Fecha del CVA	09/05/2023

Parte A. DATOS PERSONALES

Nombre *	Eugenio		
Apellidos *	Santos		
Sexo *	No Contesta	Fecha de Nacimiento *	
DNI/NIE/Pasaporte *		Teléfono *	
URL Web			
Dirección Email			
Identificador científico	Open Researcher and Contributor ID (ORCID) *	0000-0003-3565-0321	
	Researcher ID	B-3823-2017	
	Scopus Author ID	7202142651	

* Obligatorio

A.1. Situación profesional actual

Puesto	Catedrático de Universidad / Full Professor		
Fecha inicio	1999		
Organismo / Institución	Universidad de Salamanca		
Departamento / Centro	Departamento de Microbiología y Genética / Universidad de Salamanca		
País	España	Teléfono	(34) 923294720
Palabras clave			

A.3. Formación académica

Grado/Master/Tesis	Universidad / País	Año
Doctor en Ciencias Biológicas / PhD Biological Sciences	Universidad de Salamanca	1978
Licenciado en Ciencias Biológicas / M Sci Biological Sciences	Universidad de Salamanca	1975

A.4. Indicadores generales de calidad de la producción científica

A. Scientific Production

Google Scholar Citation Indexes for Eugenio Santos

Citations: 12828. h-index: 51. i10-index: 115

B. Competitive Funding as PI

Indiv. proj: Intramural NCI (1990–99; 450000$/yr). FEDER 1FD97-1678 (2000-2001; 282355€). FEDER 1FD97-1735 (2000–01; 187624€). SAF2000-0069 (2000-03; 285072€.). FIS PI021570 (2002-05; 219765€). CICYT SAF2003-04177 (2003-06; 200000€). CICYT GEN2003-20239-C06-02 (2004–07; 177100€). FIS PI061274 (2006-09; 422000€). GR93, CyL (2008-10; 197306€). FIS Intrasalud PS09/01979(2010-13; 523325€). BIO/SA03/14(2014; 25110€). SA181U13 (2013-14;35000€) (FIS PI13/02846 (2013-16; 195415€). SA043U16 (2016-18; 120000€). FIS PI/16/02137 (2017-19;147015€). Ciberonc (2017-; 72000€). CyL-SA264P18 (2018-20, 120000€). Areces (2019-21,129357€). FIS/PI19/00934(2020-22, 292820). BI3406 (22-3, 200000€)

Collect.proj:MCYT APC1998-0246(1998; 100.000.000Ptas) MCYT APC1999-0154. (1999; 59.000.000Ptas). MCYT APC2000-0003 (2000; 50.000.000Ptas) MCYT-FEDER UNSA00-23-014 (2001; 2055461,40€). MCYT-FEDER (2001; 488623€). MCYT-FEDER. (2002; 485017€). Infraestr SNS-FIS 01/3634 (2001; 127014,89€). Infraestr SNS-FIS 02/3632 (2002; 219704€). MCYT-FEDER-UNSA00-23-020 (2003; 1984481,80€). Infraestr SNS-FIS 03/3613 (2003; 133400€) Fund. M. Botín (2004-09; 200000€/yr). RTICCC(ISCIII)-Nodo CIC C03/10 (2003-06, 734000€/yr). Acción Transversal Cáncer (2008; 800000€). Infraestr

SAF2005-24631-E (2005; 380000€). Infraestr SNS-FIS (2008; 400000€). RTICC(ISCIII)-RD06/0020/0000 (2007-12; 304000€/ yr). RTICC (ISCIII)-RD12/0036/0001(2013-17; 442343€/ yr).MCIU-EQC2018-004532P (2018, 166.777€).INFRARED CyL (2019, 201799,20€) & (20-23; 270.233€). AECC Exc Ctr (23-26, 2000000€)

C. Other scientific activities and recognition

- **Reviewer scientific Journals** : Biochemistry, BBA, Cancer Biology&Medicine, Cancer Res., Cancer Genet.& Cytog, Cell Cycle, Differentiation, Eur. J. Biochem, Int. J. Oncol., J. Biol Chem, J Cell Biol, Leukemia, Life Science Alliance, Mol Biol of the Cell, Mol Cell Biol, Molecular Reports, Neurosc Letters, Nature, Oncogene, Proc Natl Acad of Sciences USA, Science, Sci Sig.
- **Editorial Boards**: Int J Oncology, Clin Transl Oncol, Genes&Cancer, Current Cancer Drug Targets, Cells, Int J Mol Sci
- **Reviewer Grant proposals**: National Science Foundation (USA), Canadian Fonds de la Recherche en Santé du Quebec, International Science Foundation program (ISF, Washington D.C.), Israel Science Foundation, Asoc.Italiana per la Ricerca sul Cancro (AIRC), Spanish ANEP, FIS, AECC.
- **Tenure Review committees**: National Cancer Institute; Johns Hopkins Med Sch; Mount Sinai Med Sch; Robert Wood Med Sch; USUHS
- **Scientific Advisory Board member**: CNIO (Madrid), IIS La Fe, CIPF (Valencia), CIMAGO (Coimbra), ISPA (Asturias), IDIBAPS, IDIBELL (Barcelona), CIOCC, Fund. Ferrer, Asoc. Española contra el Cáncer (AECC)
- **Invited speaker** at many national and international **meetings** on oncogene research.
- 28 **articles** cited >100 times, 4 articles among most cited of decade 80-90. 6 articles cited >400 times (ISI Citation Classics). Listed in “Most published RAS authors”(NCI Ras Initiative)
- **6** research **sexenios** and **6** teaching **quinquenios** accredited by **Spanish MINECO**.
- Grupo de Excelencia (**GR93**) and Unidad de Investigacion Consolidada (**UIC 076**) by **Castile&Leon**
- **Scientific personnel trained**: More than 50 postdoctoral fellows, predoctoral students and technicians.
- National Coordinator, Spanish Cancer Research Network (**RTICC, ISCIII**) 2003-2017

Parte B. RESUMEN LIBRE DEL CURRÍCULUM

Ph.D. from Salamanca Univ. (USAL, 1978) and postdoc training at RIMB (NJ; 79-81) and NCI (Md; 81-84). PI at the NIH in the Lab of Molecular Microbiology (NIAID, 85-90) and the Lab of Cellular and Molecular Biology (NCI, 91-00). Since 2000, Professor, Dept Microbiology&Genetics and Director, CIC-IBMCC (USAL-CSIC).

Santos’ **scientific career** has evolved in temporal sync with Molecular Oncology since his cloning and characterization of the first human oncogene (HRAS) at the NCI in the early 80's. **During the 80s** his work isolating the HRAS oncogene and demonstrating its malignant activation by point mutation was followed by his demonstration for the first time in humans of an activated KRAS oncogene in tumor but not normal tissue of the same patient (Nature 82a,82b; Science 84). **In the 90s** he contributed to understanding structure and function of RAS proteins (JBC 88; FASEB J 89) and their participation in signaling pathways controlling cell growth and differentiation (PNAS 88; MCB 90) by using various RAS-dependent biological models (Science 91a,91b; Oncogene 93,97; PNAS 93; JBC 94,96; MCB 97). **Since 2000** his work focused on mechanisms of RAS activation by exchange factors (GEF) and ascertainment of functional specificity/redundancy of various RAS and RasGEF isoforms using KO models.

Regarding functional specificity of **RAS proteins**(Genes Cancer 11; Sci Signal 14; Sci Signal 18; Genes 21) he showed that only KRAS is necessary and sufficient for development to the adult stage (MCB 01) and documented a critical involvement of NRAS in immune modulation/ host defense and apoptotic responses (Oncogene 07; Genome Biol 09; Blood 11; J Exp Med

13); KRAS in cell cycle progression (EMBO J 10; PLosOne 10; BMC Genomics 13); HRAS in systemic vascular pressure (Kidney Int 10; Hypertens 10; AJPCP 12); RRas in germinal center formation (Sci Signal 18)); and HRAS and NRAS concomitantly in pulmonary development (Cell Death Dis 19).

He documented differential functionality of **GRF1 and GRF2** (BBA Rev Cancer 11) demonstrating specific roles of GRF1 in pancreatic beta cells (EMBO J 03; BMC Genomics 14) and neurosensory and photoreception processes (Neurosci 07; J Neurochem 09; Nat Gen 10); and of GRF2 in T cell signaling (MCB 07; PLosOne 09), addiction behavior (PNAS 11, 12; Psychopharmacol 14; J Neurosci 19), control of nuclear migration required for development and function of retinal cone photoreceptors (J Cell Sci 16, Small GTPases 18), and control of stem cell density and onset of differentiation during adult neurogenesis (Mol Cell Neurosci 17).

Regarding SOS1/2 GEFs (BBA Rev Cancer 20; Meth Mol Biol 21), he first showed that **SOS1** is essential for embryonic development (EMBO J 00) but **SOS2** is dispensable in adult animals (MCB 00) and demonstrated functional redundancy of SOS1 and SOS2 for organismal survival and homeostasis (MCB 13). He then demonstrated functional prevalence of SOS1 over SOS2 regarding cellular proliferation and viability and a direct mechanistic link between SOS1 and control of intracellular mitochondrial redox homeostasis (Oncogene 16, 21). He also characterized specific roles of SOS1 and SOS2 in different biological contexts (Oncogenesis 19, J Leuk Biol 19; Cancers 21) and identified novel anthraquinone inhibitors of SOS1 GEF activity (Biomolecules 21). Importantly, he demonstrated that SOS1 is critically required for bcrabl leukemogenesis (Leukemia 17, Cancers 22) and for skin carcinogenesis (MCB 18), identifying **SOS1** as a novel, bona fide **therapeutic target** for RAS-driven cancers.

Director of the Salamanca CIC-IBMCC and former national Coordinator of RTICC cancer research network (ISCIII, 2003-17) and ASEICA president (2010-14). Member of editorial & advisory boards, Royal Academy of Medicine and European Academy of Cancer Sciences. Received scientific awards including: Severo Ochoa Biomedical Research Award, Castile&Leon Scientific Research Award, Spanish Health Ministry Encomienda, Echevarne Oncology Award.

Parte C. MÉRITOS MÁS RELEVANTES

C.1. Publicaciones

AC: Autor de correspondencia; (nº x / nº y): posición firma solicitante / total autores. Si aplica, indique el número de citaciones

1 **Artículo científico**. FC Baltanas; E Santos. 2023. Advances in Molecular Research of Oncogenes. Int. J. Mol. Sci. 24, pp.7222. https://doi.org/10.3390/ijms24087222
2 **Artículo científico**. N Martinez-Grajera; MP de Lucas; AB Camara; et al; JM Rojas-Cabañeros. 2023. PKD phosphorylation and COP9/Signalosome modulate intracellular Spry2 protein stability. Oncogenesis. Springer Nature. 12-1, pp.20. https://doi.org/10.1038/s41389-023-00465-3
3 **Artículo científico**. R Fuentes-Mateos; E Santos; A Fernandez-Medarde. 2023. Optimized Protocol for Isolation and Culture of Murine Neonatal Primary Lung Fibroblasts. Methods and protocols. MDPI. 6-1, pp.14. https://doi.org/10.3390/mps6010014
4 **Artículo científico**. ; L Clavaín; I Fernández-Pisonero; et al;. 2022. Characterization of mutant versions of the R-RAS2/TC21 GTPase found in tumors.Oncogene. 42-5, pp.389-405. https://doi.org/10.1038/s41388-022-02563-9
5 **Artículo científico**. C Gomez; N Calzada; R Garcia-Navas; FC Baltanas; R Fuentes-Mateos; A Fernandez-Medarde; E Santos. 2022. Critical Requirement of SOS1 for Development of BCR/ABL-Driven Chronic Myelogenous Leukemia. Cancers (Basel). 14-16, pp.3893. https://doi.org/10.3390/cancers14163893

6 **Artículo científico**. A Fernandez-Medarde; R Fuentes-Mateos; A Olarte-SanJuan; J Sanchez-Lopez; A Fernandez-Medarde; E Santos. 2021. Antrhaquinones as Inhibitors of SOS Ras-GEF Activity. Biomolecules. MDPI. 11-8, pp.1128. https://doi.org/10.3390/biom11081128

7 **Artículo científico**. R Garcia-Navas; P Liceras-Boillos; C Gomez; FC Baltanas; N Calzada; C Nuevo-Tapioles; JM Cuezva; E Santos. 2021. Critical requirement of SOS1 RAS-GEF function for mitochondrial dynamics, metabolism, and redox homeostasis. Oncogene. Springer Nature. 40-27, pp.4538-4551.

8 **Artículo científico**. FC Baltanas; R Garcia-Navas; E Santos. 2021. SOS2 Comes to the Fore: Differential Functionalities in Physiology and Pathology. Int J. Mol. Sci. MDPI. 22, pp.6613. https://doi.org/10.3390/ijms22126613

9 **Artículo científico**. Alberto; Eugenio. 2021. Ras-GEF Mouse Models for the Analysis of Ras Biology and Signaling. Methods Mol Biol.2262, pp.361-395.

10 **Artículo científico**. A Fernandez-Medarde; J De Las Rivas; E Santos. 2021. 40 Years of RAS – A historic overview. Genes (Basel). MDPI. 12-5, pp.681. https://doi.org/110.3390/genes12050681.

11 **Artículo científico**. F; C; LF; et al; E. 2021. Functional Specificity of the Members of the Sos Family of Ras-GEF Activators: Novel Role of Sos2 in Control of Epidermal Stem Cell Homeostasis. Cancers. MDPI. 13-9, pp.2152. https://doi.org/10.3390/cancers13092152

12 **Artículo científico**. F Baltanas; N Zarich; JM Rojas-Cabañeros; E Santos. (/ 3). 2020. SOS GEFs in health and disease. Biochim Biophys Acta Rev Cancer. Elsevier. 1874-2, pp.188445. https://doi.org/10.1016/j.bbcan.2020.18445

13 **Artículo científico**. R Fuentes-Mateos; D Jimeno; C Gomez; N Calzada; A Fernandez-Medarde; E Santos. 2019. Concomitant deletion of HRAS and NRAS leads to pulmonary immaturity, respiratory failure and neonatal death in mice. . Cell Death Dis. 10-838.

14 **Artículo científico**. R Spanagel; R Brambilla; E Santos; S Fasano; I Morella; A Olevska; R Bernardi. 2019. The inhibition of RasGRF2, but not RasGRF1, alters cocaine reward in mice. Journal of Neuroscience. 39-32.

15 **Artículo científico**. FC Baltanas; MY Berciano; O Tapia; et al; M Lafarga. 2019. Nucleolin reorganization and nucleolar stress in Purkinje cells of mutant pcd mice. Neurobiology of Disease. 127, pp.312-322.

16 **Artículo científico**. S Suire; F Baltnas; A Segonds-Pichon; K Davidson; E Santos; P Hawkins; L Stephens. 2019. TNF? and GM-CSF1 priming augments the role of SOS1/2 in driving activation of Ras, PI3K? and neutrophil proinflammatory responses. . J Leukoc. Biol. https://doi.org/10.1002/JLB.2HI0918-359RR

17 **Artículo científico**. N Zarich; B Anta; A Fernandez-Medarde; et al; E Santos. 2019. The CSN3 subunit of the COP9 signalosome interacts with the HD region of Sos1 regulating stability of this GEF protein. Oncogenesis. 8-1.

18 **Artículo científico**. 2018. The RAS-ERK pathway: A route for couples. Science Signaling. 11-554, pp.). pii: eaav0917. https://doi.org/10.1126/scisignal.aav0917

19 **Artículo científico**. L Manyes; S Holst; M Lozano; E Santos; A Fernandez-Medarde. 2018. Spatial learning and long term memory impairments in RasGrf1 KO, Pttg1 KO and double KO mice. Brain and Behavior. https://doi.org/10.1002/brb3.1089

20 **Artículo científico**. 2018. Differential role of the RasGEFs SOS1 and SOS2 in mouse skin homeostasis and carcinogenesis.Molecular and Cellular Biology. In press.

21 **Artículo científico**. C Gomez; D Jimeno; A Fernandez-Medarde; R Garcia-Navas; N Calzada; E Santos. 2017. Ras-GRF2 regulates nestin-positive stem cell density and onset of differentiation during adult neurogenesis in the mouse dentate gyrus. Molecular and Cellular Neuroscience. 85, pp.127-147. https://doi.org/10.1016/j.mcn.2017.09.006

22 **Artículo científico**. S Gerboth; E Frittoli; A Palamidessi; et al; G Scita. 2017. Phosphorylation of SOS1 on tyrosine 1196 promotes its RAC GEF activity and contributes to BCR-ABL leukemogenesis. Leukemia. https://doi.org/10.1038/leu.2017.267

23 **Artículo científico**. P Mendoza; N Martínez-Martín; ER Bovolenta; et al; B Alarcon. 2017. RRas2 is required for germinal center formation to aid B cells during energetically demanding processes. Science Signalling. 11-532. https://doi.org/10.1038/leu.2017.267

24 **Artículo científico**. B Anta; A Perez-Rodriguez; J Castro; et al; JM Rojas-Cabañeros. 2016. PGA1-induced apoptosis involves specific activation of H-Ras and N-Ras in cellular endomembranes. Cell Death & Disease. 7-7, pp.e2311. https://doi.org/doi: 10.1038/cddis.2016.219

25 **Artículo científico**. David Jimeno; Eugenio Santos. 2016. A new functional role uncovered for RASGRF2 in control of nuclear migration in cone photoreceptors during postnatal retinal development. Small GTPases. 8-1, pp.26-30. https://doi.org/10.1080/21541248.2016.1189989

26 **Artículo científico**. Pilar Liceras-Boillos; Rosula Garcia-Navas; Alicia Ginel-Picardo; et al; Eugenio Santos. 2016. Sos1 disruption impairs cellular proliferation and viability through an increase in mitochondrial oxidative stress in primary MEFs. Oncogene http://www.nature.com/doifinder/10.1038/onc.2016.169. Macmillan Publishers Limited. https://doi.org/doi:10.1038/onc.2016.169

27 **Artículo científico**. Jimeno, D.; Gómez, C.; Calzada, N.; de la Villa, P.; Lillo, C.; Santos, E.2016. RasGRF2 controls nuclear migration in postnatal retinal cone photoreceptors.Journal of Cell Science. 129-4, pp.729-742. ISSN 1477-9137. https://doi.org/doi:10.1242/jcs.180919

28 **Artículo científico**. Stacey, D.; Lourdusamy, A.; Ruggeri, B.; et al; Schumann, G.2015. A translational systems biology approach in both animals and humans identifies a functionally related module of accumbal genes involved in the regulation of reward processing and binge drinking in males.Journal of Psychiatry & Neuroscience : JPN. 41-2, pp.150138. ISSN 1488-2434. https://doi.org/10.1503/jpn.150138

29 **Artículo científico**. Santos E. 2014. Dimerization opens new avenues into Ras signaling research. Science Signalling. 7-324, pp.pe12. https://doi.org/10.1126/scisignal.2005318

30 **Artículo científico**. Easton AC; Rotter A; Lourdusamy A; et al; Müller CP. 2014. RasGRF2 controls dopaminergic adaptations to alcohol in mice. Brain Res Bull. pp.143-150. https://doi.org/10.1016/j.brainresbull.2014.10.008

31 **Artículo científico**. Easton A C; Rotter A; Lourdusamy A; et al; Müller CP. 2014. RasGRF2 controls noradrenergic involvement in the acute and subchronic effects of alcohol in the brain.Psychopharmacology. Biermann T. https://doi.org/doi: 10.1007/s00213-014-3562-x

32 **Artículo científico**. Manyes L; Arribas M; Gomez C; Calzada N; Fernandez-Medarde A; Santos E. 2014. Transcriptional profiling reveals functional links between RasGrf1 and Pttg1 in pancreatic beta cells.BMC Genomics. 15, pp.1019-1019. https://doi.org/10.1186/1471-2164-14-731

33 **Artículo científico**. Baltanás C. F; Perez-Andrés M; Ginel-Picardo A; et al; Santos E. 2013. Functional redundancy of sos1 and sos2 for lymphopoiesis and organismal homeostasis and survival.Molecular and Cellular Biology. 33-22, pp.4562-4578. https://doi.org/10.1128/MCB.01026-13

34 **Artículo científico**. Sami Azrak; Alicia Ginel Picardo; Michael Drosten; Mariano Barbacid; Eugenio Santos. 2013. Reversible, interrelated mRNA and miRNA expression patterns in the transcriptome of Rasless fibroblasts: functional and mechanistic implications.BMC Genomics. 14-1, pp.731. https://doi.org/10.1186/1471-2164-14-731

35 **Artículo científico**. Castellano E; Santos E.2011. Functional Specificity of Ras Isoforms: So Similar but So Different.Genes & Cancer. 2-3, pp.216-231.

36 **Artículo científico**. Fernández-Medarde A; Santos E.2011. Ras in cancer and developmental diseases.Genes Cancer. 2-3, pp.344-358.

37 **Artículo científico**. Fernández-Medarde A; Santos E.2011. The RasGrf family of mammalian guanine nucleotide exchange factors.Biochimica et Biophysica Acta (BBA) - Reviews on Cancer. 1815-2, pp.170-188.

38 **Artículo científico**. Hysi PG; Young TL; Mackey DA; et al; Hammond CJ.2010. A genome-wide association study for myopia and. Nature Genetics. 42-10, pp.902-905.

39 **Artículo científico**. Fernández-Medarde; A.; Barhoum R.; et al; E.2009. Rasgrf1 Disruption Causes Retinal Photoreception Defects And Associated Transcriptomic Alterations.Journal of Neurochemistry. 110-2, pp.641-652.

40 **Artículo científico**. Castellano E; Guerrero C; Núñez A.; De Las Rivas J; Santos E.2009. Serum-dependent transcriptional networks identify distinct functional roles for H-Ras and N-Ras during initial stages of the cell cycle.Genome Biology Genome Biology.10:R123. https://doi.org/10.1186/gb-2009-10-11-r123

41 **Artículo científico**. J. Font de Mora; L.M. Esteban; D.J. Burks; et al; Santos, E.2003. Ras-GRF1 Signaling is Required for Normal ¿Ò-cell Development and Glucose Homeostasis. Embo journal. 22(12), pp.3039-3049. ISSN 0261-4189.

42 **Artículo científico**. A. Fernandez-Medarde; L.M. Esteban; A. Nuñez-Porteros; L. Tesarolo; Santos, E.2002. Targeted disruption of Ras-Grf2 shows its dispensability for mouse growth and development. Mol. Cell. Biol. 22, pp.2498-2504.

43 **Artículo científico**. J.M. Esteban; A. Fernandez-Medarde; E. Lopez; K. Yienger; C. Guerreo; J.M. Ward; Santos, E.; L. Tessarolo. 2000. Ras-guanine nucleotide exchange factor Sos2 is dispensable for mouse growth and development. Mol. Cell. Biol.20, pp.6410-6413.

44 **Artículo científico**. J. Font de Mora; A. Porras; N. Ahn; Santos, E.1997. MAP kinase Activation is not necessary for, but Antagonizes, 3T3 L1 Adipocytic Differentiation. Mol. Cell. Biol.17, pp.6068-6075.

45 **Artículo científico**. M. Benito; A. Porras; A.R. Nebreda; Santos, E.1991. Differentiation of 3T3 L1 fibroblasts to adipocytes induced by transfection of ras oncogenes. Science. 253, pp.565-568.

46 **Artículo científico**. A.R. Nebreda; D. Martin-Zanca; Santos, E.1991. NGF induces meiotic maturation of Xenopus oocytes expressing the trk protooncogene product. Science. 252, pp.558-560.

47 **Artículo científico**. Santos, E.; T. Alonso; R. Morgan; J.C. Marvizon; H. Zarbl. 1988. Malignant transformation by ras and other oncogenes produces common alterations in phosphoinositide signalling pathways. Proceedings of the national academy of sciences of the united states of ame. 85, pp.4271-4275. ISSN 0027-8424.

48 **Artículo científico**. Santos, E.; A.R. Nebreda; T. Bryan; E. Kempner. 1988. Oligomeric structure of p21 ras proteins as determined by radiation inactivation. Journal of biological chemistry. 263, pp.9853-9858. ISSN 0021-9258.

49 **Artículo científico**. Santos, E.; D. Martin-Zanca; E.P. Reddy; G. Pierotti; G. Della-Porta; M. Barbacid. 1984. Malignant activation of a K-ras oncogene in lung carcinoma but not in normal tissue of the same patient.Science. 223, pp.661-664.

50 **Artículo científico**. Santos, E.; E.P. Reddy; S. Pulciani; R.J. Feldmann; M. Barbacid. 1983. Spontaneous activation of a human proto-oncogene. Proceedings of the national academy of sciences of the united states of ame. 80, pp.4679-4683. ISSN 0027-8424.

51 **Artículo científico**. Santos, E.; S.R. Tronick; S.A. Aaronson; S. Pulciani; M. Babacid. 1982. T24 human bladder carcinoma oncogene is an activated form of the normal human homologue of BALB- and Harvey-MSV transforming genes. Nature. 298, pp.343-347. ISSN 0028-0836.