

**PERSONAL DATA**

Name: **Vassilis Raos**  
 Date of Birth: December 11<sup>th</sup>, 1966  
 Citizenship: Hellenic  
 Present Family Status: Married, one daughter.  
 Present Academic Status: Associate Professor of Physiology  
 Dept of Basic Sciences, School of Medicine, University of Crete  
 Collaborating Researcher  
 Group of Computational Neuroscience, IACM, FORTH.  
 Present Academic Address: Vassilika Vouton, 700 13 Heraklion, Crete, Greece  
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**EDUCATION**

- 6/1989-12/1994: Graduate student, Laboratory of Functional Brain Imaging, Department of Basic Medical Sciences, School of Medicine, School of Health Sciences, University of Crete, (12/1994 Doctorate degree).
- 9/1984-5/1989: Undergraduate student, University of Patras, School of Natural Sciences and Mathematics, Faculty of Biology (5/1989 Bachelor in Biology).

**Foreign Languages:** English, Italian

**PROFESSIONAL HISTORY**

- Associate Professor of Physiology, University of Crete, (Φ.Ε.Κ. 519/08-06-2017 τ. Γ).
- Assistant Professor of Physiology (tenured), University of Crete, (Φ.Ε.Κ. 998/14-12-2009 τ. Γ).
- Assistant Professor of Physiology, University of Crete, (Φ.Ε.Κ. 201/17-08-2005 τ. ΝΠΔΔ).
- Collaborating Researcher, Institute of Applied and Computational Mathematics, FORTH, 2002-
- Research Fellow, University of Crete, 1999-2005
- Research Fellow, University of Parma, 1996-1999
- Research Fellow, University of Verona, 1991

**CURRENT RESEARCH INTERESTS**

- Neuronal responses to action execution and action observation in frontal cortical areas of the macaque brain.
- Functional mapping of the neural circuits involved in observation and execution of hand grasping movements (*in collaboration with H.E. Savaki*).

**RESEARCH EXPERIENCE**

- *Dipartimento di Neuroscienze, Sezione di Fisiologia Umana, Facoltà di Medicina e Chirurgia, Università di Parma, Italia, (October 1996-April 1999).*
- Motor and visuomotor properties of neurons in the ventral premotor cortex (area F5) of the macaque monkey (supervised by G. Rizzolatti).
- Functional organisation of the dorsal premotor cortex (area F2) of the macaque monkey (supervised by M. Matelli).
- Reversible inactivation of different subregions of area F2 in the macaque brain (supervised by V. Gallese).  
*March 1995-September 1996: Military service*
- *Laboratory of Functional Brain Imaging, School of Medicine, University of Crete, (June 1989-February 1995).*
- Doctoral thesis: "Functional relations and anatomical connections of the centrolateral and reticular thalamic nuclei. In vivo study in the rat, by means of the quantitative autoradiographic [<sup>14</sup>C] 2-deoxyglucose method and tract-tracing techniques" (supervised by H.E. Savaki).
- Study of metabolic activity changes in cortical and subcortical structures of the monkey brain during the performance of a visually guided, one direction, arm reaching movement (supervised by H.E. Savaki).
- *Dipartimento di Scienze Morfologico-Biomediche, Sezione di Anatomia e Istologia, Facoltà di Medicina e Chirurgia, Università di Verona, Italia, (March-May 1991).*

Projections of the thalamic reticular nucleus in the rat (supervised by M. Bentivoglio).

➤ *Laboratory of Physiology, Faculty of Medicine, University of Patras, (October 1988-April 1989).*

Quantification of autoradiographic images produced by the in vitro receptor sites binding technique (supervised by A. Mitsacos).

➤ *Laboratory of Human and Animal Physiology, Faculty of Biology, University of Patras, (September 1987-July 1988).*

Study of the in vitro neuronal release of the neurotransmitters glutamic acid and glycine and the neuromodulator taurine from mice cerebellum slices (supervised by P. Giombres).

## RESEARCH FUNDING

- John S. Latsis Public Benefit Foundation, 12 months (1/2015-12/2015), 12.000€, Principal Investigator
- GSRT 14TUR, Bilateral S&T Cooperation Program, 24 months (1/2014-12/2015), 30.000 €, Principal Investigator
- 3767, SARF UoC, 12 months (1/2013-12/2013), 2.500 €, Principal Investigator
- 3704, SARF UoC, 24 months (11/2012-10/2014), 10.000 €, Principal Investigator
- LS5 (575), GSRT/Supporting postdoctoral researchers, 36 months (2/2012-2/2015), 150.000 €, Supervisor, (Postdoctoral Researcher: Marina Kilintari).
- 03EΔ803, GSRT, 36 months (2/2006-1/2009), 117.000 €, Co-Investigator
- IST-027574, EU-FP6, 36 months (2/2006-1/2009), 335.000 €, Co-Investigator
- 01EΔ111, GSRT, 36 months (8/2002-8/2005), 122.000 €, Co-Investigator
- QLRT-2001-00746, EU-FP5, 36 months (9/2002-8/2005), 193.000 €, Co-Investigator
- 97EA-35, GSRT, 32 months (5/1999-12/2001), 100.000 €, Principal Investigator

## FELLOWSHIPS

- Human Capital and Mobility Fellow (02/1994-02/1995)
- European Science Foundation Fellow (10/1996-4/1998)
- BIOMED Fellow (05/1998-04/1999)

## AWARDS

- Hellenic Society for Neuroscience award for the attendance of the “European Winter Conference on Brain Research” (03/1993).
- Italian Society for Neuroscience award for the attendance of the “Forum of European Neuroscience” (6/1998).

## MEMBERSHIP IN SCIENTIFIC SOCIETIES

- International Brain Research Organisation
- Society for Neuroscience
- Federation of European Neuroscience Societies
- Hellenic Society for Neuroscience
- International Neuropsychology Symposium

## Ad hoc REVIEWER

- **JOURNALS:** Journal of Neuroscience, Journal of Neurophysiology, Cerebral Cortex, NeuroImage, Neuropsychologia, Brain Research Bulletin, Frontiers, Scientific Reports, PLOS One, European Journal of Neuroscience, Transactions on Neural Systems & Rehabilitation Engineering, Neuroscience & Biobehavioral Reviews
- **FUNDING AGENCIES:** General Secretariat of Research and Technology, Italian Ministry of Education, University and Research, University of Padova, University of Bologna, University of Patras.

## INVITED SPEAKER

- December 2017, 27<sup>th</sup> Meeting of the Hellenic Society for Neurosciences
- May 2017, 43<sup>rd</sup> Panhellenic Medical Congress
- June 2015, International Neuropsychological Symposium, Collioure, France
- October 2009, Symposium: “Sharing in Nature and Culture”, University of Crete

- October 2009, Dipartimento di Psicologia, Università di Padova
- October 2009, Society for Neuroscience Meeting, Chicago, USA
- November 2007, 21<sup>st</sup> Meeting of the Hellenic Society for Neurosciences
- April 2006, Dipartimento di Fisiologia Umana e Generale, Università di Bologna.
- May 2003, Dipartimento di Neuroscienze, Istituto di Fisiologia Umana, Università di Parma.
- October 2000, 15<sup>th</sup> Meeting of the Hellenic Society for Neurosciences

## TEACHING/SUPERVISION EXPERIENCE

### Undergraduate level

- Lectures in undergraduate courses Physiology I (Nervous System/Motor and premotor cerebral cortices), Physiology II (Gastrointestinal system), Physiology III (Endocrine glands, Blood, Circulation) to first and second year medical students, (1999-).
- Physiology lab practicals to second year medical students, (1989-1991).

### Graduate level

- Lectures in graduate courses "Introduction to Neurosciences" and "Cerebral cortex and cognitive functions" to first and second year graduate students of the graduate programme "Brain and Mind" (2003-).
- Supervision of students in 6-month lab rotations.  
[Graduate Programme "Brain and Mind": Papadourakis V, Kechayas V, Kryoneriti D, Petratou D, Kouroupaki K, Sakkelaridi V, Paraskevopoulou M. Faculty of Biology: Tiblalexli M. Erasmus: Pappas N, Squadroni S, Bencivenni G, Putzu G.]
- Supervisor, PhD Thesis  
[Papadourakis V (<http://hdl.handle.net/10442/hedi/43255>, School of Medicine, 2018), Stamos A (<http://hdl.handle.net/10442/hedi/24331>, Graduate Programme "Brain and Mind", 2011)]
- Advisor, PhD Thesis  
[Tzanou A (School of Medicine, in progress), Theodorou I (School of Medicine, in progress), Paneri S (School of Medicine, in progress), Kilintari M (Graduate Programme "Brain and Mind", 2010), Neromyliotis E (School of Medicine, 2017)]
- Examiner, PhD Thesis  
[Kastellakis G (Faculty of Biology, 2016), Hourdakis E (Faculty of Computer Science, 2012), Tsirka V (School of Medicine, 2011), Pachou E (School of Medicine, 2009), Evangelidou MN (School of Medicine, 2008), Bakola S (School of Medicine, 2007), Hadjidimitrakis K (School of Medicine, 2007)]
- Examiner, MSc exams, Graduate Programme "Brain and Mind"  
[Skourti E (2018), Sakkelaridi V (2016), Kouroupaki K (2011), Spyropoulos G (2011), Stefanou S (2011), Papadourakis V (2008), Neromyliotis E (2008), Papoutsi A (2008), Kastellakis G (2008), Georgiadis V (2007), Stamos A (2007), Theodorou I (2006)]

## ADMINISTRATIVE DUTIES

- Member of the General Assembly of the School of Medicine (2009/10, 2015/16, 2016/17, 2017/18, 2018/19)
- Member of the Animal Facility Committee, School of Medicine (2013/14, 2014/15, 2015/16, 2016/17, 2017/18, 2018/19).
- Member of the Experimental Protocols Evaluation Committee, School of Medicine & Directorate of Veterinary Services, Region of Crete (2014-2019).
- Member of the Animal Welfare Body, School of Medicine & Directorate of Veterinary Services, Region of Crete (2018-2019).
- Member of the Library Committee, School of Medicine (2014/15, 2015/16, 2016/17, 2017/18, 2018/19).
- Member of the Committee for the receipt of goods for the Library of the University of Crete (2014/15).
- Member of the Committee for the control of the performance of the contract for the Ration and Housing of Students, University of Crete (2014/15).

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**PUBLICATIONS**


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**Doctoral thesis**

“Functional relations and anatomical connections of the centrolateral and reticular thalamic nuclei. In vivo study in the rat, by means of the quantitative autoradiographic [<sup>14</sup>C] 2-deoxyglucose method and tract-tracing techniques” (<http://hdl.handle.net/10442/hedi/5939>, University of Crete, 1994).

**Peer reviewed articles**

1. Savaki HE, Raos V. 2019. Action Perception and Motor Imagery: Mental Practice of Action. **Prog Neurobiol** (in press, doi: 10.1016/j.pneurobio.2019.01.007).
2. Papadourakis V, Raos V. 2019. Neurons in the macaque dorsal premotor cortex respond to execution and observation of actions. **Cereb Cortex** (in press, doi: 10.1093/cercor/bhy304).
3. Papadourakis V, Raos V. 2017. Evidence for the representation of movement kinematics in the discharge of F5 mirror neurons during the observation of transitive and intransitive actions. **J Neurophysiol** 118(6):3215-3229.

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*Associate Professor (6/2017)*

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4. Raos V, Savaki HE. 2017. The role of the prefrontal cortex in action perception. **Cereb Cortex** 27(10):4677-4690.
5. Raos V, Savaki HE. 2016. Perception of actions performed by external agents presupposes knowledge about the relationship between action and effect. **Neuroimage**. 132:261-273.
6. Kilintari M, Raos V, Savaki HE. 2014. Involvement of the superior temporal cortex in action execution and action observation. **J Neurosci**. 34(27):8999-9011.
7. Raos V, Kilintari M, Savaki HE. 2014. Viewing a forelimb induces widespread cortical activations. **Neuroimage**. 89:122-142.
8. Carpaneto J, Raos V, Umiltà MA, Fogassi L, Murata A, Gallese V, Micera S. 2012. Continuous decoding of grasping tasks for a prospective implantable cortical neuroprosthesis. **J Neuroeng Rehabil**. 9:84
9. Fattori P, Breveglieri R, Raos V, Bosco A, Galletti C. 2012. Vision for action in the macaque medial posterior parietal cortex. **J Neurosci**. 32(9):3221–3234.
10. Carpaneto J, Umiltà MA, Fogassi L, Murata A, Gallese V, Micera S, Raos V. 2011. Decoding the activity of grasping neurons recorded from the ventral premotor area F5 of the macaque monkey. **Neuroscience**. 188:80-94.
11. Kilintari M, Raos V, Savaki HE. 2011. Grasping in the Dark Activates Early Visual Cortices. **Cereb Cortex**. 21(4):949-63.
12. Stamos AV, Savaki HE, Raos V. 2010. The spinal substrate of the suppression of action during action observation. **J Neurosci**. 30:11605-11.
13. Fattori P, Raos V, Breveglieri R, Marzocchi N, Bosco A, Galletti C. 2010. Grasping neurons in the medial parieto-occipital cortex of the macaque. **J. Neurosci**. 30:342-9.
14. Savaki HE, Gregoriou GG, Bakola S, Raos V, Moschovakis AK. 2010. The place code of saccade metrics in the lateral bank of the intraparietal sulcus. **J. Neurosci**. 30:1118-27.

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*Assistant Professor (tenured, 12/2009)*

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15. Evangelioi MN, Raos V, Galletti C, Savaki HE. 2009. Functional Imaging of the Parietal Cortex during Action Execution and Observation. **Cereb. Cortex**. 19(3):624-39.
16. Kattoulas E, Smyrnis N, Mantas A, Evdokimidis I, Raos V, Moschovakis AK. 2008. Arm movement metrics influence saccade metrics when looking and pointing towards a memorized target location. **Exp. Brain Res**. 189:323-338.
17. Raos V, Evangelioi MN, Savaki HE. 2007. Mental simulation of action in the service of action perception. **J. Neurosci**. 27:12675-12683.
18. Bakola S, Gregoriou GG, Moschovakis AK, Raos V, Savaki HE. 2007. Saccade-related information in the superior temporal motion complex: quantitative functional mapping in the monkey. **J. Neurosci**. 27:2224-2229.
19. Raos V, Umiltà MA, Murata A, Fogassi L, Gallese V. 2006. Functional properties of grasping-related neurons in the ventral premotor area F5 of the macaque monkey. **J. Neurophysiol**. 95:709-729.

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*Assistant Professor (tenure-track 8/2005)*

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20. Raos V, Umilta MA, Gallese V, Fogassi L. 2004. Functional properties of grasping-related neurons in the dorsal premotor area F2 of the macaque monkey. **J. Neurophysiol.** 92:1990-2002.
21. Raos V, Evangelidou MN, Savaki HE. 2004. Observation of action: grasping with the mind's hand. **Neuroimage.** 23:193-201.
22. Raos V, Franchi G, Gallese V, Fogassi L. 2003. Somatotopic organization of the lateral part of area F2 (dorsal premotor cortex) of the macaque monkey. **J. Neurophysiol.** 89:1503-1518.
23. Fogassi L, Raos V, Franchi G, Gallese V, Luppino G, Matelli M. 1999. Visual responses in the dorsal premotor area F2 of the macaque monkey. **Exp. Brain Res.** 128:194-199.
24. Murata A, Fadiga L, Fogassi L, Gallese V, Raos V, Rizzolatti G. 1997. Object representation in the ventral premotor cortex (area F5) of the monkey. **J. Neurophysiol.** 78:2226-2230.
25. Savaki HE, Raos VC, Dalezios Y. 1997. Spatial cortical patterns of metabolic activity in monkeys performing a visually guided reaching task with one forelimb. **Neuroscience.** 76:1007-1034.
26. Dalezios Y, Raos VC, Savaki HE. 1996. Metabolic activity pattern in the motor and somatosensory cortex of monkeys performing a visually guided reaching task with one forelimb. **Neuroscience.** 72:325-333.
27. Raos VC, Dermon CR, Savaki HE. 1995. Functional anatomy of the thalamic centrolateral nucleus as revealed with the [14C]deoxyglucose method following electrical stimulation and electrolytic lesion. **Neuroscience.** 68:299-313.
28. Raos VC, Savaki HE. 1995. Functional anatomy of the thalamic reticular nucleus as revealed with the [14C]deoxyglucose method following electrical stimulation and electrolytic lesion. **Neuroscience.** 68:287-297.
29. Raos V, Bentivoglio M. 1993. Crosstalk between the two sides of the thalamus through the reticular nucleus: a retrograde and anterograde tracing study in the rat. **J Comp Neurol.** 332:145-154.
30. Savaki HE, Raos VC, Dermon CR. 1992. Bilateral cerebral metabolic effects of pharmacological manipulation of the substantia nigra in the rat: unilateral intranigral application of the inhibitory GABAA receptor agonist muscimol. **Neuroscience.** 50:781-794.
31. Chen S, Raos V, Bentivoglio M. 1992. Connections of the thalamic reticular nucleus with the contralateral thalamus in the rat. **Neurosci. Lett.** 147:85-88.

#### Abstracts and Conference Proceedings

1. Papadourakis V, Raos V. 2017. Properties of mirror neurons in the dorsal premotor cortex of the macaque brain. Comparison with F5 mirror neurons. Program No. 497.12 2017 Neuroscience Meeting Planner. Washington, DC: **Society for Neuroscience**, 2017. Online.
2. Ashena N, Papadourakis V, Raos V, Oztop E. 2017. Real-Time Decoding of Arm Kinematics During Grasping Based on F5 Neural Spike Data. **Advances in Neural Networks - International Symposium on Neural Networks 2017, Proceedings Part I**, 261-268
3. Papadourakis V, Raos V. 2015. Mirror neurons respond to the observation of intransitive actions. Program No. 601.15 2015 Neuroscience Meeting Planner. Washington, DC: **Society for Neuroscience**, 2015. Online.
4. Kirtay M, Papadourakis V, Raos V, Oztop E. 2015. Neural representation in F5: cross-decoding from observation to execution. **BMC Neurosci.** 16(Suppl 1):P190.
5. Papadourakis V, Raos V. 2014. Action observation elicited responses in the dorsal premotor cortex (area F2) of the macaque monkey. 9th **FENS Forum of Neuroscience**. Abstract Number: FENS2021
6. Papadourakis V, Raos V. 2013. Action observation response profile of F5 ventral premotor neurons in the macaque brain. **26th Meeting of the Hellenic Society for Neuroscience**, Abstract book, p.101. **Best poster presentation award to V. Papadourakis.**
7. Papadourakis V, Raos V. 2013. Cue-dependent action-observation elicited responses in the ventral premotor cortex (area F5) of the macaque monkey. **Soc. Neurosci. Abstr.**, Program No. 263.08. 2013 Abstract Viewer/Itinerary Planner.
8. Kilintari M, Raos V, Savaki HE. 2013. Functional imaging of the temporal cortex during action execution and observation. **Soc. Neurosci. Abstr.**, Program No. 458.14. 2013 Abstract Viewer/Itinerary Planner.
9. Raos V, Kilintari M, Savaki HE. 2012. Effects of biological motion in the cerebral cortex of the primate brain. **Soc. Neurosci. Abstr.**, Program No. 467.03. 2012 Abstract Viewer/Itinerary Planner.
10. Raos V, Savaki HE. 2011. Frontal cortical areas of the monkey brain engaged in visual and somatosensory guidance of reaching-to-grasp. **Soc. Neurosci. Abstr.**, Program No. 803.70. 2011 Abstract Viewer/Itinerary Planner.

11. Kilintari M, Raos V, Savaki HE. 2010. Mental imagery serving action cognition includes visual in addition to the motor and kinesthetic components. **Soc. Neurosci. Abstr.**, Program No. 485.4. 2010 Abstract Viewer/Itinerary Planner.
12. Fattori P, Raos V, Breveglieri R, Ciavarro M, Galletti C. 2010. Vision for action in the medial parieto-occipital cortex: Visual responses to graspable objects in area V6A. **Soc. Neurosci. Abstr.**, Program No. 533.3. 2010 Abstract Viewer/Itinerary Planner.
13. Fattori P, Raos V, Breveglieri R, Marzocchi N, Bosco A, Galletti C. 2009. Grasping neurons in the medial parieto-occipital cortex of the macaque. **Soc. Neurosci. Abstr.**, Program No. 307.2. 2009 Abstract Viewer/Itinerary Planner.
14. Stamos A, Evangeliou M N, Savaki HE, Raos V. 2009. Involvement of the spinal cord in the inhibition of overt actions during action simulation. **Soc. Neurosci. Abstr.**, Program No. 307.9. 2009 Abstract Viewer/Itinerary Planner.
15. Raos V, Evangeliou MN, Savaki HE. 2008. Parietal cortical areas of the monkey brain engaged in visual and somatosensory guidance of reaching-to-grasp. **Soc. Neurosci. Abstr.**, Program No. 262.2. 2008 Abstract Viewer/Itinerary Planner.
16. Raos V, Evangeliou MN, Savaki HE. 2005. Observation of action: grasping with the mind's hand. **Soc. Neurosci. Abstr.**, Program No. 288.4. 2005 Abstract Viewer/Itinerary Planner.
17. Raos V, Umiltà MA, Gallese V, Fogassi L. 1999. Hand representation in the dorsal premotor area F2 of the macaque monkey. **Soc. Neurosci. Abstr.**, Vol.25, Part 1, p.381.
18. Raos V, Franchi G, Fogassi L, Gallese V, Luppino G, Matelli M. 1998. Functional organization of area F2 in the monkey. **Eur. J. Neurosci. Suppl.** 10, p.87.
19. Raos V, Fadiga L, Fogassi L, Gallese V, Rizzolatti G. 1997. Object coding in the ventral premotor cortex (area F5) of the monkey. **TINS Suppl.** 20(9), p.46.
20. Savaki HE, Raos V, Dalezios Y. 1996. Two dimensional reconstructed patterns of metabolic activity in the primate neocortex during performance of a visually guided reaching task. **Soc. Neurosci. Abstr.**, Vol.22, Part 3, p.2026.
21. Savaki HE, Dalezios Y, Raos VC, Caminiti R. 1995. Metabolic activity pattern in the motor and somatosensory cortex of monkeys performing a visually guided arm reaching task. **Eur. J. Neurosci. Suppl.** 8, p.99.
22. Raos V, Chen S, Bentivoglio M. 1992. Crosstalk between the two sides of the thalamus through the reticular nucleus: a retrograde and anterograde study in the rat. **Eur. J. Neurosci. Suppl.** 5, p.202.
23. Savaki H E, Raos V, Dermon CR. 1990. Bilateral local metabolic effects induced by high concentration of muscimol injected intranigally. **Soc. Neurosci. Abstr.**, Vol.16, Part 1, p.233.