TRANSLATION TO SOCIETY

Communications
Research Highlights

PRESS, RADIO, TV, ONLINE

*AVE INDICATES the ESTIMATED COST OF editorial coverage if it were advertising space

EUREKALERT

EurekAlert! The Global Source for Science News

82,525 HITS
23 PRESS RELEASES SUBMITTED

SOCIAL MEDIA MENTIONS

CNIC FLICKER ACCOUNT

flickr CNIC JOINED IN FEBRUARY 2016 AND HAS LOADED 748 IMAGES

CNIC TWITTER ACCOUNT

@CNIC_CARDIO TWITTER ACCOUNT has **5280** followers, including scientists, institutions and key figures in the scientific journalism community

TOTAL 2016 Tweet impressions (Number of people who saw a @cnic_cardio tweet): **217.006**

TOTAL 2016 Profile visits: **14.250**

TOP TWEET OF THE YEAR

Top Tweet

¿Conoces las cifras de las enfermedades cardiovasculares en Europa?
#DiaMundialdelCorazón ❤

	Tweet impressions (Number of people who saw a @cnic_cardio tweet)	Profile visits	Top Tweet of the month
JANUARY	7.803	1.058	**Top Tweet** Nuevo mecanismo para 'anima' al sistema inmune a que combata el #cancer
FEBRUARY	11.400	1.106	**Top Tweet** Si eres estudiante de Máster y último curso carreras de biomedicina puedes ajuntarte al #ProgramaCicerone del CNIC
MARCH	21.500	972	**Top Tweet** Crean se nuevo tipo de células para recuperar el corazón tras un infarto
APRIL	15.400	972	**Top Tweet** Silvia G. Priori' research group at @CNIC_CARDIO is searching a Postdoctoral Researcher #cnic_empleo
MAY	22.900	1.511	**Top Tweet** Cell metabolism: Descubren los mecanismos moleculares que aseguran la estructura correcta del corazón
JUNE	13.900	1.443	**Top Tweet** @CNIC_CARDIO Orgullosos de participar en este programa @ObraSocialaCaixa - #JovenesCientificos
JULY	20.600	171	**Top Tweet** Todas las fotos de los estudiantes del programa #ACERCATE @CNIC_CARDIO #cnic_jovenes
AUGUST	10.300	593	**Top Tweet** Quieres que tu proyecto luzca la mejor imagen biomédica? conoce el plato #CTS
SEPTEMBER	28.800	2.006	**Top Tweet** ¿Conoces las cifras de las enfermedades cardiovasculares en Europa? #DiaMundialdelCorazón ❤
OCTOBER	16.600	1.195	**Top Tweet** #SemanaCienciaMadrid "Un día en familia en CNIC para niños y "Jornada Abierta a la investigación" para estudiantes
NOVEMBER	37.900	1.984	**Top Tweet** The CNIC proud hosting institution of the INPHINIT Fellowships Programme @FuenteCarlos
DECEMBER	9.903	1.239	**Top Tweet** Disponible online el último número de CNICPulse. #cnic_news

19 Dec 2016

2 million euros from the E.U. to David Sancho

21 Nov 2016

PhDay: Beyond PhD

16 Nov 2016

The CNIC is a host institution within the INPhINIT "la Caixa" Fellowships Programme

14 Nov 2016

A Family Day: Science up-close for children

10 Nov 2016

The CNIC Acércate Research Seminar welcomes 200 ESO and Bachillerato high school students

4 Nov 2016

Thai representatives visit the CNIC

2 Nov 2016

The CNIC Conference brings together international experts in mechanobiology

10 Oct 2016

The CNIC, "Setting the standard for research in Spain and Europe"

22 Sep 2016

Acciona's "Health and Wellbeing" program received the NAOS Award for 2015

8 Sep 2016

First call for proposals to access the ReDIB Unique Scientific-Technological Infrastructure (SSTI)

29 Jul 2016

Three CNIC projects selected for the BBVA Foundation's 2016 Fellowship and Grants Program

22 Jul 2016

Spain's future researchers train at the CNIC

20 Jul 2016

Dr. Fuster at Santander UIMP Summer Course for young cardiologists

11 Jul 2016

Madri+d Award for Best European R&D Cooperative Project awarded to the SECURE Project

29 Jun 2016

La Caixa-Severo Ochoa PHD fellowships award ceremony

27 Jun 2016

Isabel Fariñas: “Researchers must never let themselves be discouraged”

20 Jun 2016

The Pro CNIC Foundation celebrates 100 years of heparin

31 May 2016

Dr. Valentín Fuster awarded with the Severo Ochoa Prize for Biomedical Research

31 May 2016

The CNIC's 'Severo Ochoa' accreditation is reneweds

25 May 2016

Ido Amit: "To do 'good science' you must be constantly prepared to make mistakes and to learn from those mistakes"

24 May 2016

EPES 061 and CNIC sign a collaboration agreement

9 May 2016

Dan Roden: "Science is not only making discoveries, but also engaging society in them"

9 Mar 2016

Danone joins the Pro-CNIC Foundation in the fight to prevent cardiovascular diseases

3 Feb 2016

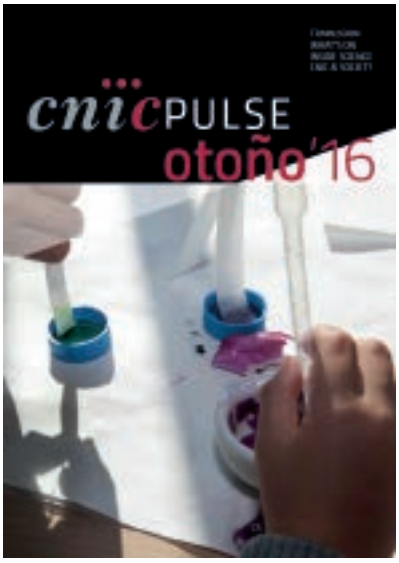
Fifty-Fifty project: a breakthrough in group therapy for cardiovascular research

8 Jan 2016

The *Hospital Universitario Fundación Jiménez Díaz* and the CNIC unite to fight cardiovascular diseases

CNIC PULSE MAGAZINE

For more information about the CNIC's contribution to this great enterprise of science and how we apply ourselves for the benefit of everyone, please check CNIC PULSE at www.cnic.es. This magazine is divided into four sections. In **Inside Science**, we present news of major, long-term scientific significance. **Train2Gain** highlights real-world examples from our training programs. Both the Pro-CNIC Foundation and I take a strong interest in these programs. The next two sections present interviews with important players in the cardiovascular field (**What's on**) and report on events related to our commitment to the public communication of science and medicine (**CNIC &Society**).



CLINICAL & EPIDEMIOLOGICAL RESEARCH

CNIC clinical researchers made significant contributions to atherosclerosis primary prevention last year. Primary prevention involves identifying individuals who do not yet have disease symptoms but who are at risk of having a cardiovascular event (myocardial infarction, stroke, sudden cardiac death, etc.) in the medium term. Major advances were made in the use of noninvasive imaging to identify the presence of atherosclerosis in different arterial territories and to use this information to estimate the risk of future cardiovascular events. Another area of progress was in programs examining lifestyle and behaviors that can be modified to improve cardiovascular health.

Our work with noninvasive imaging techniques forms the backbone of the Progression of Early Subclinical Atherosclerosis (PESA) study. This clinical study examines the level of asymptomatic atherosclerosis in participants with an intermediate cardiovascular risk profile and relates the findings to a range of biological and behavioral risk factors. The amount and location of atherosclerosis is assessed by coronary computed tomography (CT) and by 2D and 3D ultrasound of the carotid and femoral arteries and the aorta. CNIC researchers found that the presence of atherosclerotic plaques in the femoral arteries is a better indicator of risk in asymptomatic subjects than atherosclerosis in other territories (*Laclaustra et al. J Am Coll Cardiol 2016;67:1263-74*). This study complements previous CNIC studies showing that the femoral arteries are where atherosclerosis first develops (*Fernandez-Fiera et al. Circulation 2015;131:2104-13*). The imaging data from the PESA study were also used in a cross-sectional study that found no association between subclinical atherosclerosis in different arterial territories and the length of telomeres (the terminal structures that protect chromosomes from damage) in circulating leukocytes (*Fernández-Alvira et al. J Am Coll Cardiol 2016;67:2467-76*).

The CNIC's work with noninvasive imaging is contributing to a better stratification of cardiovascular risk among asymptomatic individuals, pointing the way to future interventions to halt disease progression after the identification of extensive subclinical atherosclerosis.

Our work on the links between lifestyle, atherosclerosis, and cardiovascular events builds on previous research led by Prof Fuster, showing that patients who adhere strictly to the prescribed medication program have better long term outcomes than those who don't (*Bansilal et al. J Am Coll Cardiol 2016; 68:789-801*). To improve medication adherence, the CNIC is leading a H2020-funded project testing the efficacy of a polypill combining the 3 most prescribed medications for cardiovascular problems in a single pill (SECURE project, http://www.secure-h2020.eu/). Another CNIC research project into lifestyle identified an association between a social-business eating pattern associated with extensive atherosclerosis (*Peñalvo et al. J Am Coll Cardiol 2016;68:805-14*).

The CNIC also investigates ways to modify behaviors, and thus stop the progression of cardiovascular disease (CVD). Last year we demonstrated that a group therapy intervention can significantly improve the risk profile among CVD patients (*Gómez-Pardo et al. J Am Coll Cardiol 2016;67:476-85*).

These contributions improve our understanding of how lifestyle determines the presence of atherosclerotic disease and of the several measures available to modify bad habits and improve long-term cardiovascular health.

BASIC RESEARCH

Basic research is a fundamental part of the CNIC's activity, generating new knowledge that underpins advances in patient treatment and prevention. 2016 was an extraordinary year for the CNIC basic research groups, with more articles published than ever before. Some of the highlights are summarized below.

Work on the roles of mitochondria in aging, metabolism, CVD, and the associated immune response revealed new mechanisms governing the superassembly of mitochondrial respiratory complexes (*Cogliati et al. Nature 2016; 539: 579-582*) and demonstrated that mitochondrial and nuclear DNA matching determines metabolism and healthy aging (*Latorre-Pellicer et al. Nature 2016; 535: 561-5*). These results also underline the importance of ensuring that the donor mitochondrial DNA in mitochondrial donation procedures, which produce children with three genetic parents, is an appropriate match for the recipient's nuclear genome. CNIC researchers also demonstrated that mitochondrial respiratory-chain adaptations in macrophages contribute to the body's defence against bacterial infections (*Garaude et al. Nat Immunol 2016; 17:1037-45*). These studies could help in the design of vaccines and provide new pharmacological targets for the treatment of infections and inflammatory metabolic disorders.

CNIC researchers last year identifid new mechanisms involved in the formation and morphogenesis of ventricular chambers (*D'Amato et al. Nat Cell Biol 2016; 18: 7-20*) and cardiac valves (*MacGrogan et al. Circ Res 2016; 118: 1480-97*). These studies demonstrate that perturbations of the ligand-dependent Notch signaling pathway during embryonic development cause abnormalities in heart chamber formation, thus opening a new research avenue into cardiomyopathies. These studies also identify a mechanism operating during valve morphogenesis that is linked to the origin of congenital heart defects associated with reduced NOTCH function.

Excessive growth of the heart (cardiac hypertrophy) increases the risk of illness and death due to diastolic and systolic heart failure and arrhythmia. A 2016 CNIC study (*Gonzalez-Terán et al. Nat Commun 2016; 7: 10477*) demonstrated that the kinases p38γ and p38δ are activated by pathological and physiological hypertrophic stimuli and promote cardiac physiological and pathological hypertrophy by targeting the mTOR-inhibitory protein DEPTOR for degradation. These results open a route to the development of new treatment strategies for this disease.

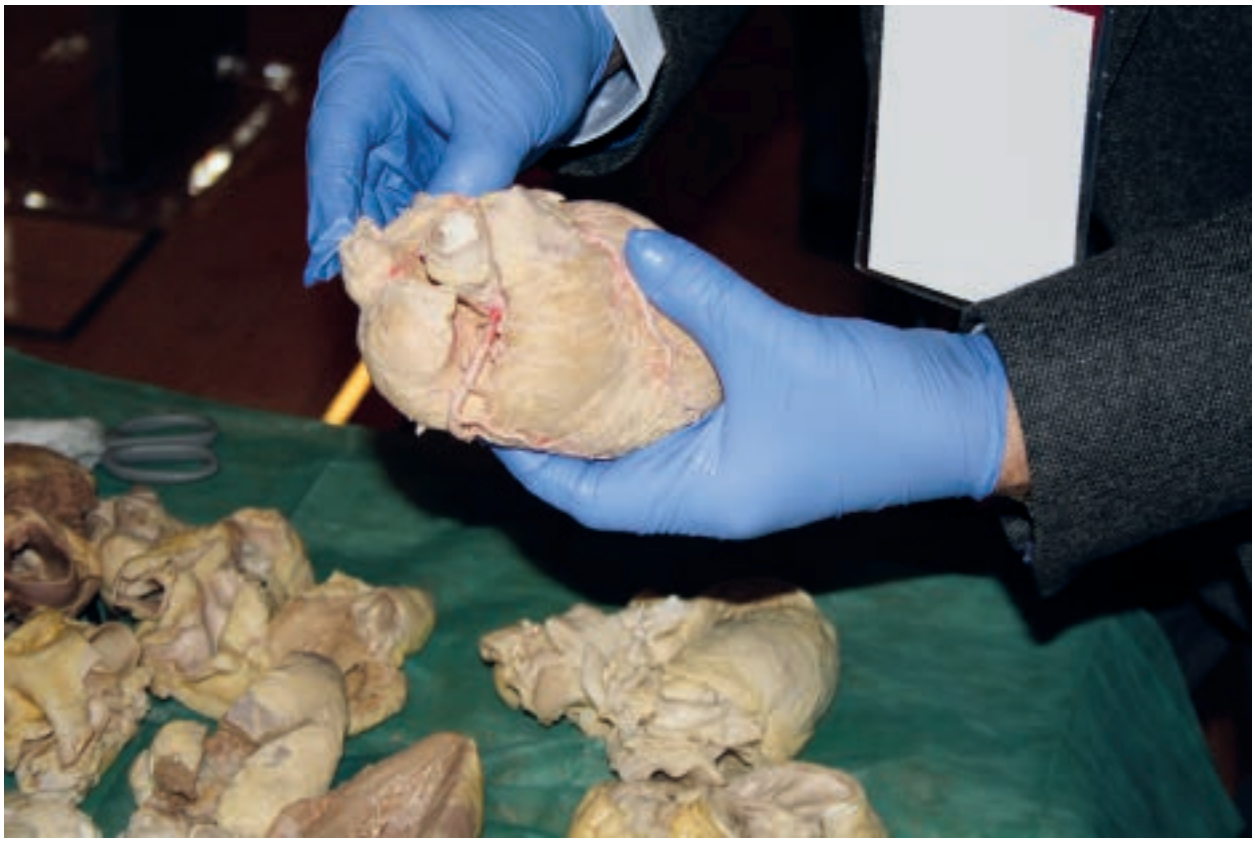
Catecholaminergic polymorphic ventricular tachycardia (CPVT) is an inheritable and highly debilitating disease that causes an estimated 15% of all unexplained sudden cardiac deaths in young people. However, the identity of the cardiac cells responsible for CPVT was unknown. A new CNIC study (*Willis et al. Circulation 2016; 133: 2348-59*) demonstrates for the first time a greater role of Purkinje cells in promoting arrhythmogenesis than ventricular myocytes. Although these are still preliminary results obtained in mouse models, they nonetheless introduce the Purkinje network as a potential target in CPVT and other cardiac diseases associated with calcium-linked arrhythmias.

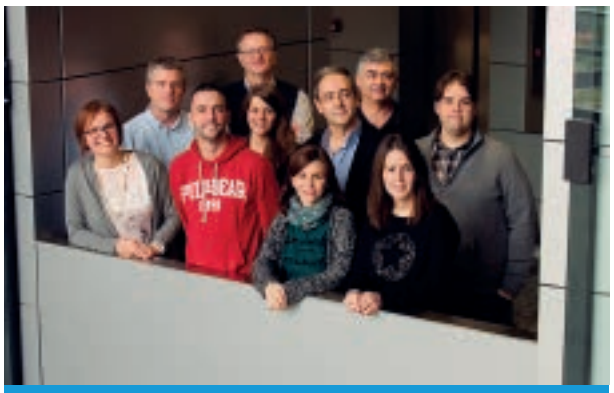
Another study identified a population of cells expressing nestin in the vessel wall that promote the entry of inflammatory cells from the bloodstream and enhance atherosclerosis development (*Del Toro et al. Nat Commun 2016; 7: 12706*). This population of cells could represent a new therapeutic target.

CNIC researchers also identified the activation marker CD69 as a key mediator of psoriasis, a chronic inflammatory skin disease associated with a greater risk of early cardiovascular events (*Cibrián et al. Nat Immunol 2016; 17: 985-96*).

Heart and skeletal muscles are formed during embryonic development. Although they share structural similarities, they express different sets of genes to meet their distinct functions. A CNIC study (*Gomez-Del Arco et al. Cell Metab 2016; 23: 881-92*) found that the contractile structures of both muscle types depend on a mechanism involving the chromatin remodeling complex Chd4/NuRD. Loss of Chd4 in the heart triggers aberrant expression of the skeletal muscle genetic program, causing severe cardiomyopathy and sudden death. Conversely, Chd4 loss in skeletal muscle causes inappropriate expression of cardiac genes and myopathy. Thus, loss of Chd4-dependent regulation leads to hybrid striated muscle tissues incompatible with life.

In other projects, CNIC researchers identified mechanisms mediated by immune cells that could help in the design of new vaccines against a host of pathogens that cause infection via the skin or mucous membranes, such as flu, herpes, tuberculosis, HIV-1, dengue virus, cholera, and emerging viral diseases (*Iborra et al. Immunity 2016; 45: 847-60*), or against the ***Leishmania*** parasite, which causes leishmaniasis (*Iborra et al. Immunity 2016; 45: 788-801*).





20 Dec 2016

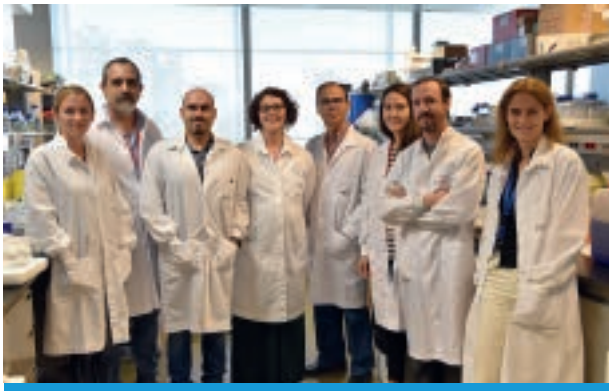
Developmental Cell: Hypoxia signaling plays a physiological role in the formation of the heart

25 Nov 2016

Nature Communications: Discover a key signal in intercellular communication

2 Nov 2016

PNAS: Heart defects identified in progeria patients that increase the risk of arrhythmias and premature death



26 Oct 2016

Nature: Scientists decipher the organization of the cellular mechanisms responsible for energy production

14 Oct 2016

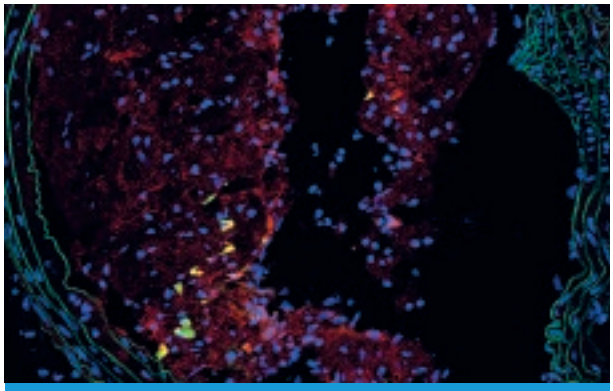
Immunity: Identify a mechanism through which the Leishmania parasite sabotages the immune response

28 Sep 2016

Immunity: CNIC investigators identify ways to improve vaccine design

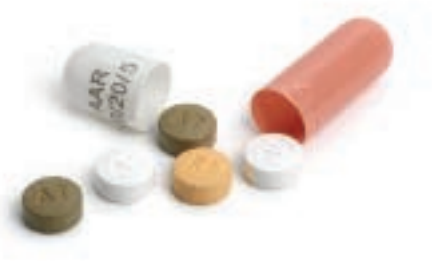
20 Sep 2016

Circulation Research: The CNIC A Successful Vision in Cardiovascular Research



8 Sep 2016

Nature Communications: Identified a new mechanism involved in atherosclerosis



23 Aug 2016

JACC: MINERVA results demonstrate full adherence to guideline-recommended therapies associated with lower rate of a second major cardiovascular event and cost savings

7 Jul 2016

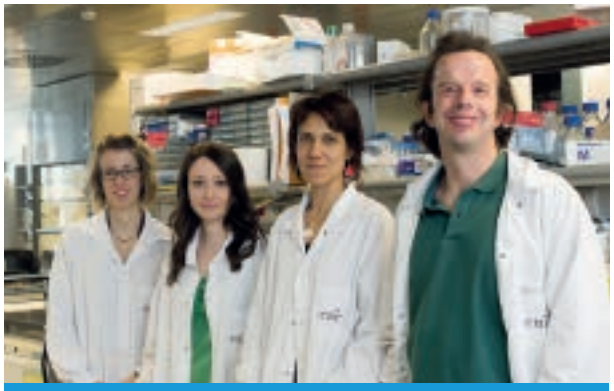
Nature: The interaction between our two genomes, nuclear and mitochondrial, is the key to healthy aging

5 Jul 2016

Nature Immunology: Scientists identify an essential role of the immune receptor CD69 in psoriasis

28 Jun 2016

Nature Immunology: Changes to mitochondrial metabolism allow the immune system to adapt to infection



1 Jun 2016

The Journal of Cell Biology: Telomere shortening limits the capacity of the heart to regenerate

24 May 2016

JACC: Telomere length in circulating blood cells does not predict asymptomatic atherosclerosis

11 May 2016

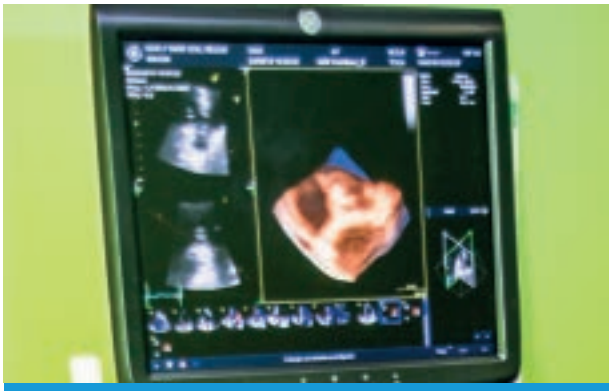
Cell Metabolism: CNIC researchers discover the molecular mechanisms that produce the heart's contractile structure

25 Apr 2016

Circulation Research: CNIC Researchers identify a new signaling mechanism implicated in congenital aortic valve disease

20 Apr 2016

Nature Communications: CNIC researchers define the key role of a protein in lymphocyte activation



22 Mar 2016

JACC: New method for early diagnosis of atherosclerosis

3 Feb 2016

EMBO Journal: CNIC researchers discover a new target for the treatment of fatty liver disease

22 Jan 2016

Nature Communications: Two proteins control the growth of the heart and its adaptation to high blood pressure

8 Jan 2016

Nature Communications: Stem cells regulate their own proliferation and their microenvironment