon of drug addiction, which could now be seen as a process of maladaptive learning and memory at the cellular level. In turn, this information helped explain why drug taking can often become such a long-lasting phenomenon, with relapse occurring even several years after the last encounter with a drug. Subsequently, my work has used a combination of electrophysiology, optogenetic, molecular and behavioral procedures to keep on studying the basic cellular mechanisms and circuits underlying reward and substance use disorders. Finally, we are currently in the process of developing an optogenetic-based treatment against cocaine use disorders, by using transcranial magnetic stimulation.

Research Areas of Interests: Neuroscience, synaptic plasticity, optogenetics, drug abuse, Transcranial Magnetic Stimulation

The key studies produced by my laboratory are listed below:

1. Pignatelli M, Umanah G, Riberio SP, Chen R, Yau HJ, Dawson VL, Dawson TM, Bonci A. Synaptic Plasticity onto Dopamine Neurons Shapes Fear Learning. Neuron. 2017 Jan 18;93(2):425-440. PubMed PMID: 28103482.
2. Tejeda HA, Wu J, Kornspun A, Pignatelli M, Kashtelyan V, Krashes MJ, Lowell BB, Carlezon WA, Bonci A. Pathway- and Cell-Specific Kappa-Opioid Receptor Modulation of Excitation-Inhibition Balance Differentially Gates D1 and D2 Accumbens Neuron Activity. Neuron. 2017 Jan 4;93(1):147-163. PubMed PMID: 28056342.
3. Edwards NJ, Tejeda HA, Pignatelli M, Zhang S, McDevitt RA, Wu J, Bass CE, Bettler B, Morales M, Bonci A. Circuit specificity in the inhibitory architecture of the VTA regulates cocaine-induced behavior. Nat Neurosci. 2017 Jan 23. doi: 10.1038/nn.4482. [Epub ahead of print] PubMed PMID: 28114294.
4. McDevitt RA, Tiran-Cappello A, Shen H, Balderas I, Britt JP, Chung SL, Richie CT, Harvey B, Bonci A. Serotonergic versus non-serotonergic dorsal raphe projection neurons: differential participation in reward circuitry. Cell Rep. 2014 Sep 25;8(6):1857-69. PubMed PMID: 25242321.
5. Chen BT, Yau H, Hatch C, Chou SL, Hopf FW, Bonci A. Rescuing Cocaine-induced Prefrontal Cortex Hypoactivity Prevents Compulsive Cocaine Seeking. Nature. 2013 Apr 18;496(7445):359-62. PubMed PMID: 23552889.
6 . Kourrich S, Hayashi T, Tsai SY, Harvey B, Su TP, Bonci A. Dynamic Interaction between Sigma-1 Receptor and Kv1.2 Shapes Neuronal and Behavioral Responses to Cocaine. Cell. 2013 Jan 17;152(1-2):236-47. PubMed PMID: 23332758.
7. Britt JP, Benaliouad F, McDevitt RA, Stuber GD. Wise RA, Bonci A. Synaptic and Behavioral Profile of Multiple Glutamatergic Inputs to the Nucleus Accumbens. Neuron. 2012 Nov 21;76(4):790-803. PubMed PMID: 23177963.
8 . Stuber GD, Sparta DR, Stamatakis AM, van Leeuwen WA, Hardjoprajitno JE, Cho S, Tye KM, Kempadoo KA, Zhang F, Deisseroth K, Bonci A. Excitatory Transmission from the Amygdala to Nucleus Accumbens Facilitates Reward Seeking. Nature. 2011 Jun 29;475(7356):377-80. PubMed PMID: 21716290.
9 . Stuber GD, Klanker M, de Ridder B, Bowers MS, Joosten RN, Feenstra MG, Bonci A. Reward-Predictive Cues Enhance Excitatory Synaptic Strength onto Midbrain Dopamine Neurons. Science. 2008 Sep 19;321(5896):1690-2. PubMed PMID: 18802002.
10 . Chen BT, Bowers MS, Martin M, Hopf FW, Guillory AM, Carelli RM, Chou JK, Bonci A. Cocaine but Not Natural Reward Self-Administration nor Passive Cocaine Infusion Produces Persistent LTP in the VTA. Neuron. 2008 Jul 31;59(2):288-97. PubMed PMID: 18667156.
11 . Ungless MA, Whistler JL, Malenka RC, Bonci A. Single Cocaine Exposure in Vivo Induces Long-Term Potentiation in Dopamine Neurons. Nature. 2001 May 31;411(6837):583-7. PubMed PMID: 11385572.