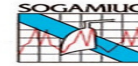




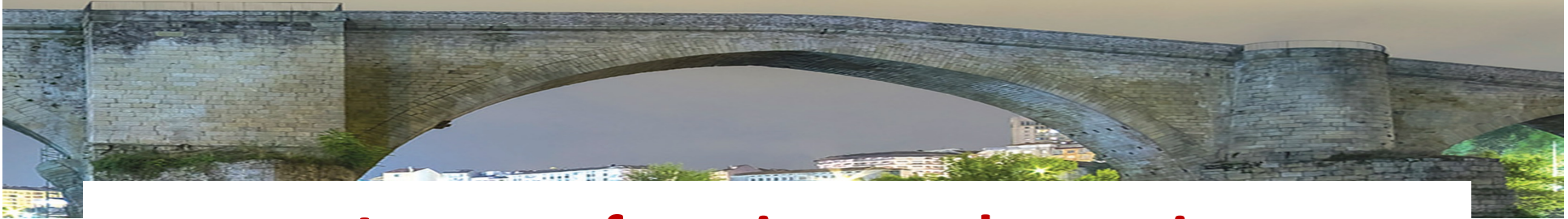
SERVIZO  
GALEGO  
de SAÚDE

Xerencia de Xestión Integrada de Ourense  
Verín e O Barco de Valdeorras



SOCIEDADE GALEGA  
DE MEDICINA INTENSIVA  
E UNIDADES CORONARIAS

# XXXI REUNIÓN SOGAMIUC "TENDIENDO PUENTES"



## Inmuno-fenotipos en la sepsis

Jesus F Bermejo-Martin, MD PhD

bio • sepsis

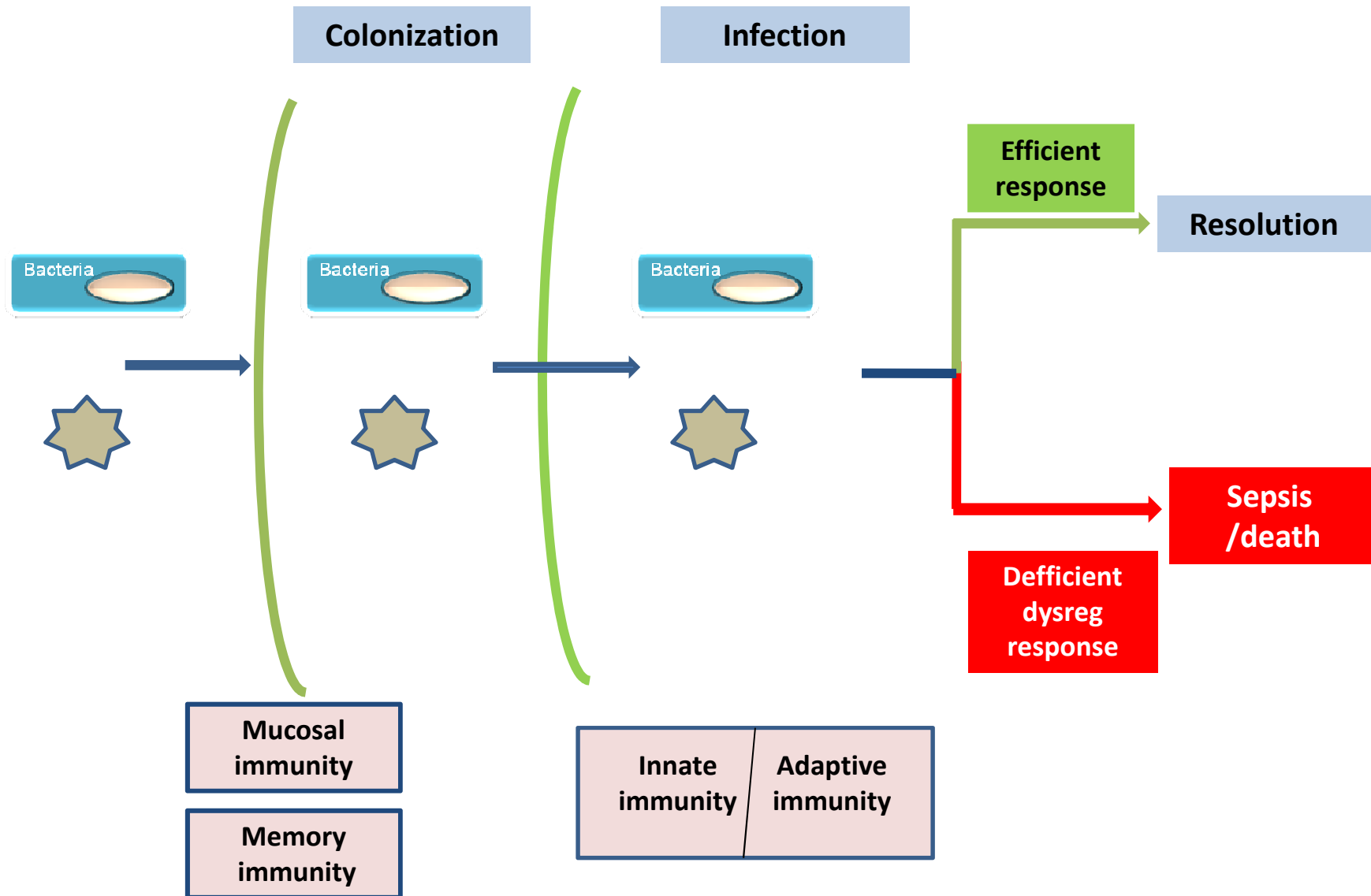
σήψις

Hospital Clínico Universitario de Valladolid

# Conflicts of interest

Assessment on biomarkers as prognosis markers in sepsis	<b>Thermo Fisher Scientific</b>
Patent on a biomarker for sepsis diagnosis	<b>Thermo Fisher Scientific</b>
Assessment on immunoglobulin levels in sepsis	<b>Biotest AG</b>





February 23, 2016, Vol 315, No. 8 >

[< Previous Article](#) [Next Article >](#)

Special Communication | February 23, 2016

CARING FOR THE CRITICALLY ILL PATIENT


## The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) **FREE**



“Sepsis should be defined as life-threatening organ dysfunction caused by a **dysregulated host response to infection**”



## Most Downloaded Journal of Infection Articles

The most downloaded articles from ScienceDirect  in the last 90 days.



ELSEVIER

**BIAA**  
British Infection Association

[www.elsevierhealth.com/journals/jinf](http://www.elsevierhealth.com/journals/jinf)

### REVIEW

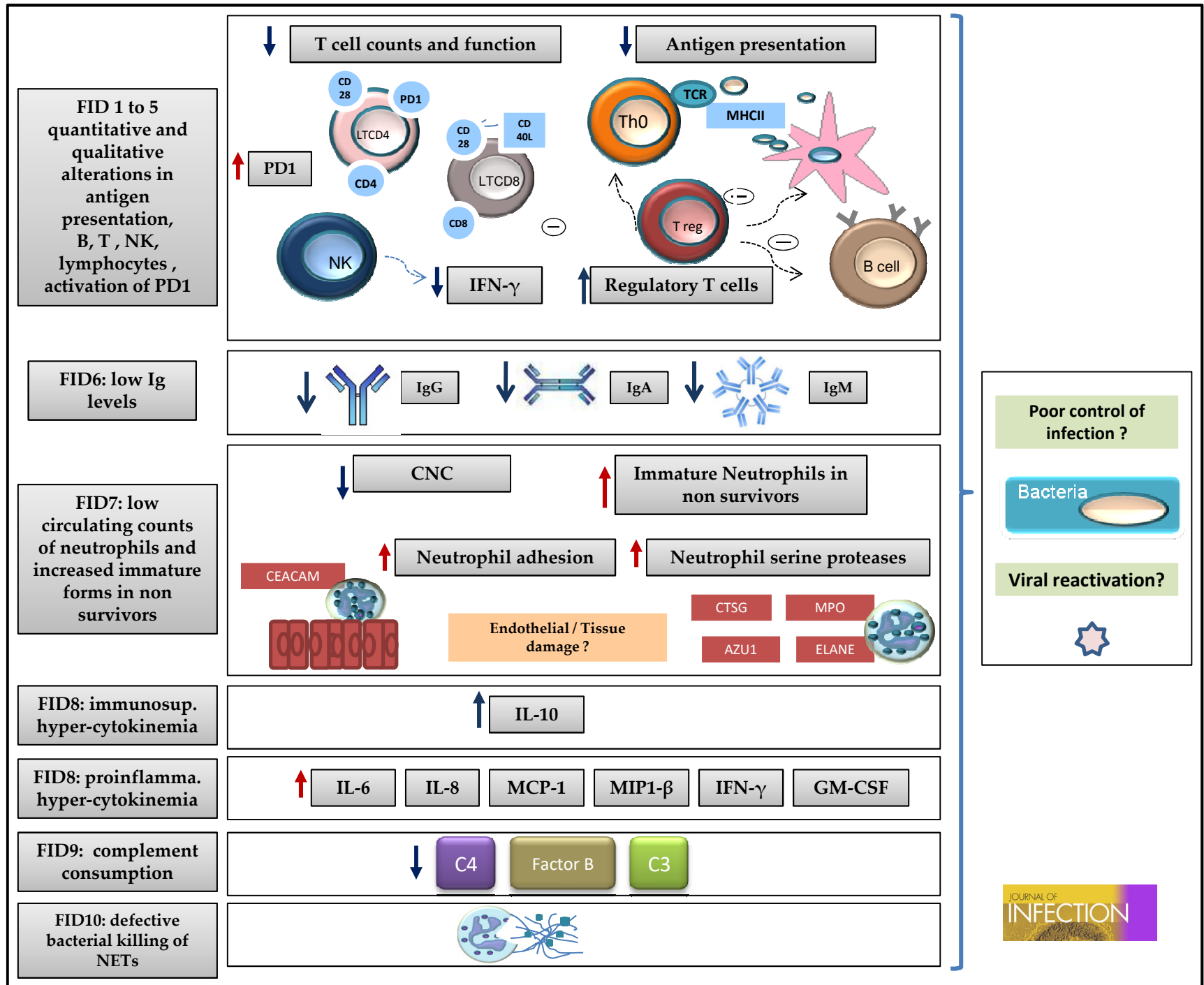
## Defining immunological dysfunction in sepsis: A requisite tool for precision medicine

Jesús F. Bermejo-Martin <sup>a,b,\*</sup>, David Andaluz-Ojeda <sup>b,c</sup>,  
Raquel Almansa <sup>a,b</sup>, Francisco Gandía <sup>b,c</sup>,  
Jose Ignacio Gómez-Herreras <sup>b,d</sup>, Esther Gomez-Sanchez <sup>b,d</sup>,  
María Heredia-Rodríguez <sup>b,d</sup>, Jose Maria Eiros <sup>b</sup>,  
David J. Kelvin <sup>e,f,g,h</sup>, Eduardo Tamayo <sup>b,d,h</sup>

Ageing  
Co-  
morbidity

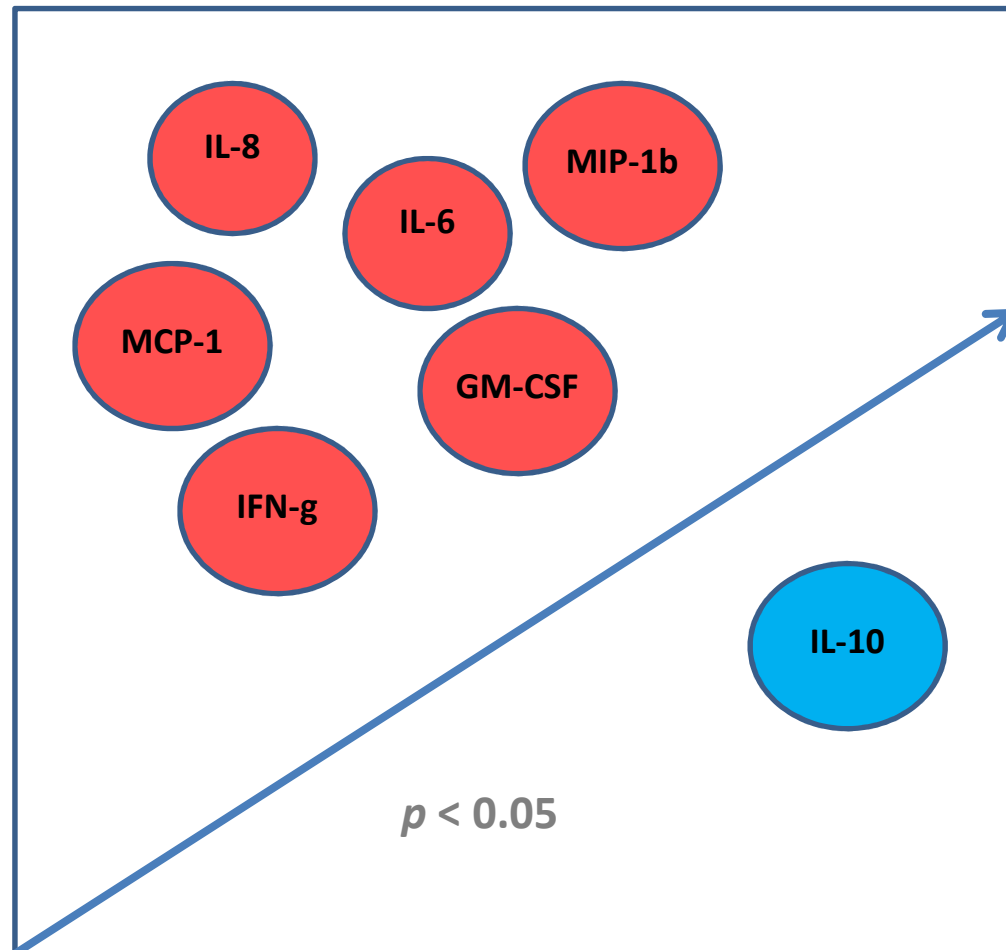
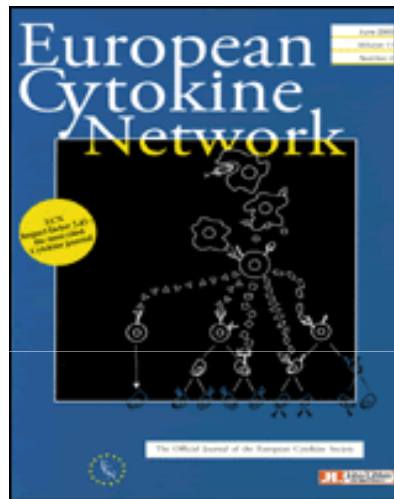


Infection  
leading  
to sepsis



Early hypersecretion of cytokines /  
hormokines

## Symultaneous secretion of pro and anti-inflammatory cytokines



*Eur Cytokine Netw.* 2011 Jun;22(2):82-7. doi: 10.1684/ecn.2011.0281.

**Pro- and anti-inflammatory responses are regulated simultaneously from the first moments of septic shock.**

Tamayo E<sup>1</sup>, Fernández A, Almansa R, Carrasco E, Heredia M, Lajo C, Goncalves L, Gómez-Herreras JJ, de Lejarazu RO, Bermejo-Martin JF.



# Cytokine-adsorbing hemofilter: old but new modality for septic acute kidney injury

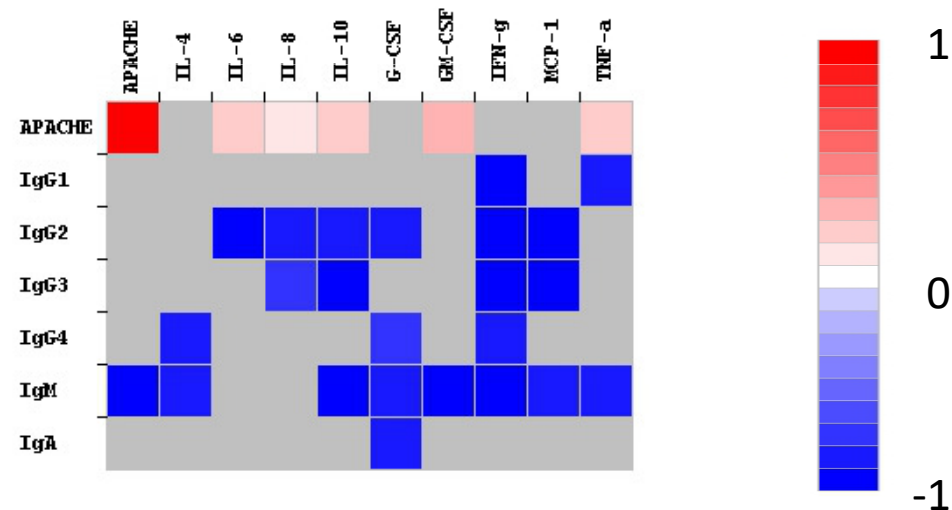


- Continuous hemodiafiltration using cytokine-adsorbing hemofilters such as **polymethylmethacrylate (PMMA)** and **AN69ST membrane** hemofilters
- Particularly useful for **the treatment of septic shock and septic AKI.**

## IgM levels in plasma predict outcome in severe pandemic influenza

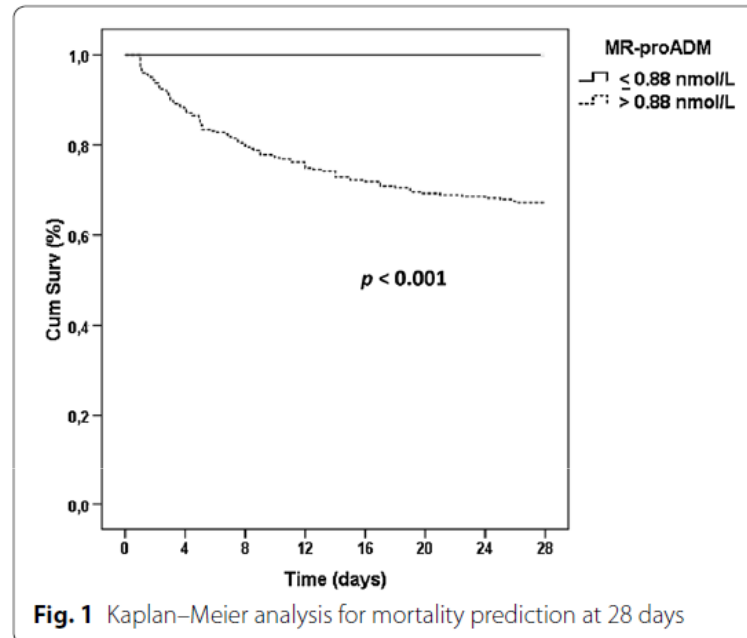


Mar Justel<sup>a,1</sup>, Lorenzo Socias<sup>b,1</sup>, Raquel Almansa<sup>c,1</sup>, Paula Ramírez<sup>d</sup>, Maria C. Gallegos<sup>e</sup>, Victoria Fernandez<sup>e</sup>, Monica Gordon<sup>d</sup>, David Andaluz-Ojeda<sup>f</sup>, Leonor Nogales<sup>f</sup>, Silvia Rojo<sup>a</sup>, Jordi Vallés<sup>g</sup>, Angel Estella<sup>h</sup>, Ana Loza<sup>i</sup>, Cristobal León<sup>i</sup>, Cristina Lopez-Mestanza<sup>a</sup>, Jesús Blanco<sup>j</sup>, Jose Ángel Berezo<sup>j</sup>, Sara Rosich<sup>k</sup>, Catia Cillóniz<sup>l</sup>, Antoni Torres<sup>l</sup>, Raul Ortiz de Lejarazu<sup>a</sup>, Ignacio Martin-Loeches<sup>g</sup>, Jesus F. Bermejo-Martin<sup>c,\*</sup>



**Inverse correlation between Igs and cytokine levels**

## Biomarker/s score: Pro-adrenomedullin



Andaluz-Ojeda et al. *Ann. Intensive Care* (2017) 7:15  
DOI 10.1186/s13613-017-0238-9

Annals of Intensive Care

### RESEARCH

### Open Access

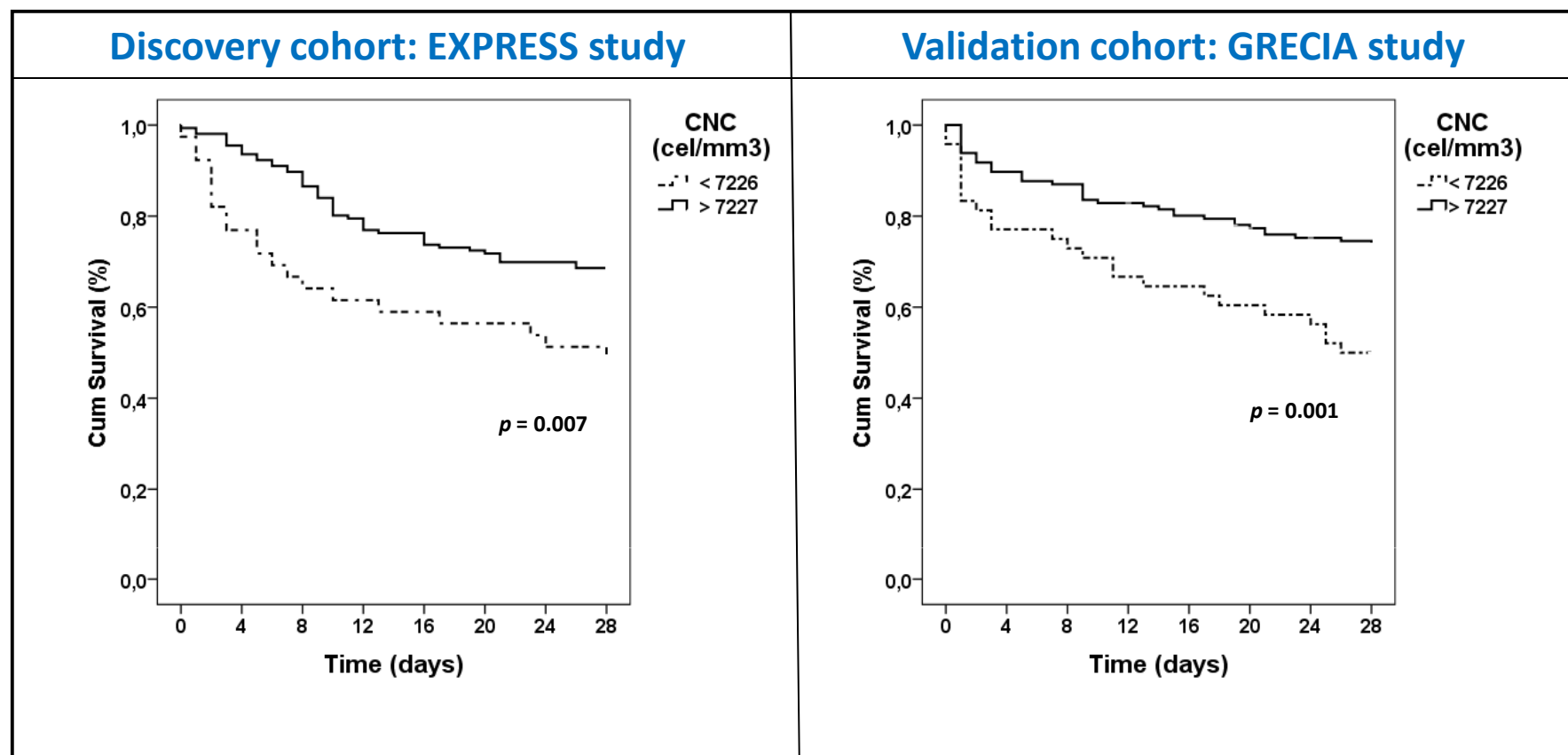


## Superior accuracy of mid-regional proadrenomedullin for mortality prediction in sepsis with varying levels of illness severity

David Andaluz-Ojeda<sup>1,2</sup>, H. Bryant Nguyen<sup>3</sup>, Nicolas Meunier-Beillard<sup>4</sup>, Ramón Cicuéndez<sup>1,2</sup>, Jean-Pierre Quenot<sup>4</sup>, Dolores Calvo<sup>5</sup>, Auguste Dargent<sup>4</sup>, Esther Zarca<sup>5</sup>, Cristina Andrés<sup>5</sup>, Leonor Nogales<sup>1,2</sup>, Jose María Eiros<sup>6</sup>, Eduardo Tamayo<sup>2,7</sup>, Francisco Gandía<sup>1,2</sup>, Jesús F. Bermejo-Martín<sup>2\*</sup> and Pierre Emmanuel Charles<sup>4</sup>

Suboptimal expansion of neutrophil  
counts in non survivors

# Neutrophil score



Bermejo-Martín JF, Tamayo E, Ruiz G, Andaluz-Ojeda D, Herrán-Monge R, Muriel-Bombín A, Fe Muñoz M, Heredia-Rodríguez M, Citores R, Gómez-Herreras J, Blanco J

Bermejo-Martín et al. *Critical Care* 2014, 18:407  
<http://ccforum.com/content/18/1/407>



## LETTER

Circulating neutrophil counts and mortality in septic shock

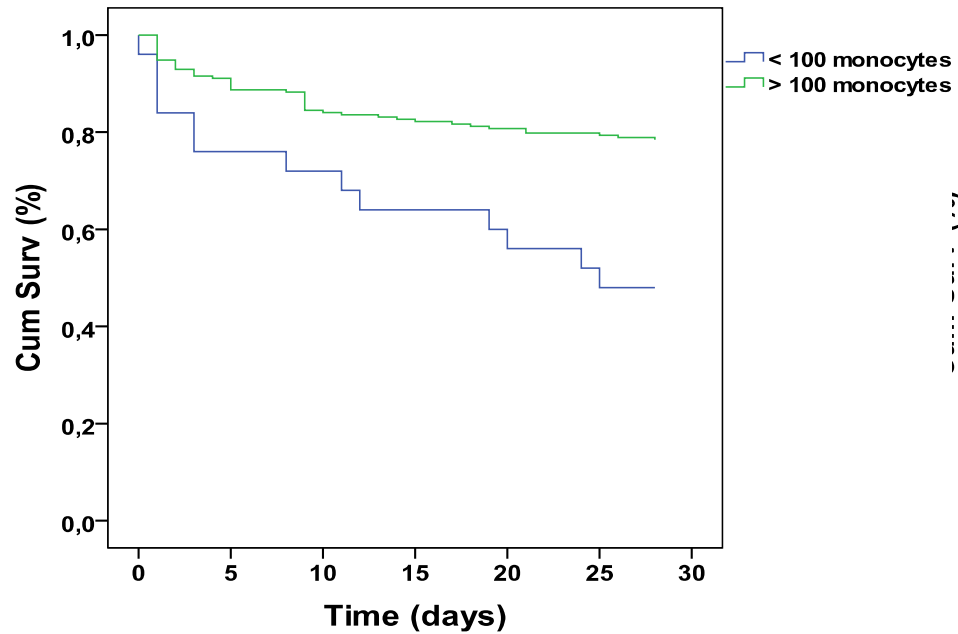
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4210  
Total accesses

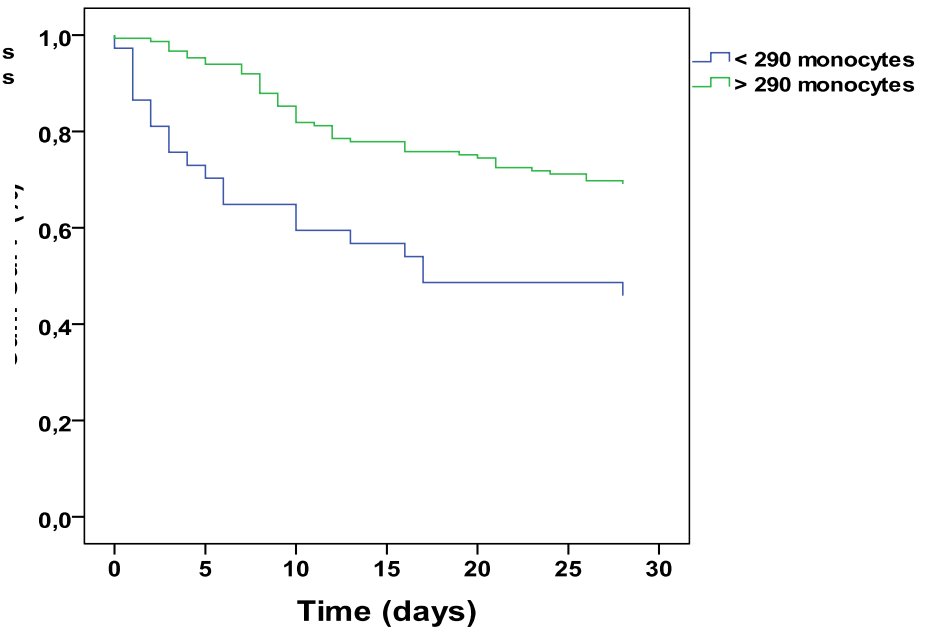
# Monocyte counts

## Discovery

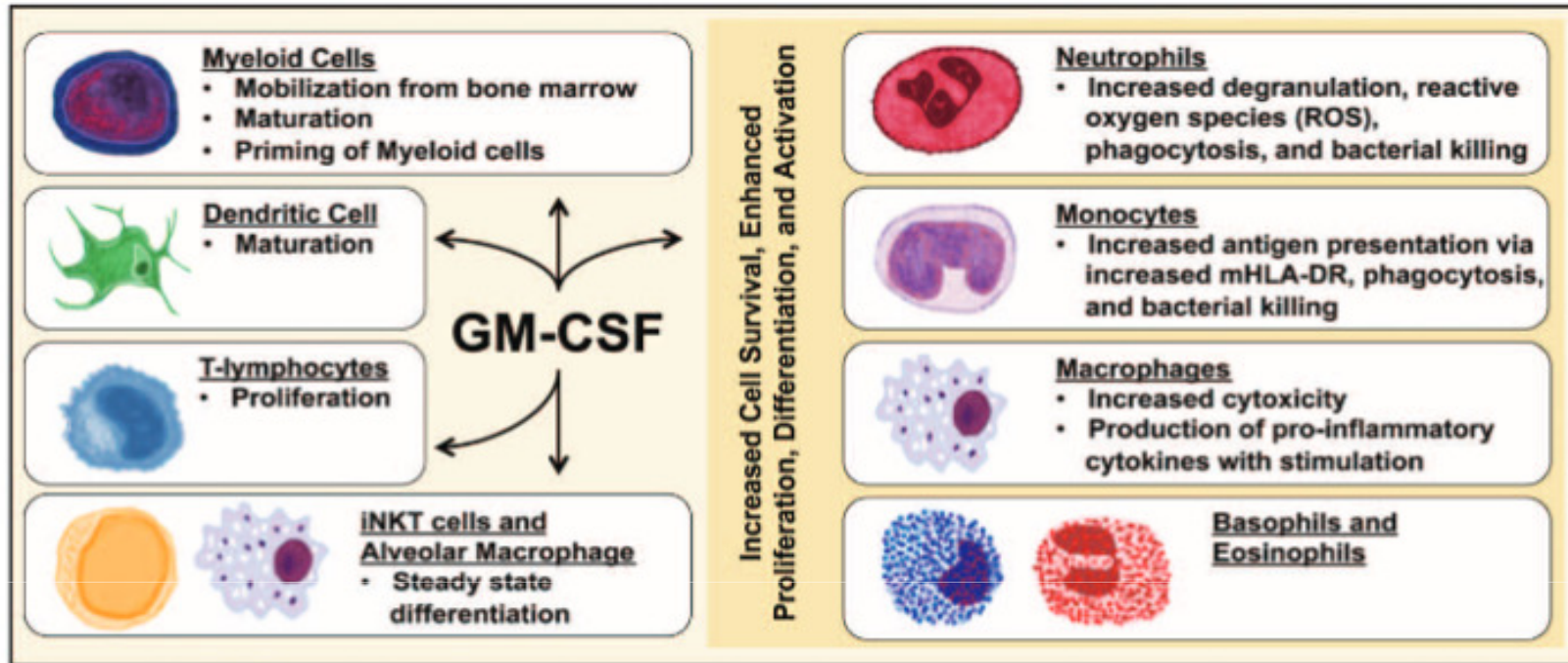


n = 238

## Validation



n = 186



### GM-CSF in patients with low HLA-DR expression:

Reduced the time on mechanical ventilation  
improved APACHE-II and reduced length of both intrahospital and intensive  
care unit stay

Meisel, C. et al. (2009). Am. J. Respir. Crit. Care Med. 180, 640–648

Immature neutrophil forms and neutrophil proteases are associated to bad outcome



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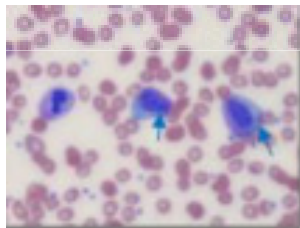
My Critical Care

Research

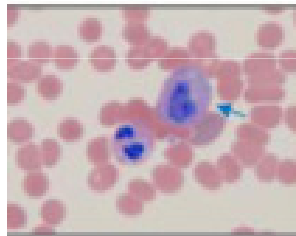
Open Access

## The diagnostic and prognostic significance of monitoring blood levels of immature neutrophils in patients with systemic inflammation

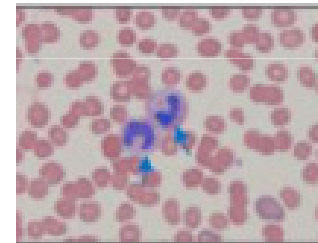
Tracey Anne Mare<sup>1,2</sup>, David Floyd Treacher<sup>1,2</sup>, Manu Shankar-Hari<sup>1,2</sup>, Richard Beale<sup>1,2</sup>, Sion Marc Lewis<sup>1,2,4</sup>, David John Chambers<sup>3</sup> and Kenneth Alun Brown<sup>1,2,4</sup>\*



1. Myelocyte

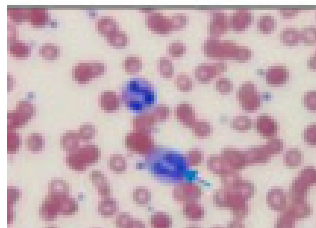


2. Metamyelocyte



3. Band cell

Earlier  
mortality



4. Mature Neutrophil

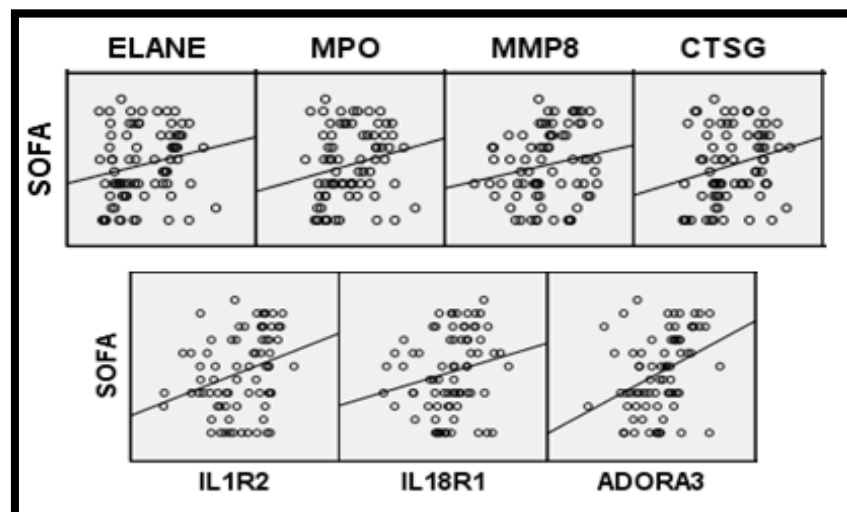


www.elsevierhealth.com/journals/jinf

## Transcriptomic correlates of organ failure extent in sepsis



Raquel Almansa <sup>a,b</sup>, María Heredia-Rodríguez <sup>a,c</sup>,  
Esther Gomez-Sanchez <sup>a,c</sup>, David Andaluz-Ojeda <sup>a,d</sup>,  
Verónica Iglesias <sup>a,b</sup>, Lucía Rico <sup>a,b</sup>, Alicia Ortega <sup>a,b</sup>,  
Estefanía Gomez-Pesquera <sup>a,c</sup>, Pilar Liu <sup>a,c</sup>, Marta Aragón <sup>a,c</sup>,  
Jose Maria Eiros <sup>e</sup>, María Ángeles Jiménez-Sousa <sup>a,f</sup>,  
Salvador Resino <sup>a,f</sup>, Ignacio Gómez-Herreras <sup>a,c</sup>,  
Jesús F. Bermejo-Martín <sup>a,b,\*g</sup>, Eduardo Tamayo <sup>a,c,g</sup>



## Neutrophil Protease inhibitors?

Shock, 2010 Jan;33(1):14-8. doi: 10.1097/SHK.0b013e3181aa95c4.

**Sivelestat (selective neutrophil elastase inhibitor) improves the mortality rate of sepsis associated with both acute respiratory distress syndrome and disseminated intravascular coagulation patients.**

Hayakawa M<sup>1</sup>, Katabami K, Wada T, Sugano M, Hoshino H, Sawamura A, Gando S.

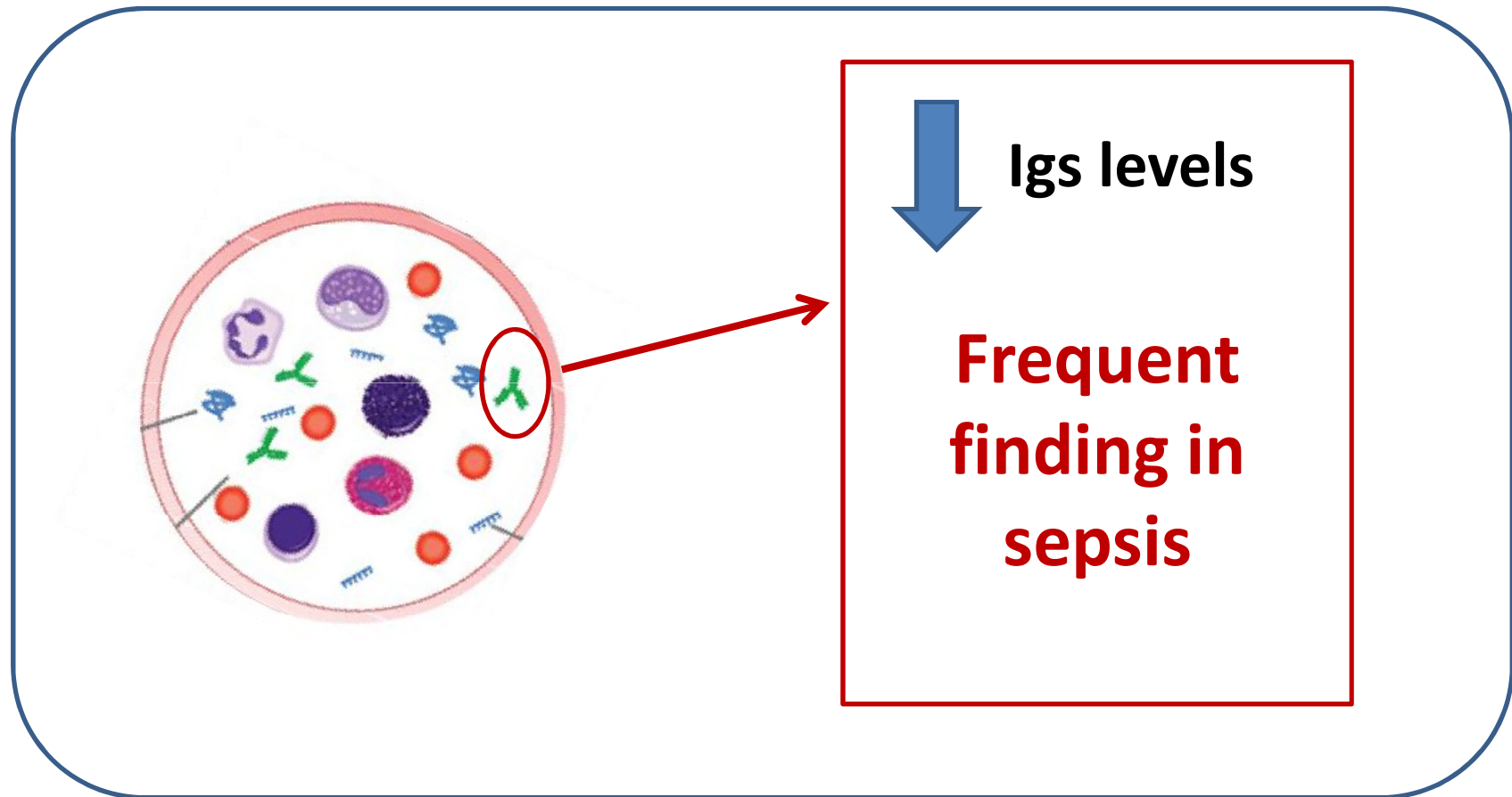
Crit Care Med, 2000 May;28(5):1276-82.

**Secretory leukocyte protease inhibitor, an inhibitor of neutrophil activation, is elevated in serum in human sepsis and experimental endotoxemia.**

Grobmyer SR<sup>1</sup>, Barie PS, Nathan CF, Fuortes M, Lin E, Lowry SF, Wright CD, Weyant MJ, Hydo L, Reeves F, Shiloh MU, Ding A.

Severe hypogammaglobulinemia is  
associated with prognosis

**Immunoglobulins are not like other drugs....we have them in our body!**





Manu Shankar-Hari  
Nicholas Culshaw  
Benjamin Post  
Eduardo Tamayo  
David Andaluz-Ojeda  
Jesús F. Bermejo-Martín  
Sebastian Dietz  
Karl Werdan  
Richard Beale  
Jo Spencer  
Mervyn Singer

## **Endogenous IgG hypogammaglobulinaemia in critically ill adults with sepsis: systematic review and meta-analysis**

**IgG  
hypogamma-globulinaemia  
at diagnosis** → **70% !**

.....but this finding did not identify a subgroup of  
patients with a higher risk of death

# IVIG: controversial role in sepsis



**Cochrane  
Library**

Cochrane Database of Systematic Reviews

Intravenous immunoglobulin for treating sepsis, severe sepsis and septic shock (Review)

Alejandria MM, Lansang MAD, Dans LF, Mantaring III JB

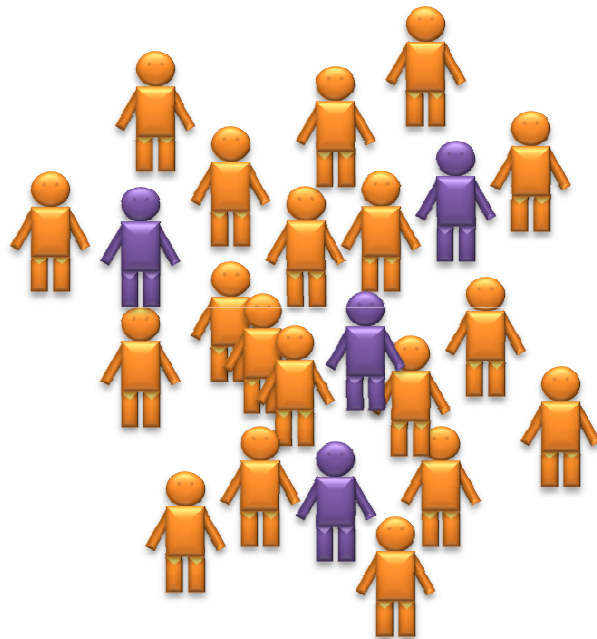
*“Polyclonal IVIG **reduced mortality** among adults with sepsis but this benefit **was not seen in trials with low risk of bias....**”*

Surviving Sepsis  
Campaign

*“We **suggest against the use of IV immunoglobulins** in patients with sepsis or septic shock (weak recommendation, low quality of evidence)...”*

*“We **encourage conduct of large multicenter studies** to further evaluate the effectiveness of other **IV polyclonal immunoglobulin preparations** in patients with sepsis”*

**But...who deserves treatment with IVIG.....?**



**It is necessary to  
identify the  
potential target  
population!**

**Is the predictive ability of  
immunoglobulins different  
depending on sepsis severity ?**





RESEARCH

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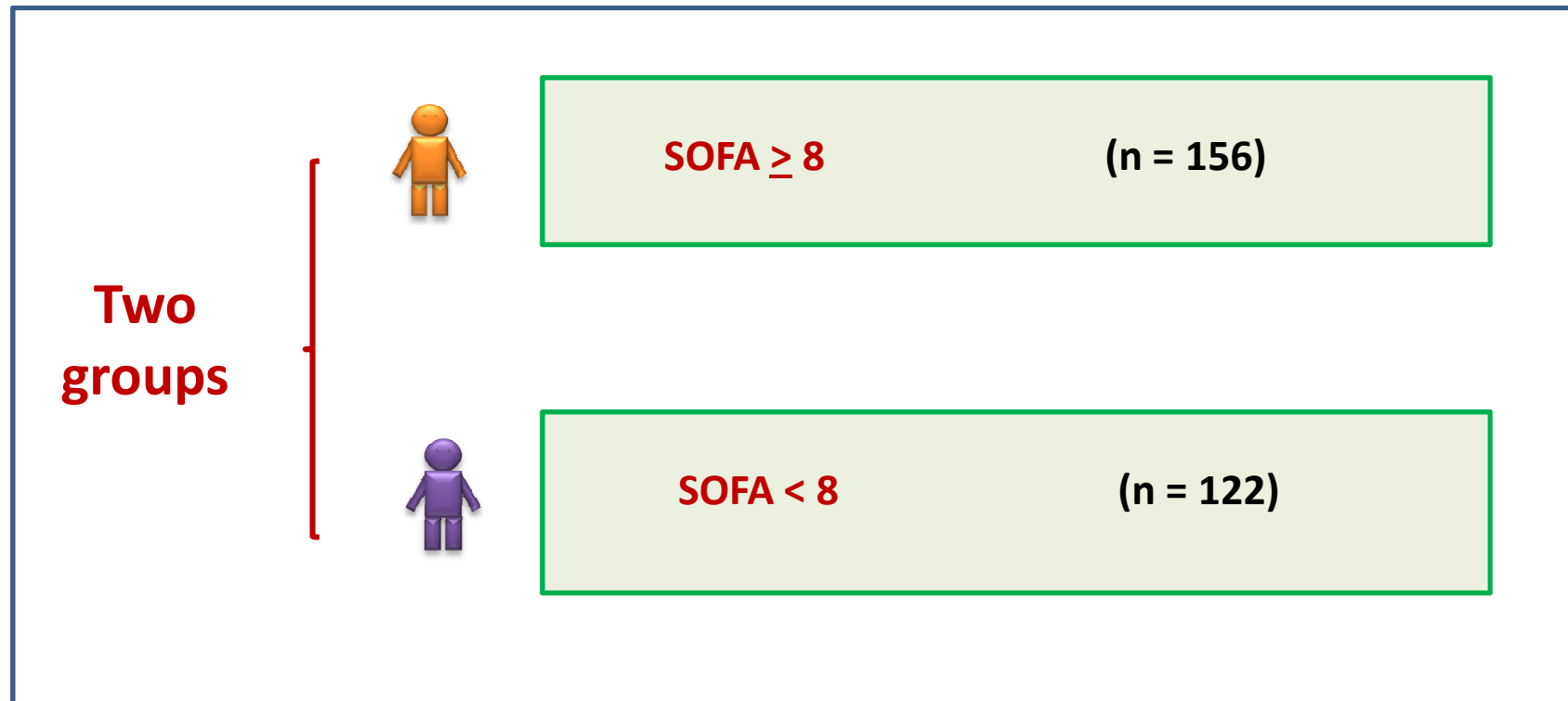
# The protective association of endogenous immunoglobulins against sepsis mortality is restricted to patients with moderate organ failure

Ignacio Martin-Loeches<sup>1</sup>, Arturo Muriel-Bombín<sup>2</sup>, Ricard Ferrer<sup>3,4</sup>, Antonio Artigas<sup>4,5,6</sup>, Jordi Sole-Violan<sup>4,7</sup>, Leonardo Lorente<sup>4,8</sup>, David Andaluz-Ojeda<sup>9</sup>, Adriele Prina-Mello<sup>10</sup>, Ruben Herrán-Monge<sup>2</sup>, Borja Suberviola<sup>4,11</sup>, Ana Rodriguez-Fernandez<sup>12</sup>, Pedro Merino<sup>2</sup>, Ana M. Loza<sup>4,13</sup>, Pablo Garcia-Olivares<sup>4,14</sup>, Eduardo Anton<sup>4,15</sup>, Eduardo Tamayo<sup>16</sup>, Wysali Trapiello<sup>17</sup>, Jesús Blanco<sup>2,6</sup>, Jesús F. Bermejo-Martin<sup>17\*</sup> and the GRECIA group<sup>18</sup>

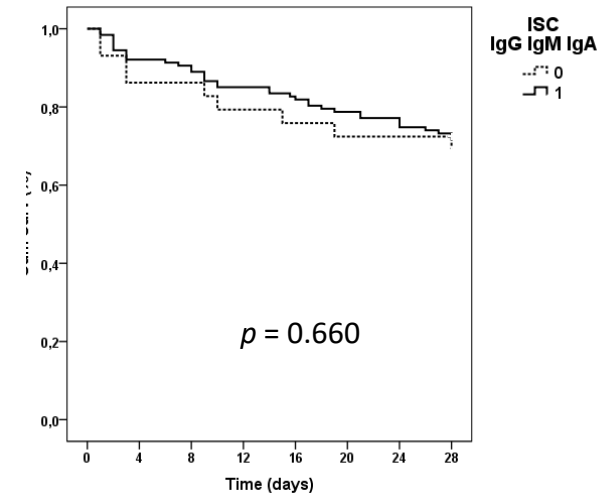
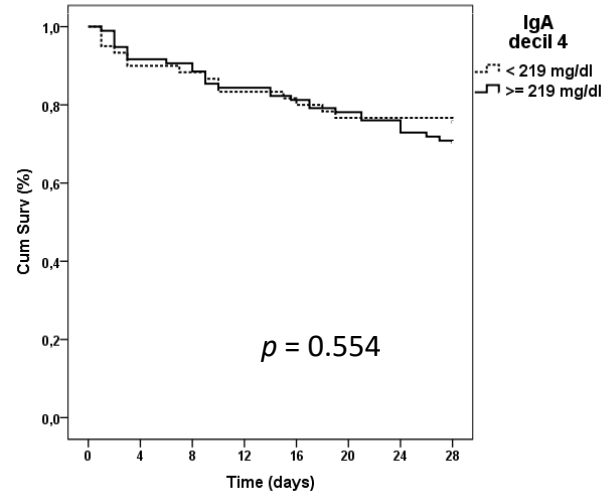
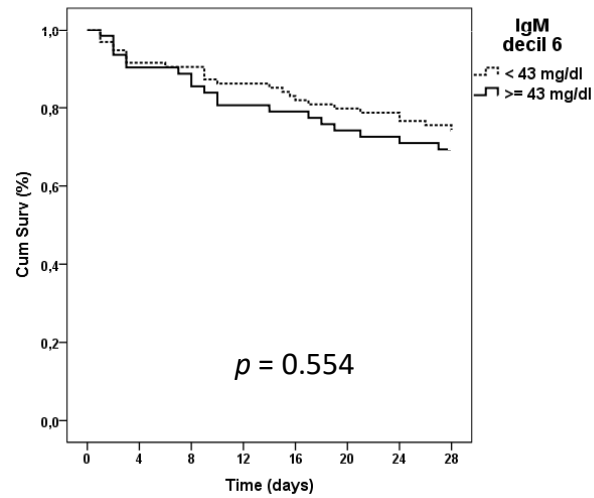
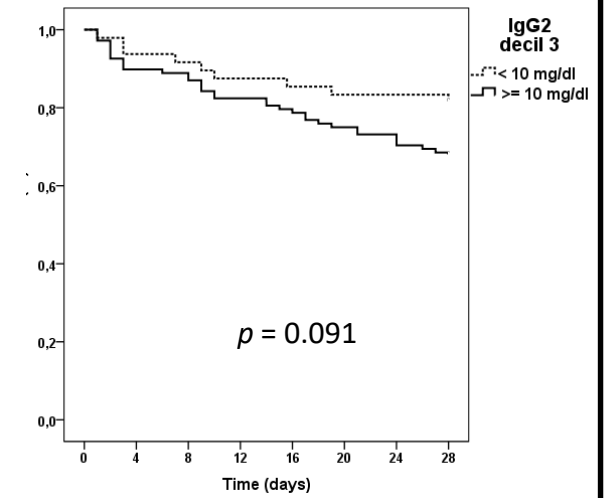
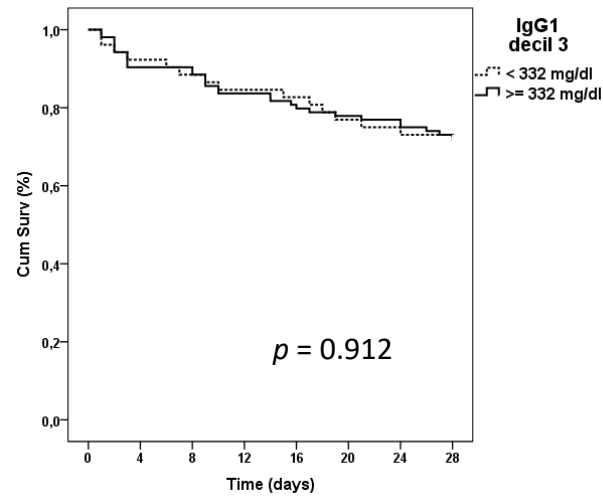
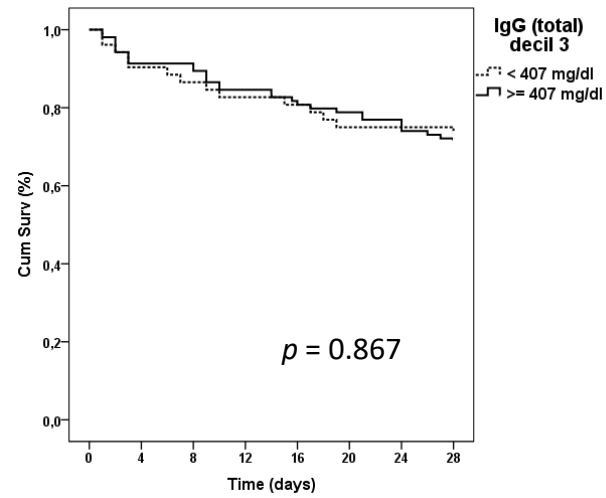
**GRECIA**

**ABISS - EDUSEPSIS**

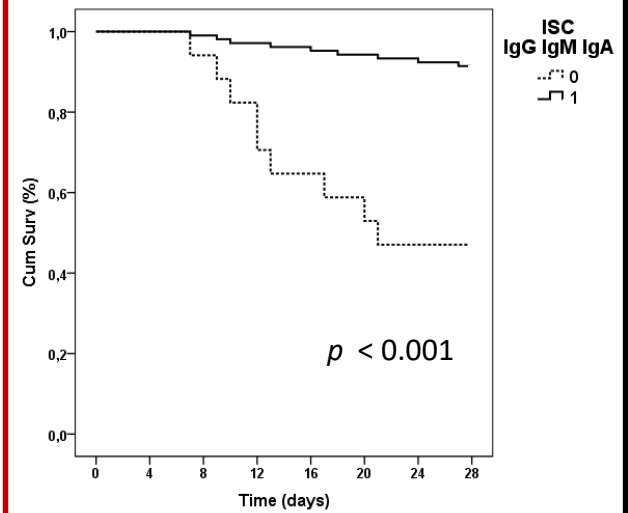
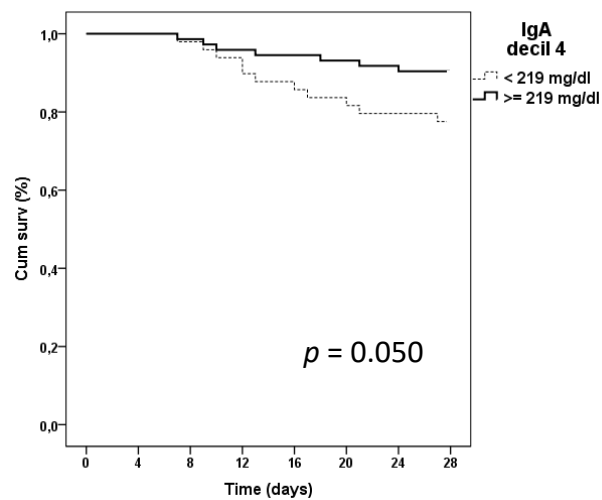
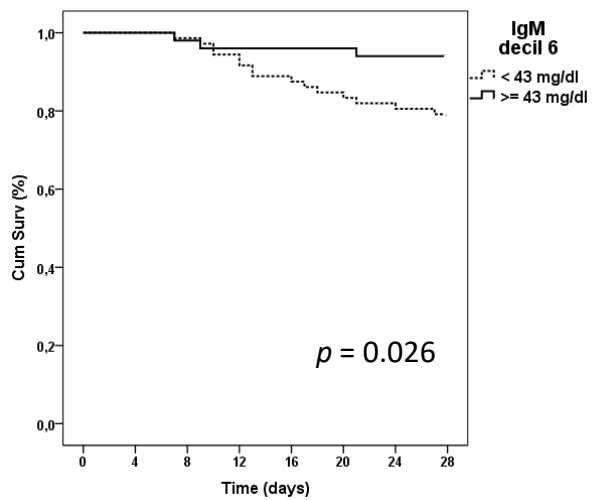
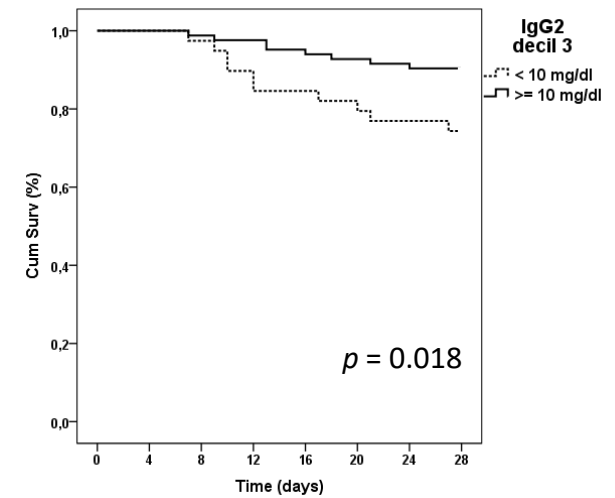
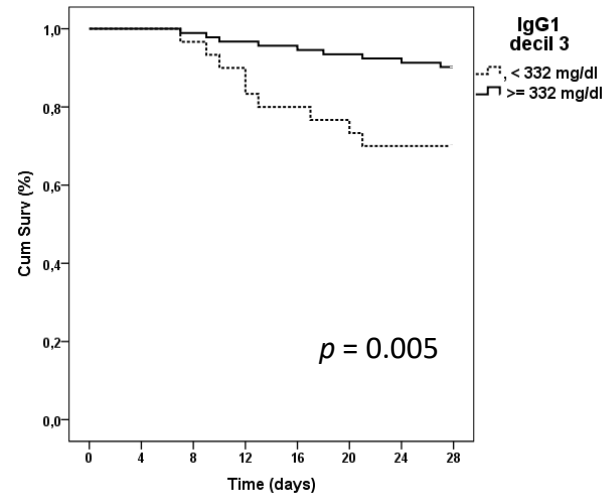
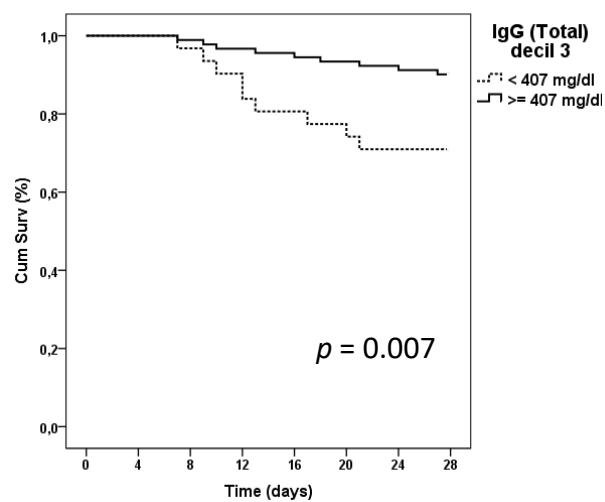
## 278 patients admitted to the ICU with sepsis



**SOFA  $\geq 8$**



# SOFA < 8

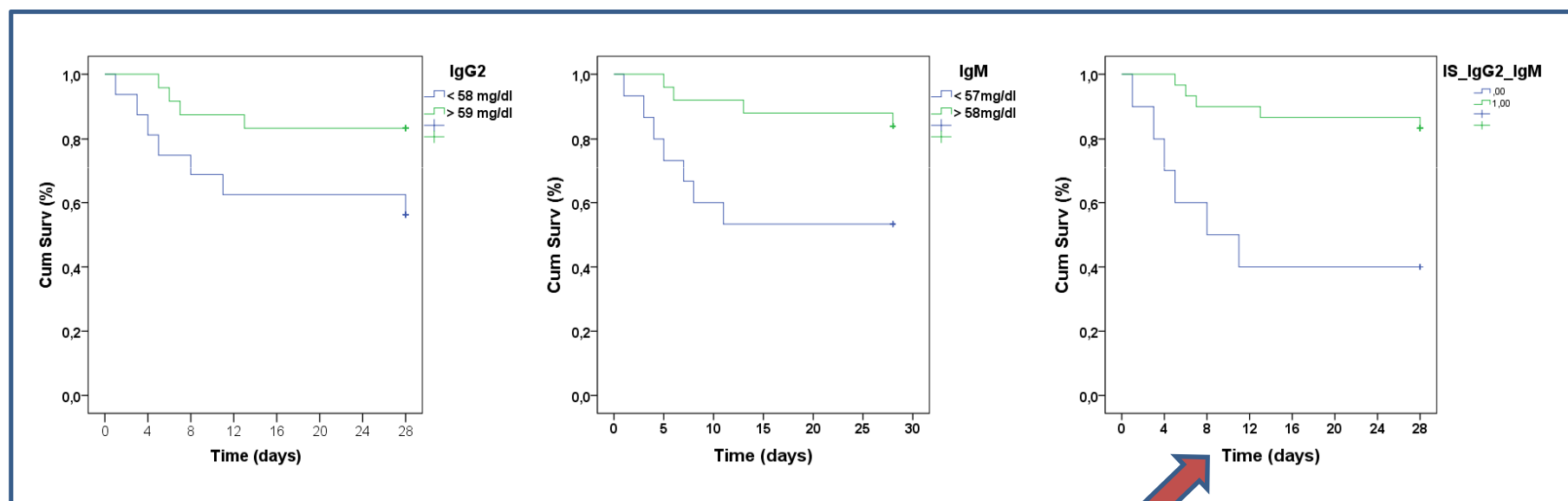


Short communication

IgM levels in plasma predict outcome in severe pandemic influenza



Justel M, Socias L, Almansa R, Ramírez P, Gallegos MC, Fernandez V, Gordon M, Andaluz-Ojeda D, Nogales L, Rojo S, Vallés J, Estella A, Loza A, León C, Lopez-Mestanza C, Blanco J, Berezo JÁ, Rosich S, Cillóniz C, Torres A, de Lejarazu RO, Martin-Loeches I, Bermejo-Martin JF.



**Combined score IgG2 + IgM**

## Surviving Sepsis Campaign

“We encourage large multicenter studies to further evaluate the effectiveness of polyclonal immunoglobulins in sepsis”



**OK, large studies.....  
but more oriented please...!**

- SOFA score
- Basal levels of IgG, IgA and IgM

## Precision Medicine in Sepsis



Complement activation: low levels of  
complement related proteins

**Complement + Immunoglobulins kills bacteria!**

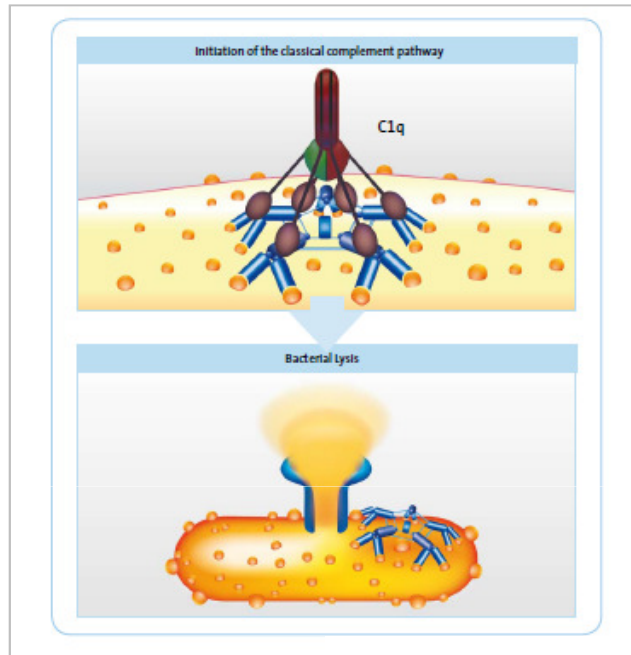
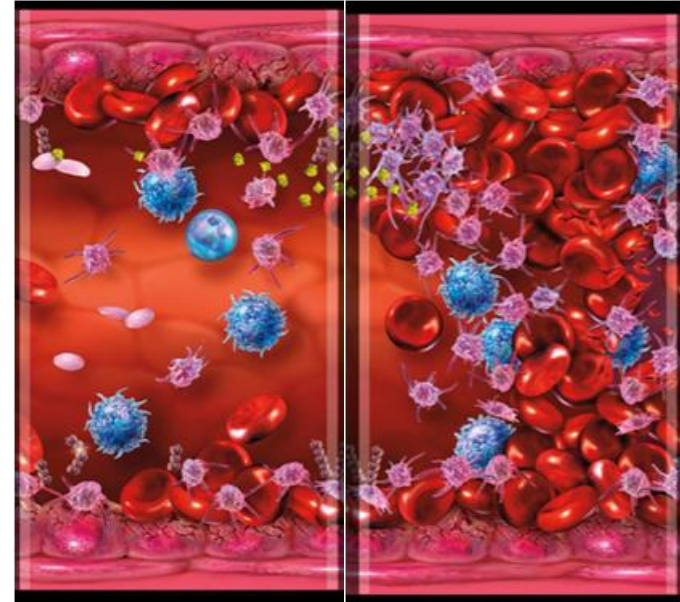


Image from  **Biotest**  
*From Nature for Life*

**Complement can cause endothelial / tissue damage!**



**aHUS**Source  
atypical Hemolytic Uremic Syndrome (aHUS)

**We need to assess complement factors levels and function!**

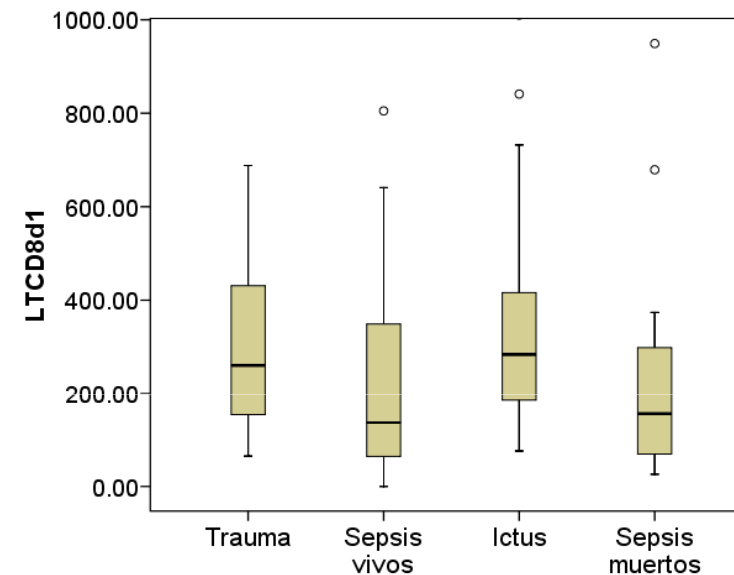
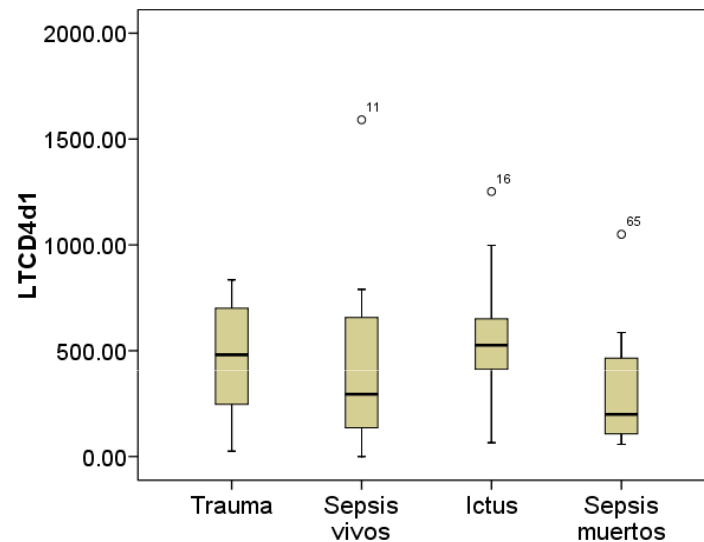
↓ Factor B and properdin → bacteriemia



Depressed lymphocyte mediated  
immunity



## Low levels of T cells in sepsis



Andaluz-Ojeda et al. *Critical Care* 2011, **15**:R243  
<http://ccforum.com/content/15/5/R243>



### RESEARCH

### Open Access

## Early natural killer cell counts in blood predict mortality in severe sepsis

David Andaluz-Ojeda<sup>1</sup>, Verónica Iglesias<sup>2</sup>, Felipe Bobillo<sup>1</sup>, Raquel Almansa<sup>2</sup>, Lucía Rico<sup>2</sup>, Francisco Gandía<sup>1</sup>, Ana Ma Loma<sup>2</sup>, Concepción Nieto<sup>2</sup>, Rosa Diego<sup>2</sup>, Epifanio Ramos<sup>2</sup>, Mercedes Nocito<sup>2</sup>, Salvador Resino<sup>4</sup>, Jose M Elros<sup>2</sup>, Eduardo Tamayo<sup>3</sup>, Raul Ortiz de Lejarazu<sup>2</sup> and Jesús F Bermejo-Martin<sup>2\*</sup>

# Severe sepsis –Septic Shock



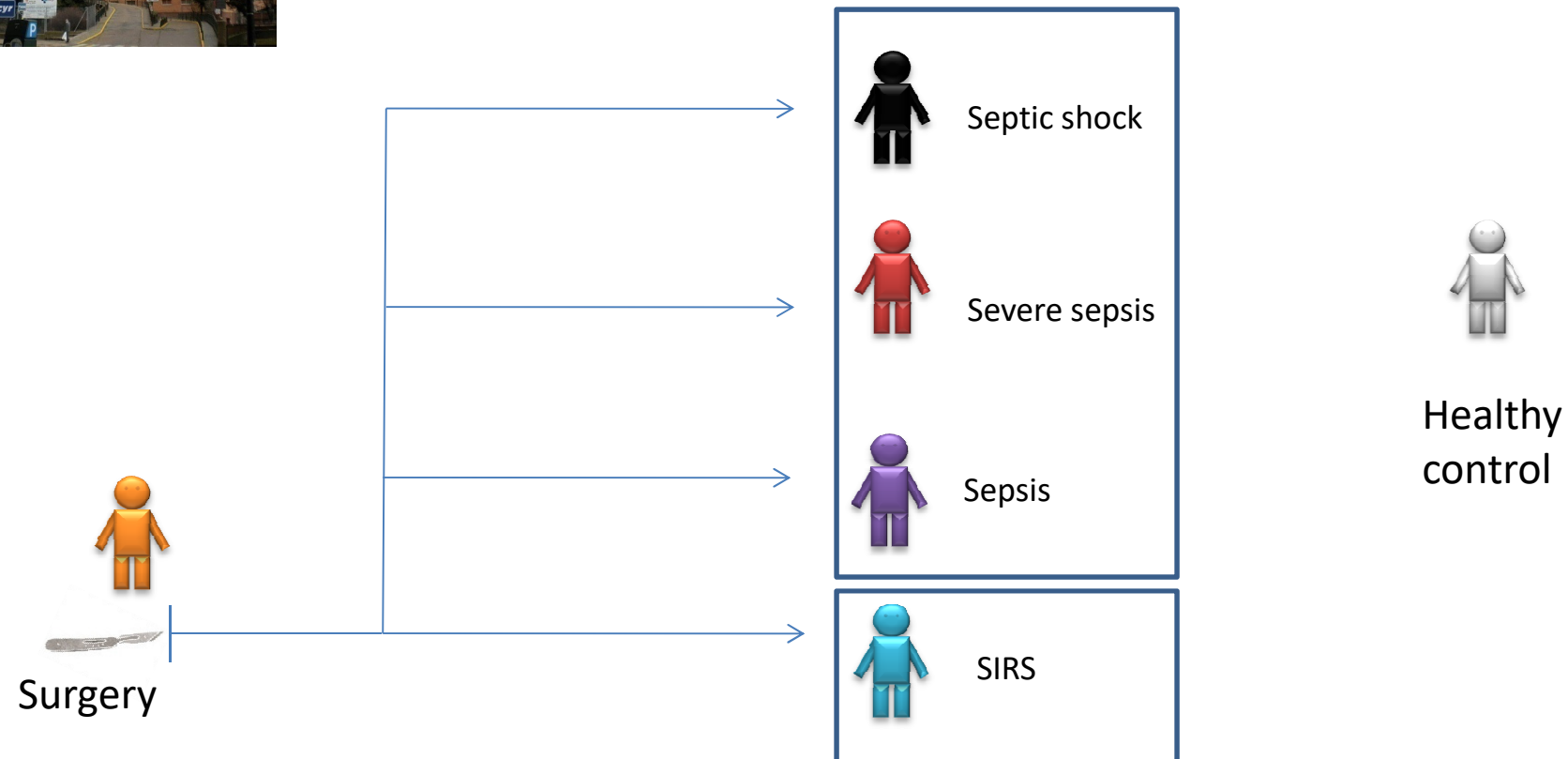
**Lymphopenia!**

**60-65 %**

(< 1000 lymphocytes / mm<sup>3</sup>)





## EXPRESS Study: Gene Expression in Sepsis



Anesthesiology Service + Research Support Unit,  
Hospital Clínico Universitario de Valladolid




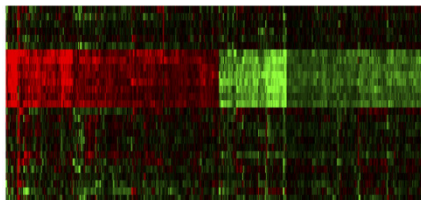
 **ELSEVIER**

 **BIAM**  
British Infection Association

[www.elsevierhealth.com/journals/jinf](http://www.elsevierhealth.com/journals/jinf)

Transcriptomic correlates of organ failure extent in sepsis

 CrossMark



**MMP8**

**LCN2/NGAL**

**PRTN3**

**LTF**

**MPO**

**HIGH  
EXPRESSION**

**CD40LG**

**HLA-II**

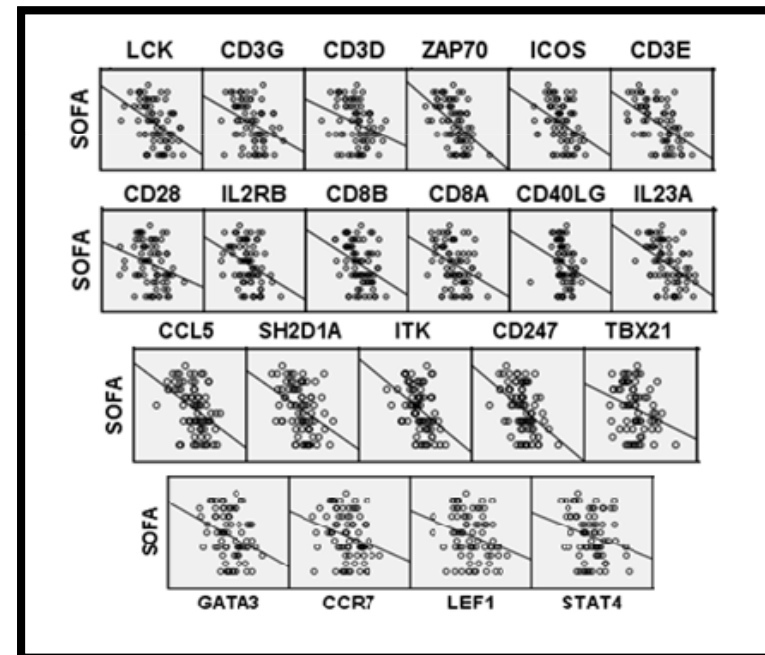
**CD28**

**ICOS**

**CD3E**

**LOW  
EXPRESSION**

## Inverse correlation between T cell markers expression and SOFA score





Research Paper

# Lymphopenic Community Acquired Pneumonia (L-CAP), an Immunological Phenotype Associated with Higher Risk of Mortality

Jesus F. Bermejo-Martin <sup>a</sup>, Catia Cilloniz <sup>b,1</sup>, Raul Mendez <sup>c,d,1</sup>, Raquel Almansa <sup>a,1</sup>, Albert Gabarrus <sup>b</sup>, Adrian Ceccato <sup>b</sup>, Antoni Torres <sup>b,\*,1</sup>, Rosario Menendez <sup>c,1</sup>, for the NEUMONAC group

## Derivation

Variable	Multivariate analysis (N = 1209)		
	OR	CI 95%	p
Chronic renal failure	2.47	1.18–5.19	0.017
CURB-65 $\geq 3$	3.99	2.15–7.40	0.000
Initial ICU admission	2.22	1.03–4.80	0.043
Appropriate antibiotic treatment	0.27	0.14–0.50	0.000
<724 lymphocyte/mm <sup>3</sup>	1.93	1.06–3.51	0.031

**(n=1550 patients)**  
**Multi-site: 14 hospitals**

## Validation

	Multivariate analysis (N = 1878)		
	OR	CI 95%	p
Smoking			0.043
No smoker	1	–	–
Smoker	0.46	0.24–0.86	0.015
Ex-smoker	0.77	0.51–1.15	0.20
Neurological disease	2.36	1.57–3.54	<0.001
CURB-65 $\geq 3$	2.77	1.87–4.09	<0.001
ARDS (complication)	3.17	1.71–5.89	<0.001
Initial ICU admission	1.72	1.10–2.70	0.019
Appropriate antibiotic treatment	0.42	0.22–0.81	0.010
<724 lymphocytes/mm <sup>3</sup>	1.86	1.28–2.71	0.001

**(n=2846 patients)**  
**Single site**



## T cell response enhancers

	Mechanism of action	Developmental status
Interleukin 7	Promotes T-cell and B-cell differentiation and growth, inhibits apoptosis, and maintains TCR diversity	Preclinical investigations; early clinical trials in oncology <sup>258</sup>
Interleukin 15	Promotes T-cell growth and inhibits lymphocyte apoptosis	Preclinical investigations in sepsis; early clinical trials in oncology <sup>259</sup>
Monoclonal antibodies to PD1 or PD Ligand	Inhibits co-inhibitory signals at the T cell-APC level, maintains T-cell function, and is anti-apoptotic	Preclinical investigations in sepsis; early clinical trials in oncology <sup>246</sup>
Monoclonal antibodies to B-lymphocyte and T-lymphocyte attenuator	Inhibits co-inhibitory signals at the T cell-APC level, maintains T-cell and B-cell function, and is anti-apoptotic	Preclinical investigations in sepsis <sup>260</sup>
IMT 504 and other immunostimulatory oligodeoxynucleotides	Immunostimulatory nucleotides can activate T and B cells and promote mesenchymal stem-cell generation	Preclinical investigations; pilot studies in human beings <sup>261</sup>

## The Lancet Infectious Diseases Commission

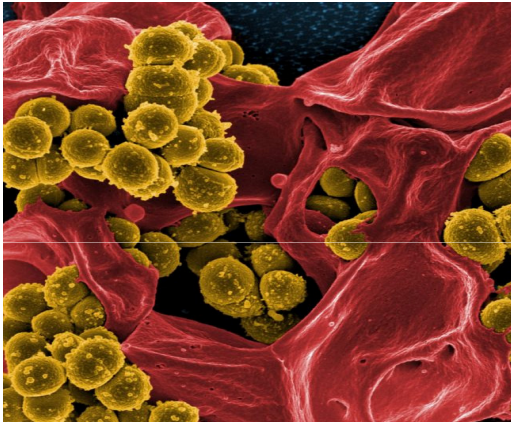
### Sepsis: a roadmap for future research

*Jonathan Cohen, Jean-Louis Vincent, Neill K J Adhikari, Flavia R Machado, Derek C Angus, Thierry Calandra, Katia Jaton, Stefano Giulieri, Julie Delaloye, Steven Opal, Kevin Tracey, Tom van der Poll, Eric Pelfrene*



## Immunotherapies move beyond cancer, with first foray into sepsis

<https://www.statnews.com/2016/12/07/immunotherapy-sepsis/>



Bristol-Myers Squibb

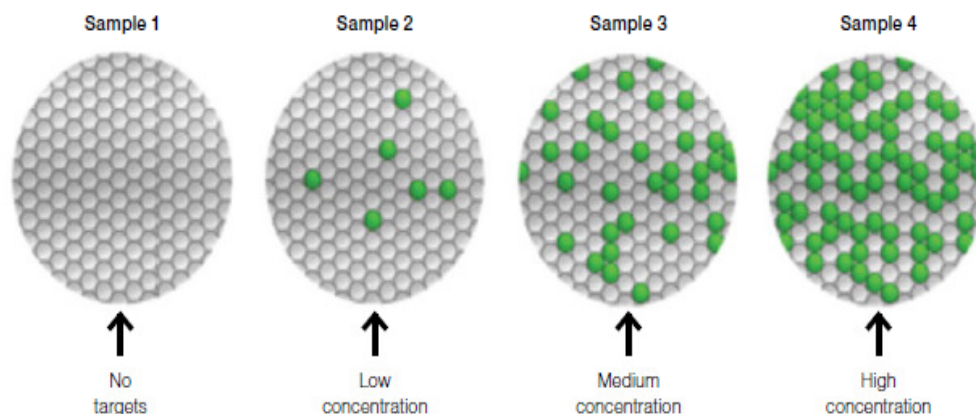
**Nivolumab** Phase 1 trial

**BMS-936559** Phase 1/2 trial

Both drugs act on PD-1/PD-L1 pathway, resulting in the activation of T cells

# New transcriptomic methods for profiling immunity in sepsis

# Droplet Digital PCR



mRNA as a  
biomarker

FIRMADO por : MARINA PILAR VILLEGAS GRACIA. A fecha : 10/12/2014 15:56:48  
El documento consta de un total de 71 folios. Folio 1 de 71 - Código Seguro de Verificación: 396626-42761694. Verificable en sede electrónica según Orden Ministerial del 24/2/2011



**MINISTERIO  
DE ECONOMÍA  
Y COMPETITIVIDAD**



Unión Europea  
Fondo Europeo de  
Desarrollo Regional  
"Una manera  
de hacer Europa"

SECRETARÍA DE ESTADO DE INVESTIGACIÓN,  
DESARROLLO E INNOVACIÓN  
SECRETARÍA GENERAL DE CIENCIA, TECNOLOGÍA  
E INNOVACIÓN  
DIRECCIÓN GENERAL DE INVESTIGACIÓN CIENTÍFICA Y TÉCNICA  
SUBDIRECCIÓN GENERAL DE FONDOS EUROPEOS PARA LA INVESTIGACIÓN

CONVOCATORIA 2013  
AYUDAS A INFRAESTRUCTURAS Y EQUIPAMIENTO CIENTÍFICO-TÉCNICO  
SUBPROGRAMA ESTATAL DE INFRAESTRUCTURAS CIENTÍFICAS Y EQUIPAMIENTO

RESOLUCIÓN DE CONCESIÓN

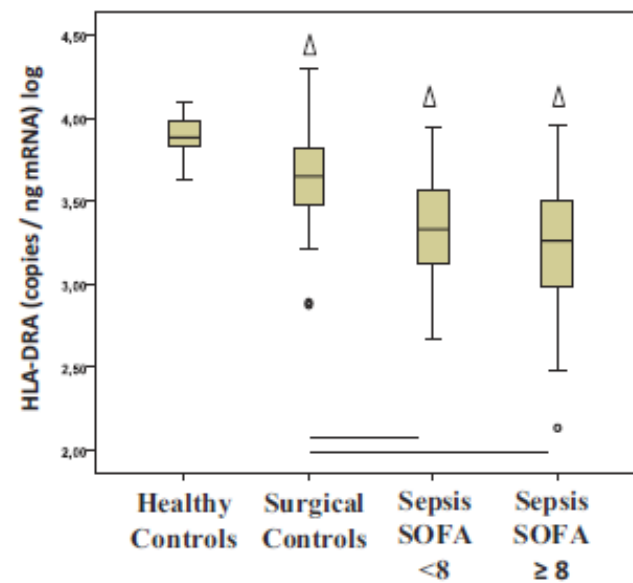
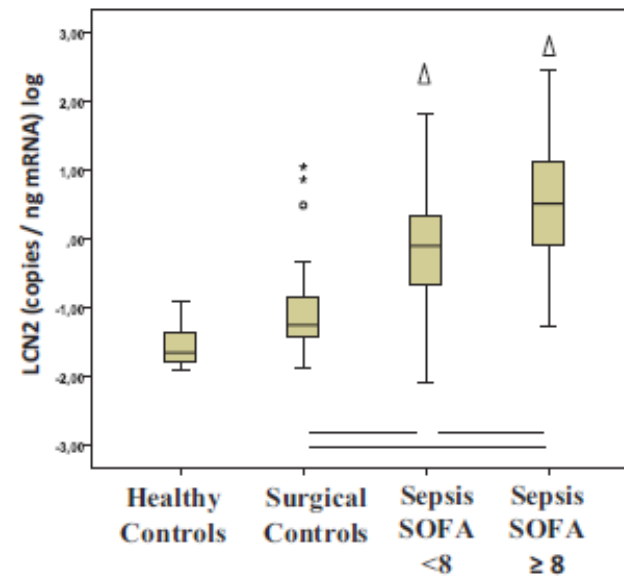
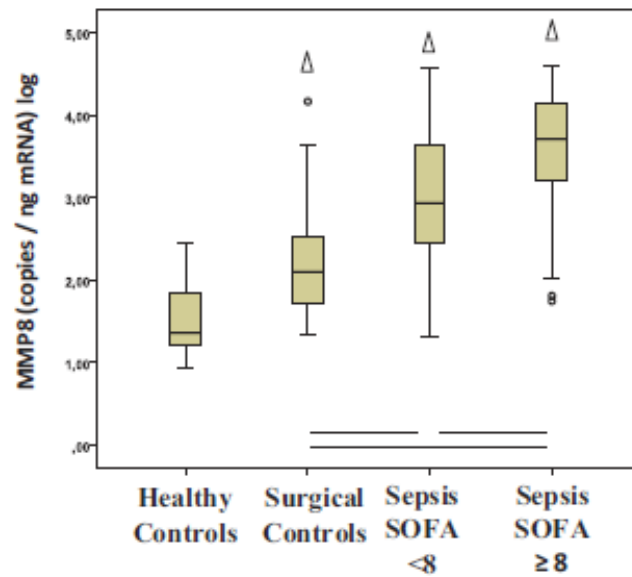
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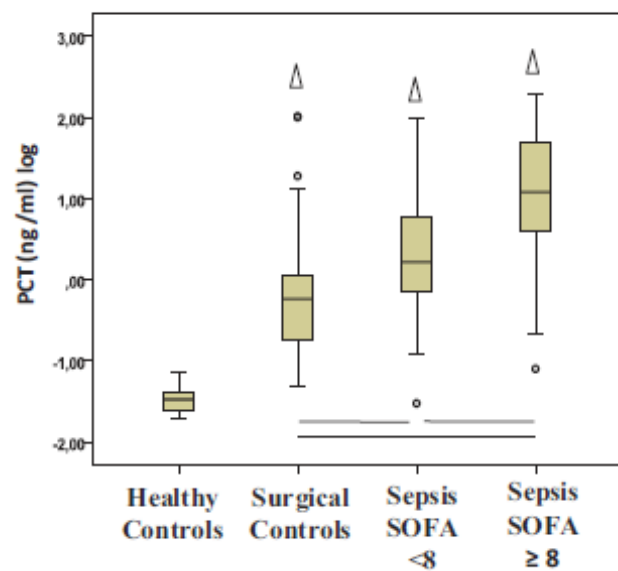
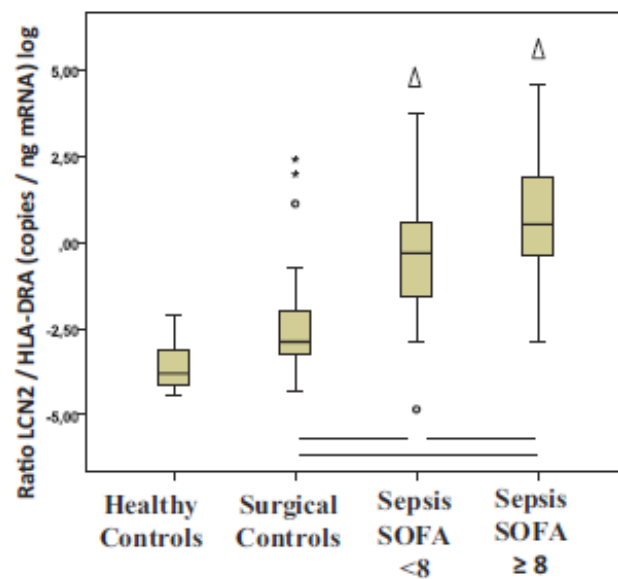
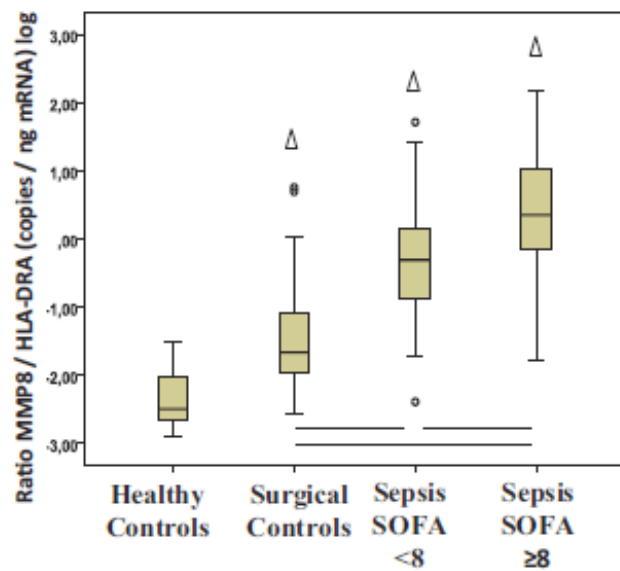
ORIGINAL ARTICLE

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## Quantification of Immune Dysregulation by Next-generation Polymerase Chain Reaction to Improve Sepsis Diagnosis in Surgical Patients

*Raquel Almansa, PhD,\* Alicia Ortega, MLT,\* Ana Ávila-Alonso, B.Pharm,\* Maria Heredia-Rodríguez, MD, PhD,† Silvia Martín, MD,‡ Diana Benavides, MD,§ Marta Martín-Fernandez, MSc,\* Lucia Rico, MLT,\* César Aldecoa, MD, PhD,‡ Jesús Rico, MD, PhD,‡ Iñigo López de Cenarruzabeitia, MD, PhD,§ Juan Beltrán de Heredia, MD, PhD,§ Esther Gomez-Sanchez, MD, PhD,† Marta Aragón, MD,† Cristina Andrés, B.Pharm,¶ Dolores Calvo, MD,¶ David Andaluz-Ojeda, MD, PhD,|| Pilar Liu, MD,† Francisco Blanco-Antona, MD,§ Lydia Blanco, MD, PhD,\*\* Jose Ignacio Gómez-Herreras, MD, PhD,† Eduardo Tamayo, MD, PhD,† and Jesus F. Bermejo-Martin, MD, PhD\**





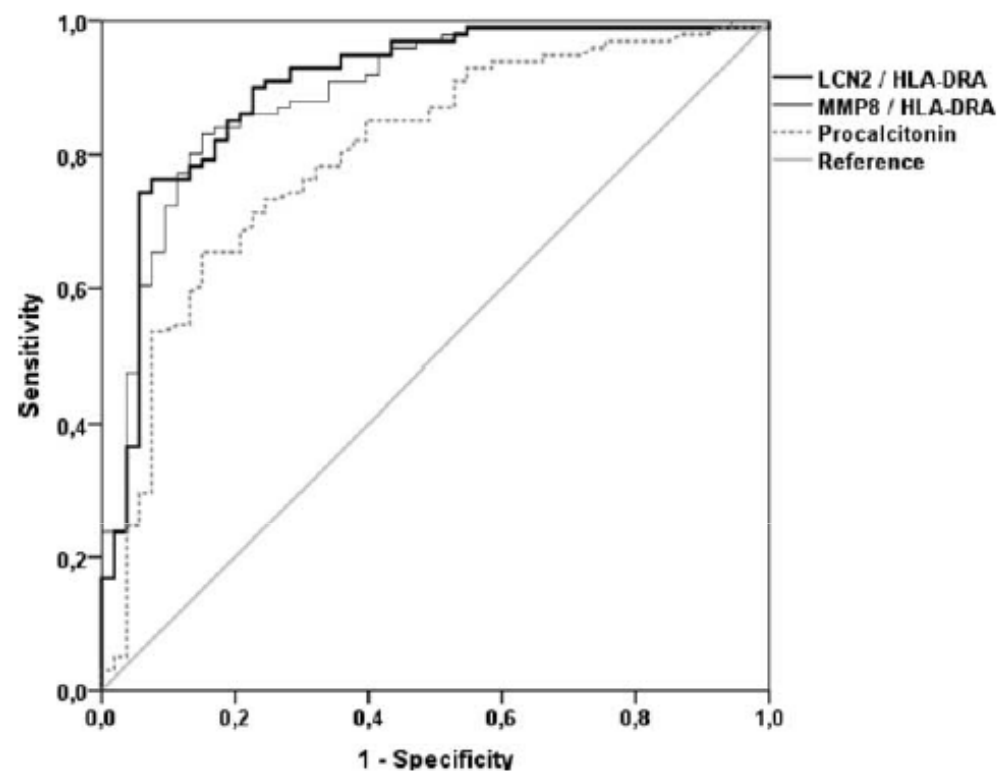


FIGURE 2. AUROC to differentiate sepsis patients from surgical controls. Only the AUROCs for the ratios showing differences with procalcitonin in the Hanley and McNeil test are showed.



## Immuno-transcriptomic scores

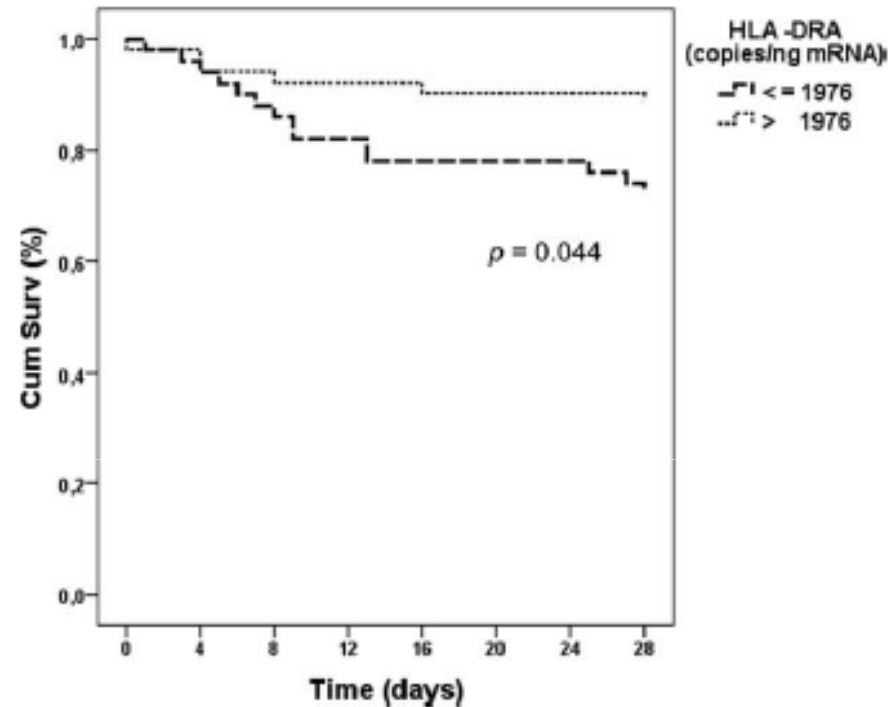
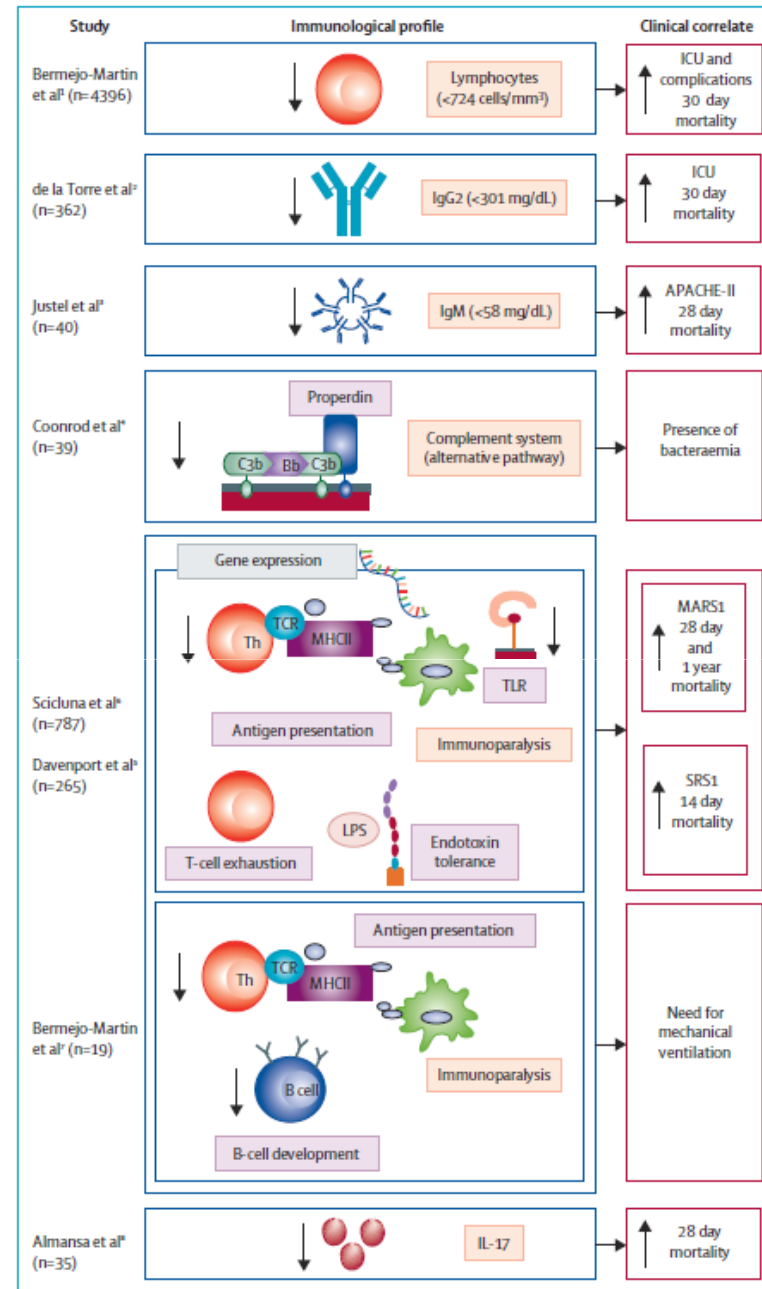


FIGURE 4. Kaplan-Meier analysis for survival at 28 days following sepsis diagnosis depending on *HLA-DRA* gene expression levels.

**Quantification of Immune Dysregulation by Next-generation Polymerase Chain Reaction to Improve Sepsis Diagnosis in Surgical Patients.**

## Immunological profiling to assess disease severity and prognosis in CAP

[www.thelancet.com/respiratory](http://www.thelancet.com/respiratory)  
Vol 5 December 2017 e36

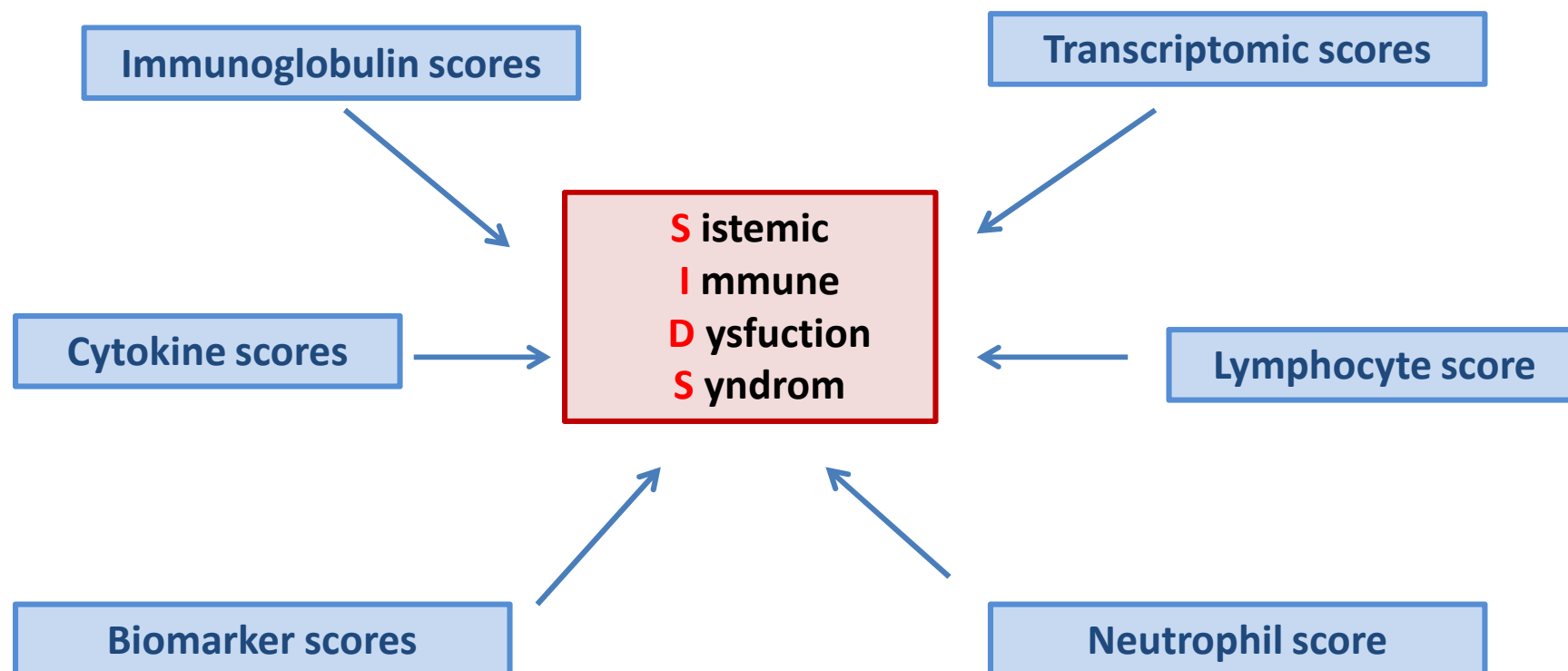


# Systemic Immune dysfunction Syndrome (SIDS) and Pre-sepsis



**Characterising Systemic Immune Dysfunction Syndrome (SIDS) to fill in the gaps of SEPSIS-2 and SEPSIS-3 definitions.**

Bermejo-Martin JF, Tamayo E, Andaluz-Ojeda D, Martín-Fernández M, Almansa R  
*Chest* . 2017;151(2):518-519.



## Pre-sepsis: A necessary concept to complete the SEPSIS-3 picture?

Jesus F. Bermejo-Martin MD PhD\*, Marta Martín-Fernandez MBiol, Raquel Almansa, PhD

*Group for Biomedical research in Sepsis (Bio Sepsis), Hospital Clínico Universitario de Valladolid/IECSCYL, Av. Ramón y Cajal, 3, 47003 Valladolid, Spain*

SOFA = 0

**Uncomplicated  
infection**

SOFA = 1  
SIDS

**Pre-sepsis**

SOFA  $\geq 2$

**Sepsis -3**

**Pre-sepsis**



## **“Sepsis Alert”**

- Close monitoring of blood pressure
- Early instauration of liquid replacement
- Close monitoring of lactate, presence of altered mentation and taquipnoea
- Active microbiological testing,
- Derivation to the hospital/ICU
- Early treatment with systemic antibiotics

THE LANCET Infectious Diseases

Preventing sepsis

Jesús F Bermejo-Martín<sup>1</sup>, David Andaluz-Ojeda, Raquel Almansa, Jose María Elros, Eduardo Tamayo  
Published: November 2015

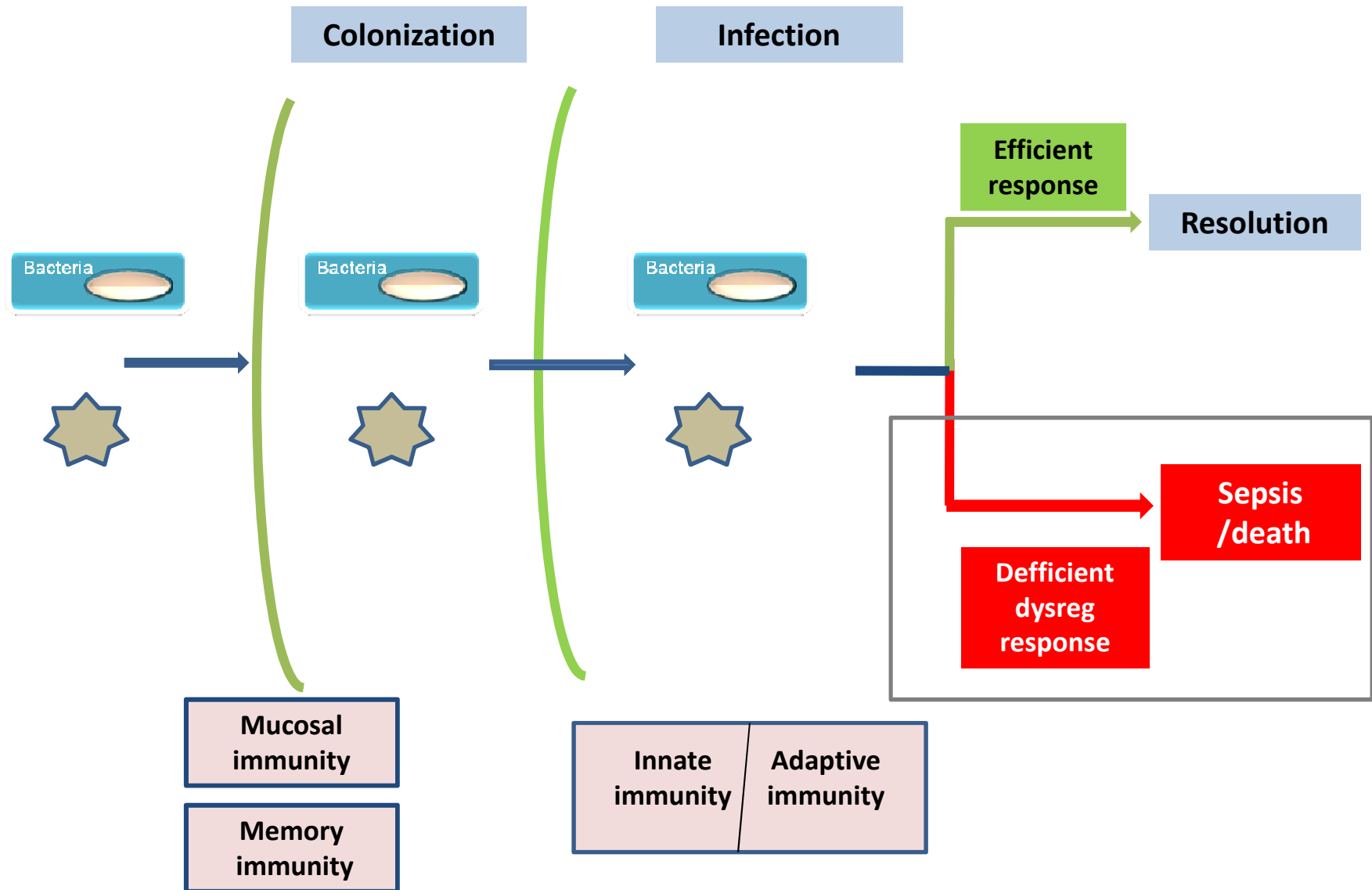
Almansa et al. Critical Care 2015, 19:4  
<http://ccforum.com/content/19/0/4>

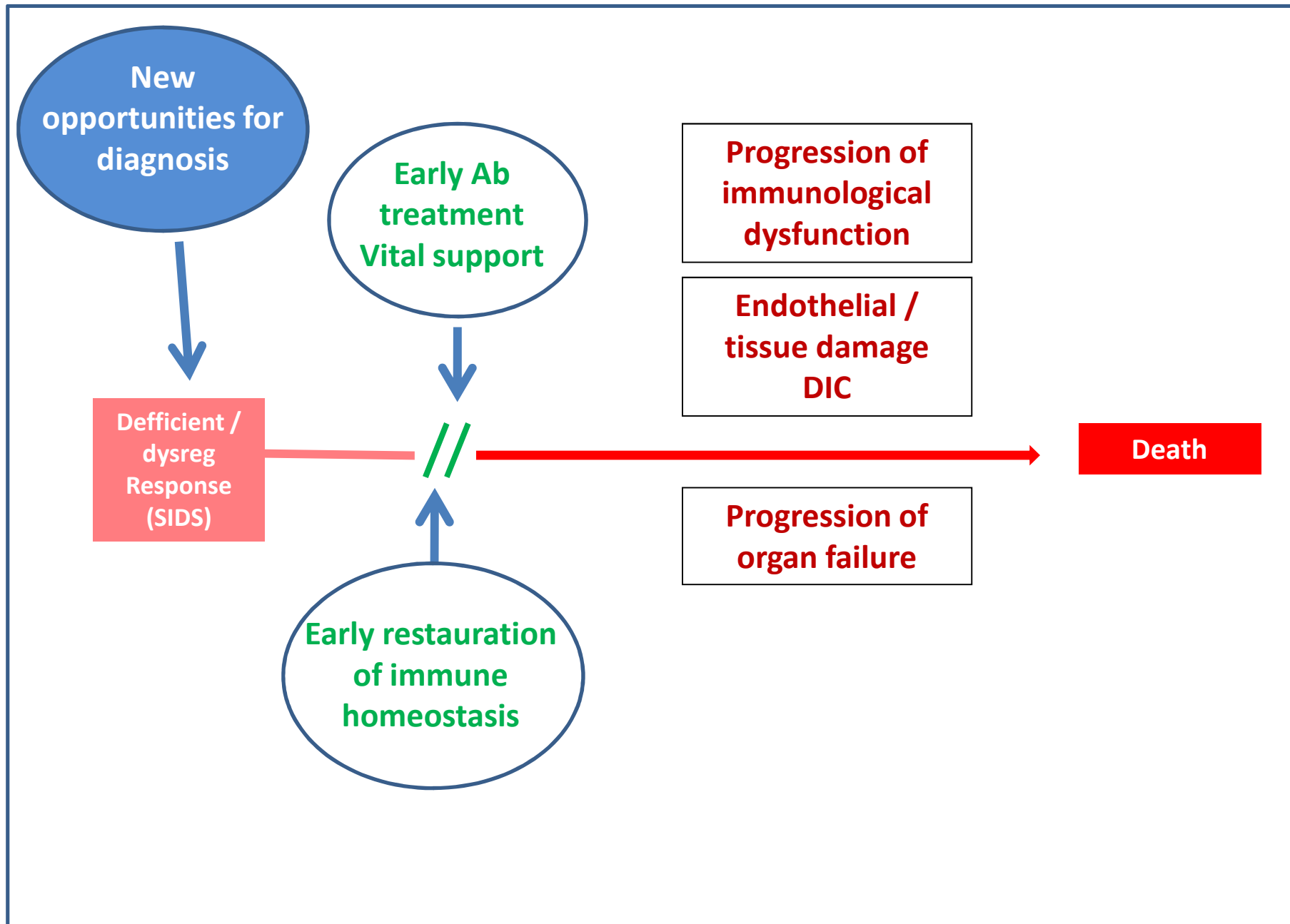


COMMENTARY

Immunological monitoring to prevent and treat sepsis



Raquel Almansa<sup>1</sup>, John Wain<sup>2</sup>, Eduardo Tamayo<sup>3</sup>, David Andaluz-Ojeda<sup>4</sup>, Ignacio Martín-Loeches<sup>5</sup>, Paula Ramírez<sup>6</sup>  
and Jesús F Bermejo-Martín<sup>\*1</sup>

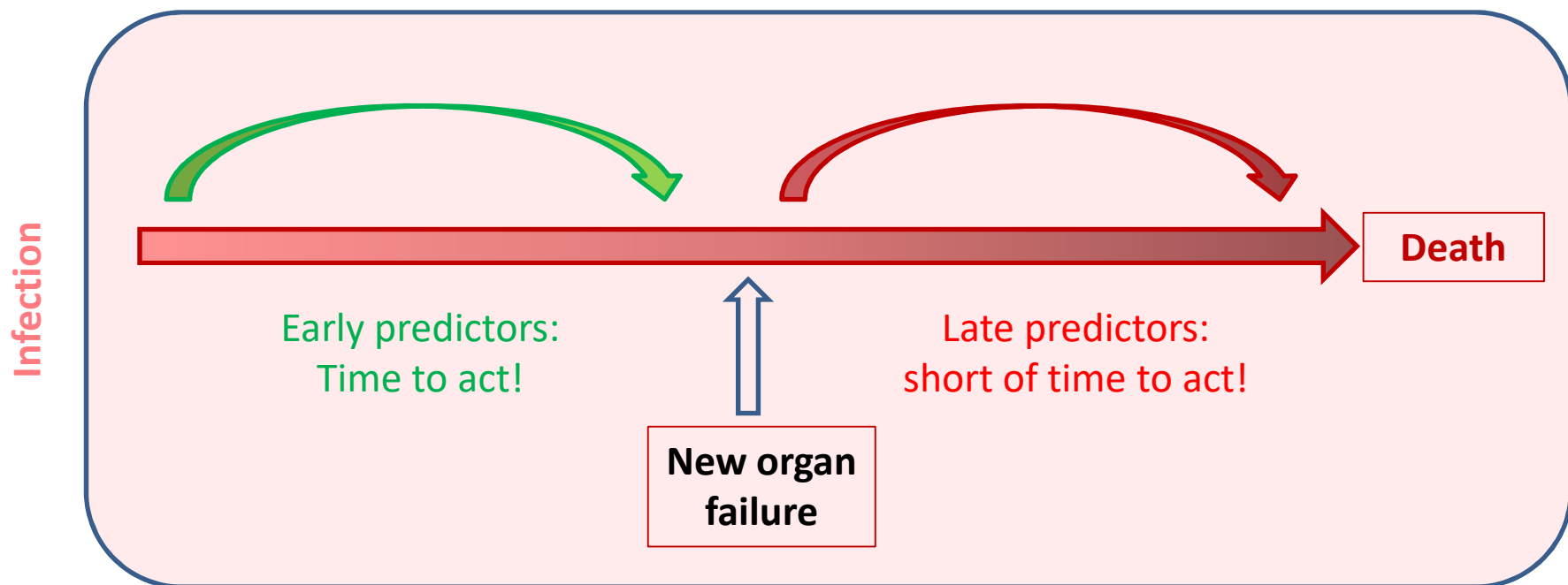






## New Organ Failure as an Alternative Endpoint to Develop Diagnostic Criteria for Sepsis

[Jesus F. Bermejo-Martin, MD](#)  , [Raquel Almansa, PhD](#), [Juan Carlos Yebenes, MD](#)



## Identifying features of immunological dysfunction

Early detection of sepsis

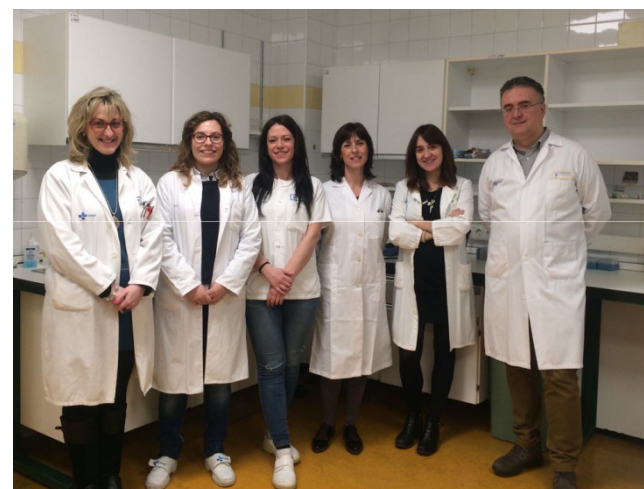
Early instauration of  
personalised treatment.



## Precision Medicine in Sepsis



bio · sepsis  
σήψις



[jfbermejo@saludcastillayleon.es](mailto:jfbermejo@saludcastillayleon.es)



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