

# nature REVIEWS

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## IMMUNOLOGY



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# nature REVIEWS IMMUNOLOGY

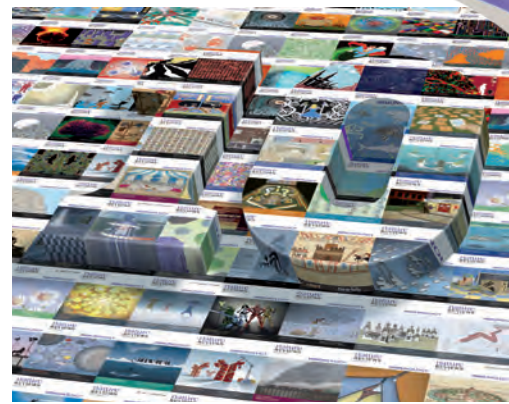
10<sup>th</sup> anniversary

Continuing our 10<sup>th</sup> anniversary celebrations, *Nature Reviews Immunology* is delighted to bring you a special immunology-themed calendar for 2012.

We are often complimented on the high quality of the figures that feature in our journal. Therefore, we have decided to adapt some of our favourite images that have appeared in the journal over the past decade to illustrate 12 different immunology topics — one for each calendar month.

We've also included a further reading list, which highlights other articles and Focus issues from *Nature Reviews Immunology* that are related to the topic of each calendar month. This can be found at the back of the calendar, along with an events list of some of the key immunology meetings that will take place in 2012. You can find a more complete and updated list of immunology conferences at: [http://www.nature.com/nri/info/info\\_conf.html](http://www.nature.com/nri/info/info_conf.html).

We hope that you enjoy using the calendar, and we thank our sponsors, eBioscience, for their kind support. Finally, we would like to extend our best wishes for the New Year to our readers and authors — may 2012 prove to be a happy and prosperous year for you all.



Nature Reviews Immunology:  
<http://www.nature.com/nri/index.html>

10<sup>th</sup> anniversary issue:  
<http://www.nature.com/nri/journal/v11/n10/index.html>

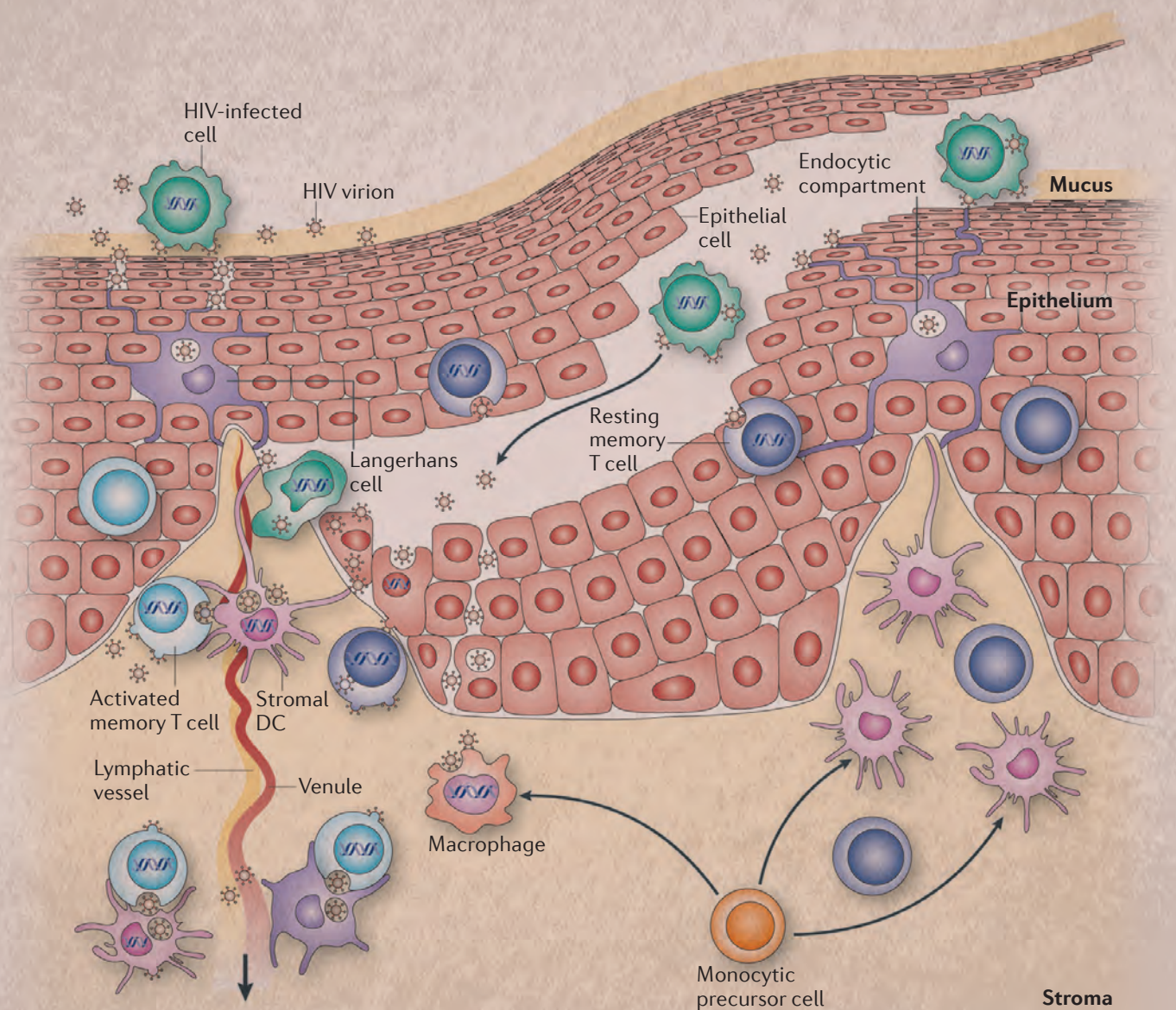
Follow @NatRevImmunol on Twitter:  
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Calendar compiled and edited by Yvonne Bordon  
Copyedited by Isabel Woodman  
Designed by Simon Bradbrook

## LIST OF ABBREVIATIONS USED IN THE CALENDAR:

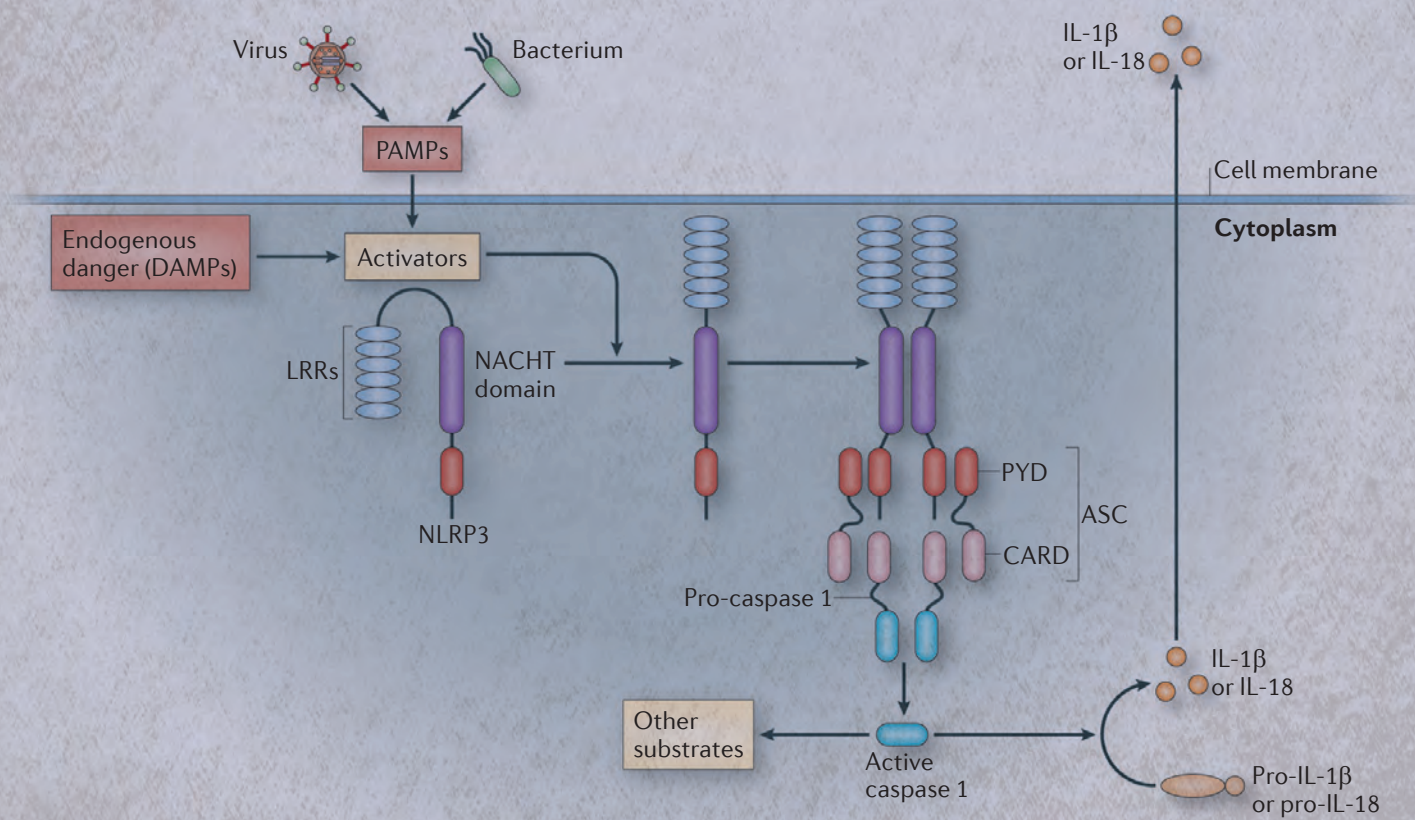
AHR, airway hyperreactivity; APRIL, a proliferation-inducing ligand; ASC, apoptosis-associated speck-like protein containing a CARD; *B. fragilis*, *Bacteroides fragilis*; BAFF, B cell-activating factor; CARD, caspase-recruitment domain; CNS, central nervous system; cTEC, cortical thymic epithelial cell; CX<sub>3</sub>CR1, CX<sub>3</sub>C-chemokine receptor 1; DAG, diacylglycerol; DAMP, damage-associated molecular pattern; DC, dendritic cell; DN, double negative; DP, double positive; FOXP3, forkhead box P3; FRC, fibroblastic reticular cell; GADS, GRB2-related adaptor protein; GM-CSF, granulocyte-macrophage colony-stimulating factor; GRB2, growth factor receptor-bound protein 2; HEV, high endothelial venule; IFN $\gamma$ , interferon- $\gamma$ ; IgNAR, immunoglobulin new antigen receptor; IL, interleukin; JAK, Janus kinase; LAT, linker for activation of T cells; LRR, leucine-rich repeat; M cell, microfold cell; MAPK, mitogen-activated protein kinase; M-CSF, macrophage colony-stimulating factor; MLN, mesenteric lymph node; mTEC, medullary

thymic epithelial cell; NACHT, domain present in NAI1, CIITA, HET-E and TP1; NFAT, nuclear factor of activated T cells; NF- $\kappa$ B, nuclear factor- $\kappa$ B; NK, natural killer; NKT, natural killer T; NLRP3, NOD-, LRR- and pyrin domain-containing 3; PAK, p21-activated kinase; PALS, periaerterial lymphoid sheath; PAMP, pathogen-associated molecular pattern; PKC $\theta$ , protein kinase C $\theta$ ; PLC $\gamma$ , phospholipase C $\gamma$ ; PNS, peripheral nervous system; PYD, pyrin domain; RANKL, receptor activator of NF- $\kappa$ B ligand; RASGRP, RAS guanyl-releasing protein; SAA, serum amyloid A; SFB, segmented filamentous bacteria; SLP76, SH2 domain-containing leukocyte protein of 76kDa (also known as LCP2); SNS, sympathetic nervous system; SP, single positive; STAT, signal transducer and activator of transcription; TCR, T cell receptor; TGF $\beta$ , transforming growth factor- $\beta$ ; T<sub>H</sub>, T helper; TLR, Toll-like receptor; T<sub>Reg</sub>, regulatory T; TSLP, thymic stromal lymphopoietin; ZAP70,  $\zeta$ -chain-associated protein kinase of 70 kDa;  $\gamma_c$ , common cytokine receptor  $\gamma$ -chain.



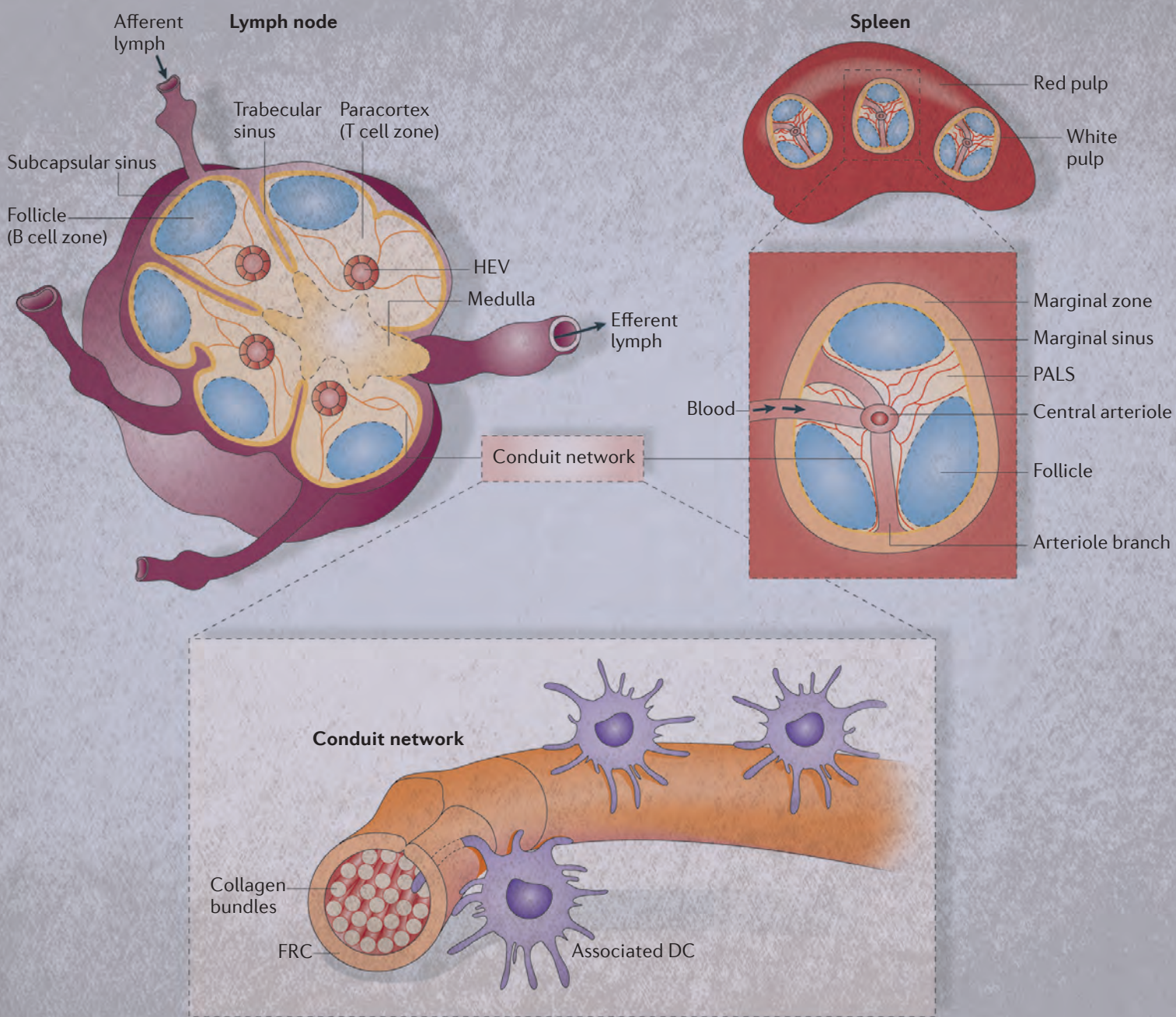
HIV infection

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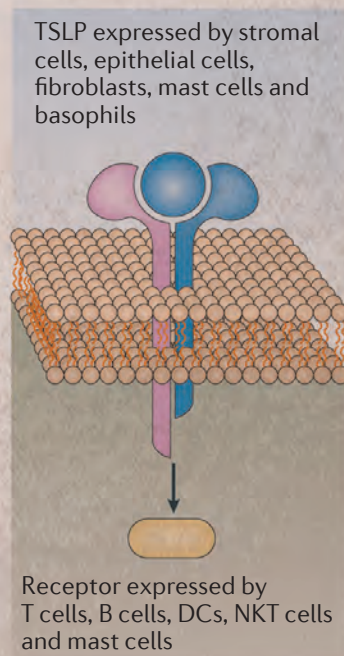
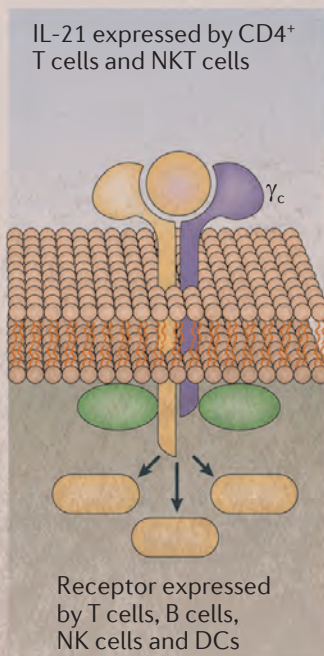
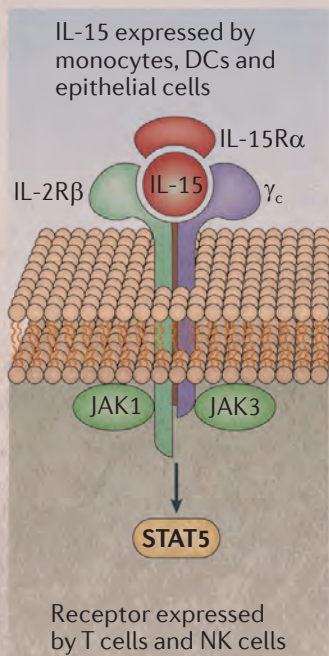
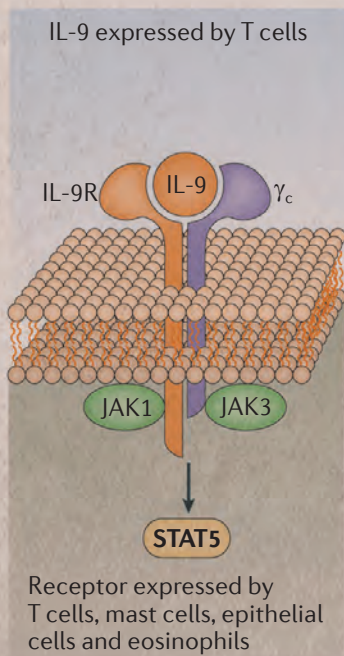
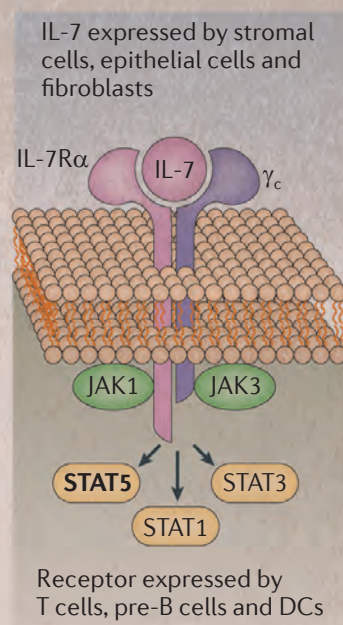
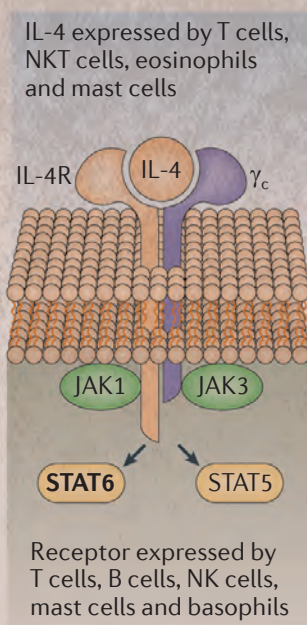
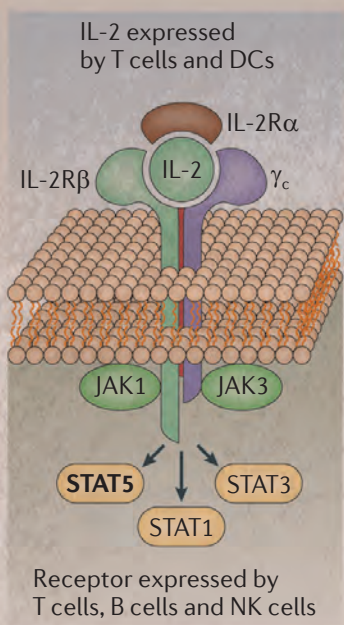
The inflammasome

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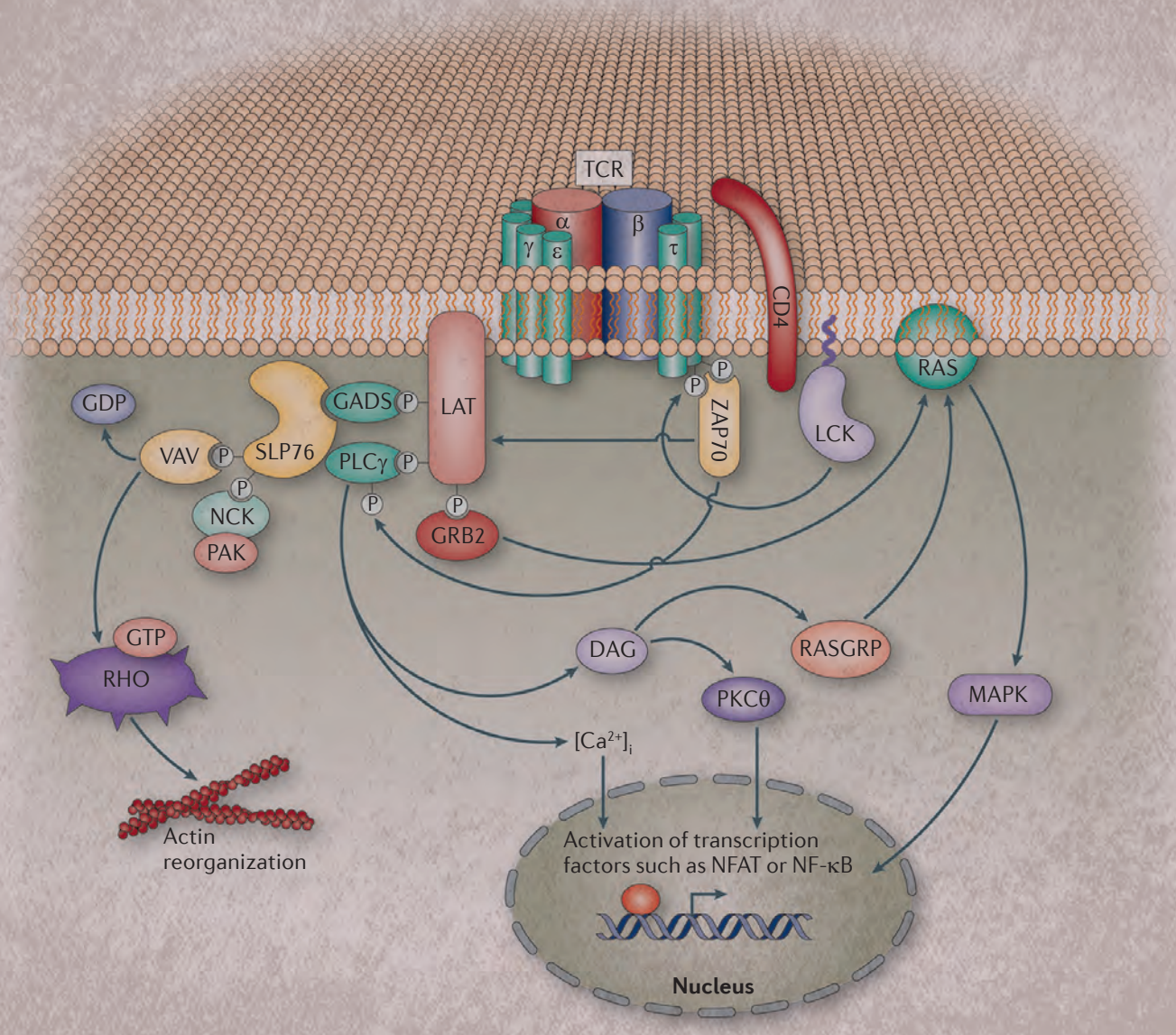


Secondary lymphoid tissues

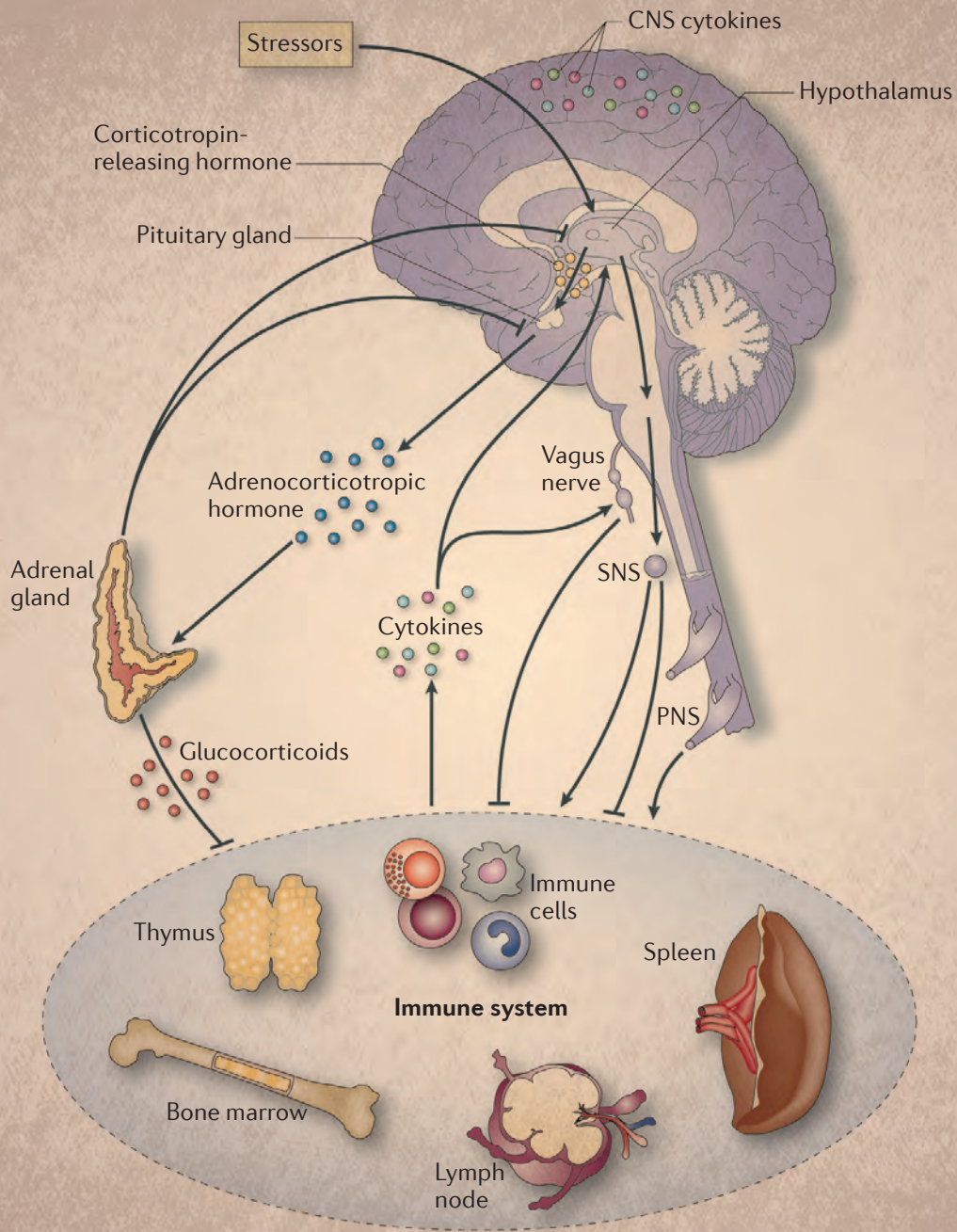
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30						Day of Immunology

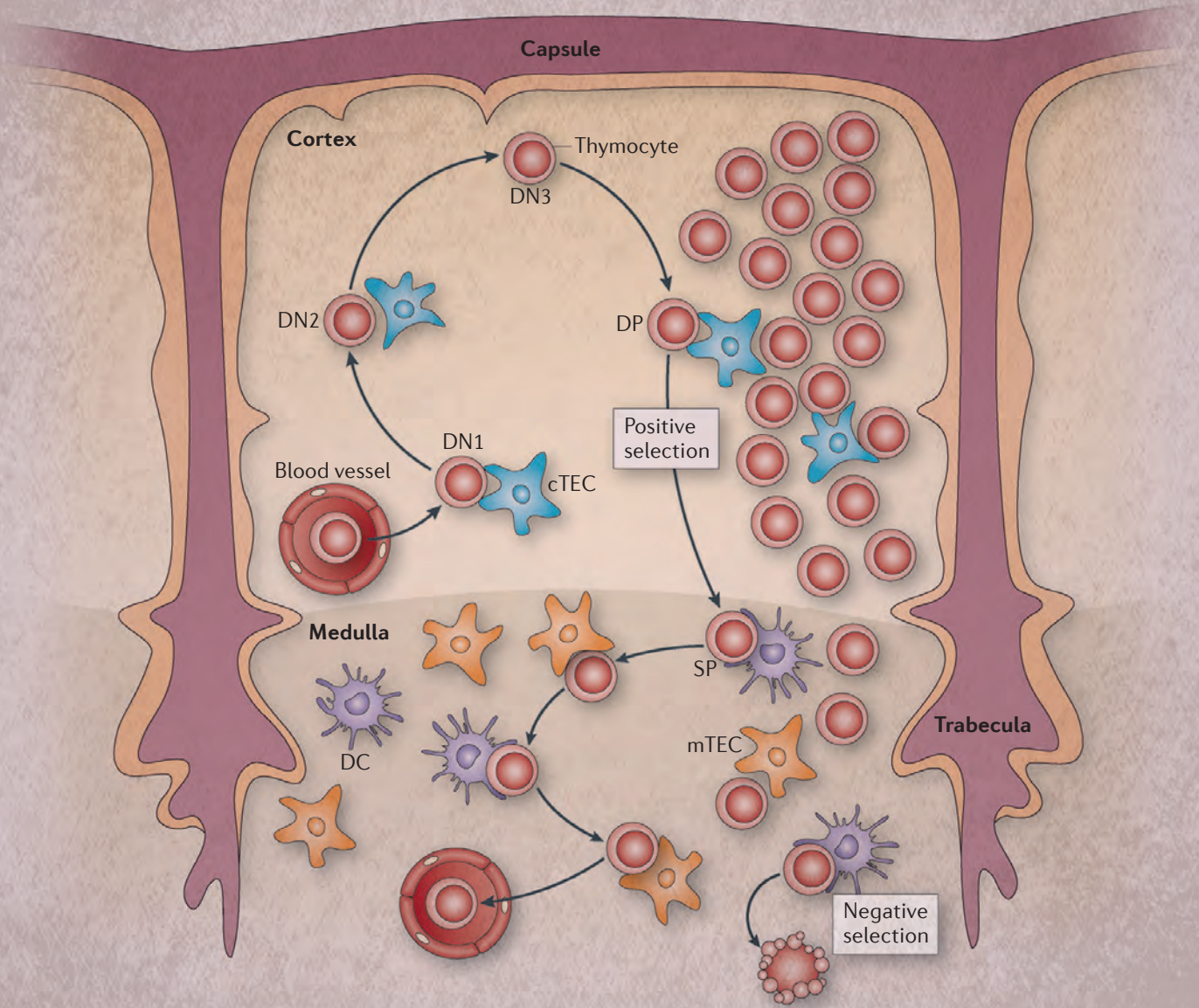


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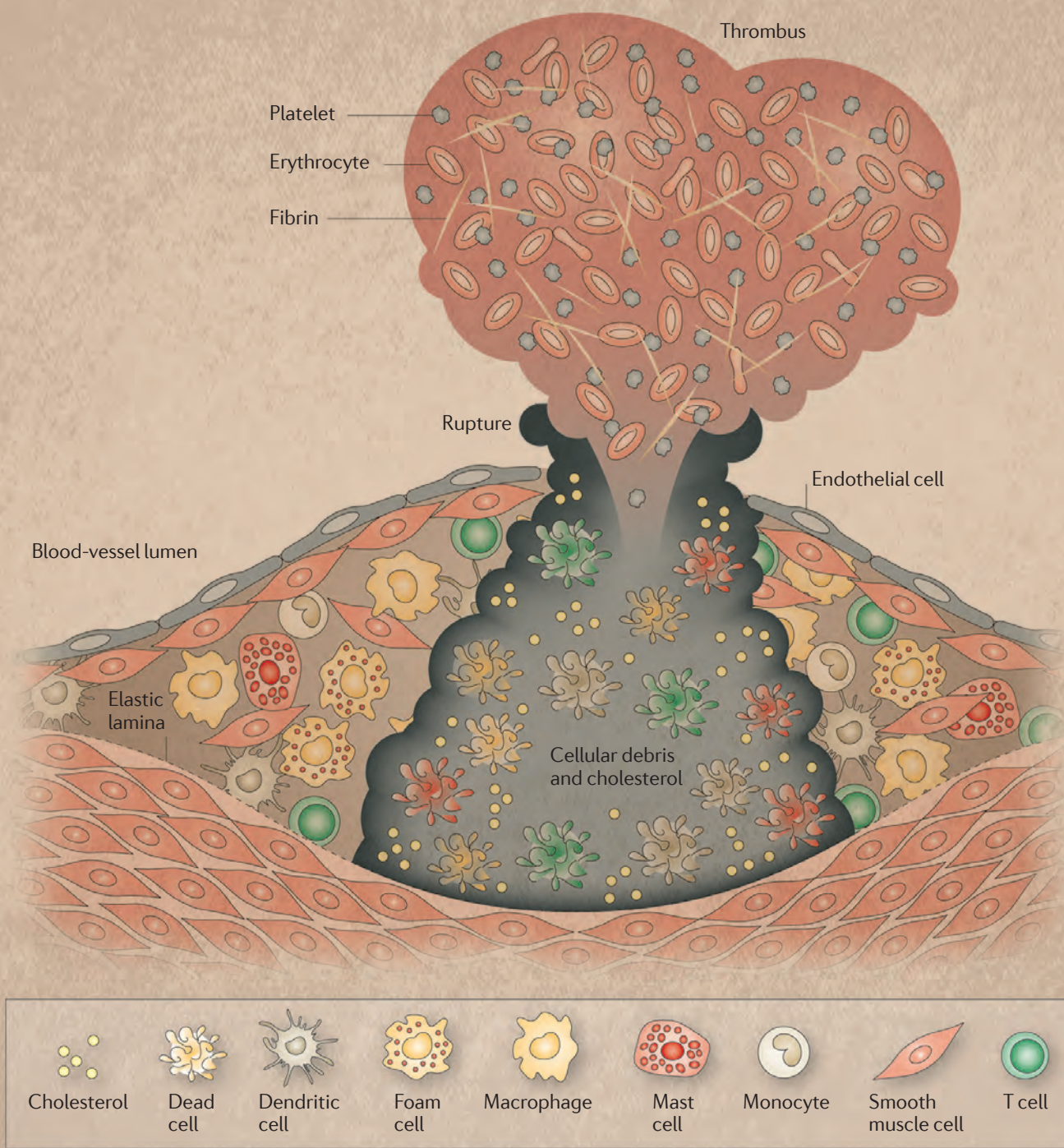


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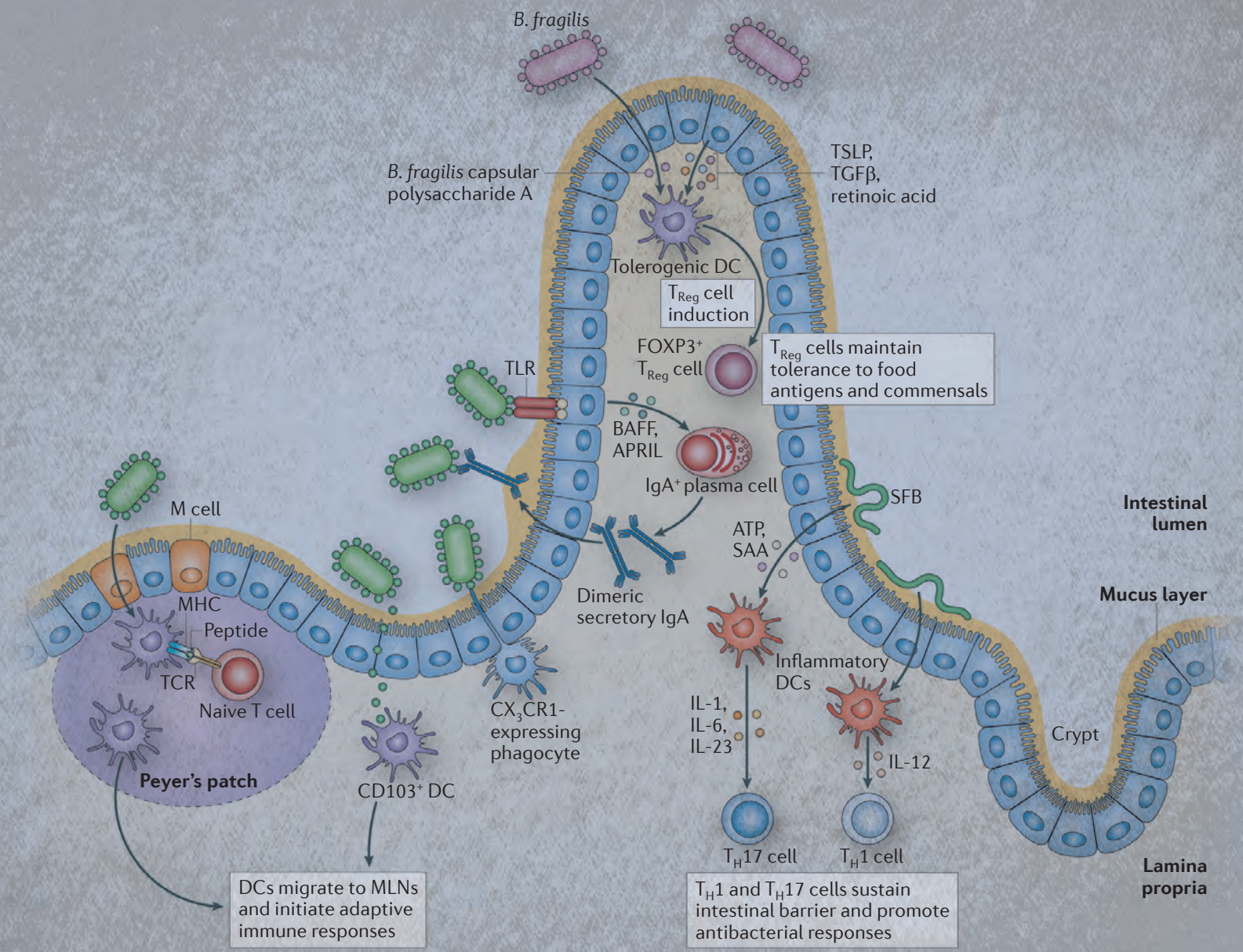


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Plaque rupture in atherosclerosis

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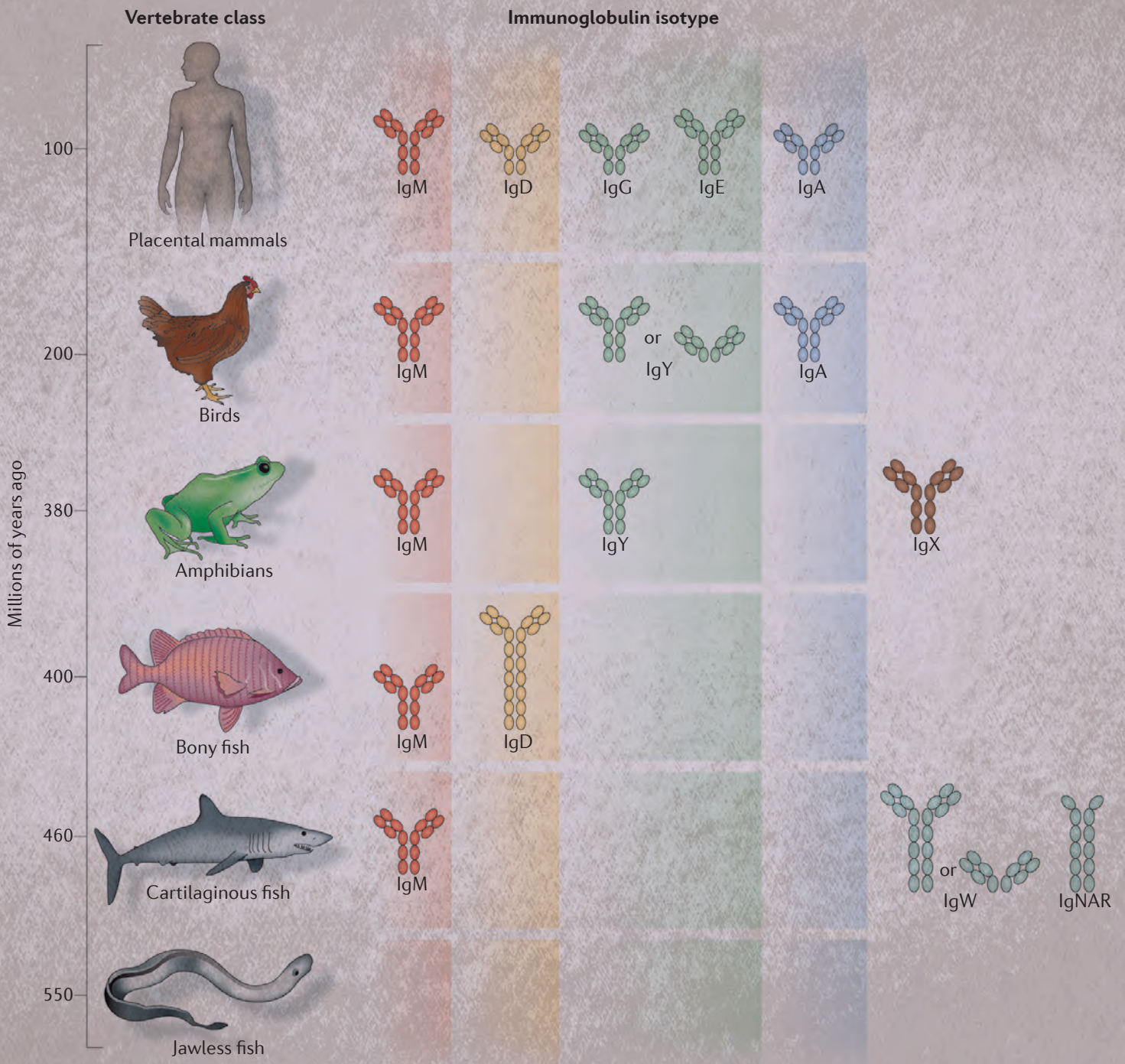


The intestinal microbiota

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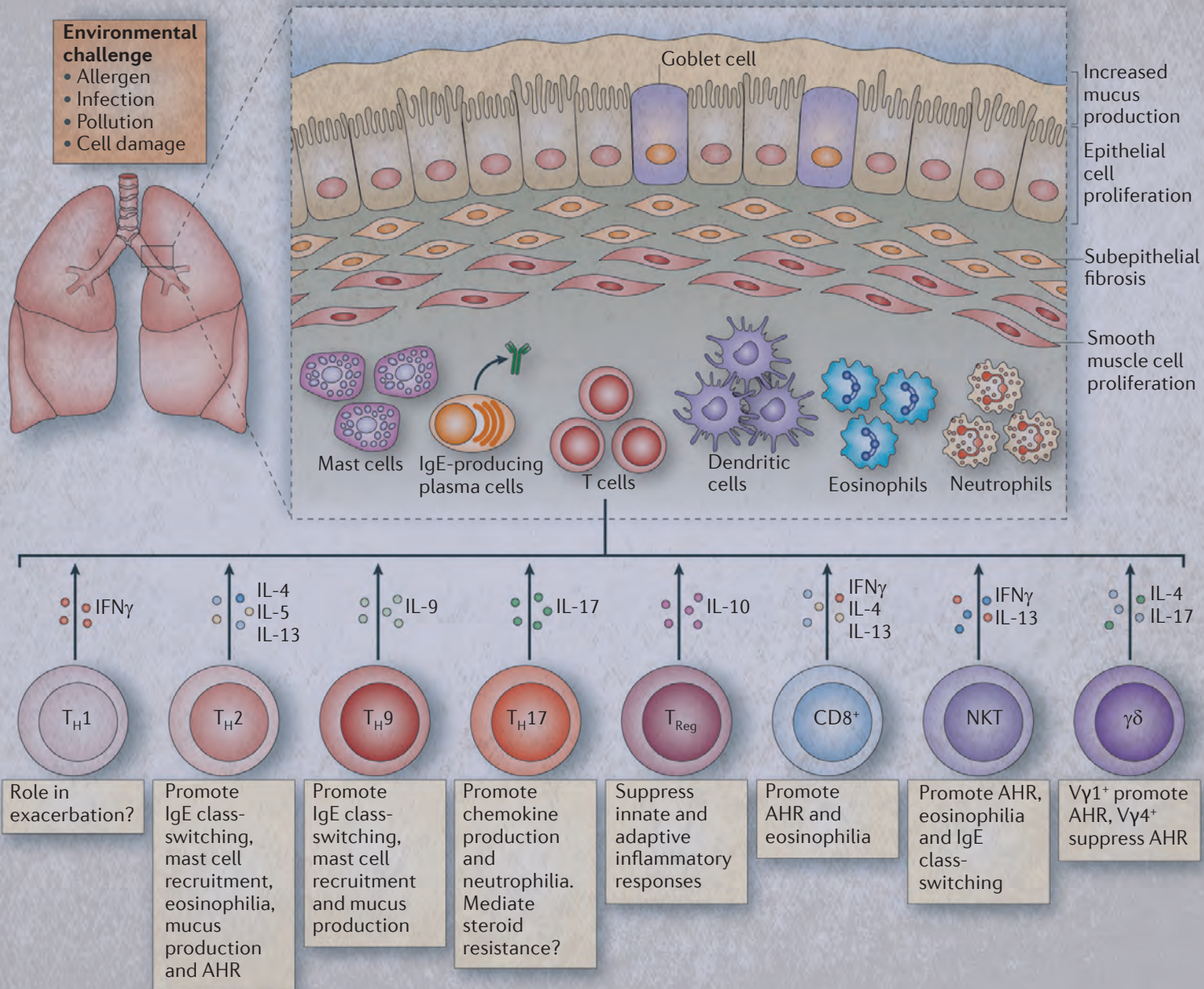
**SEPTEMBER 2012**

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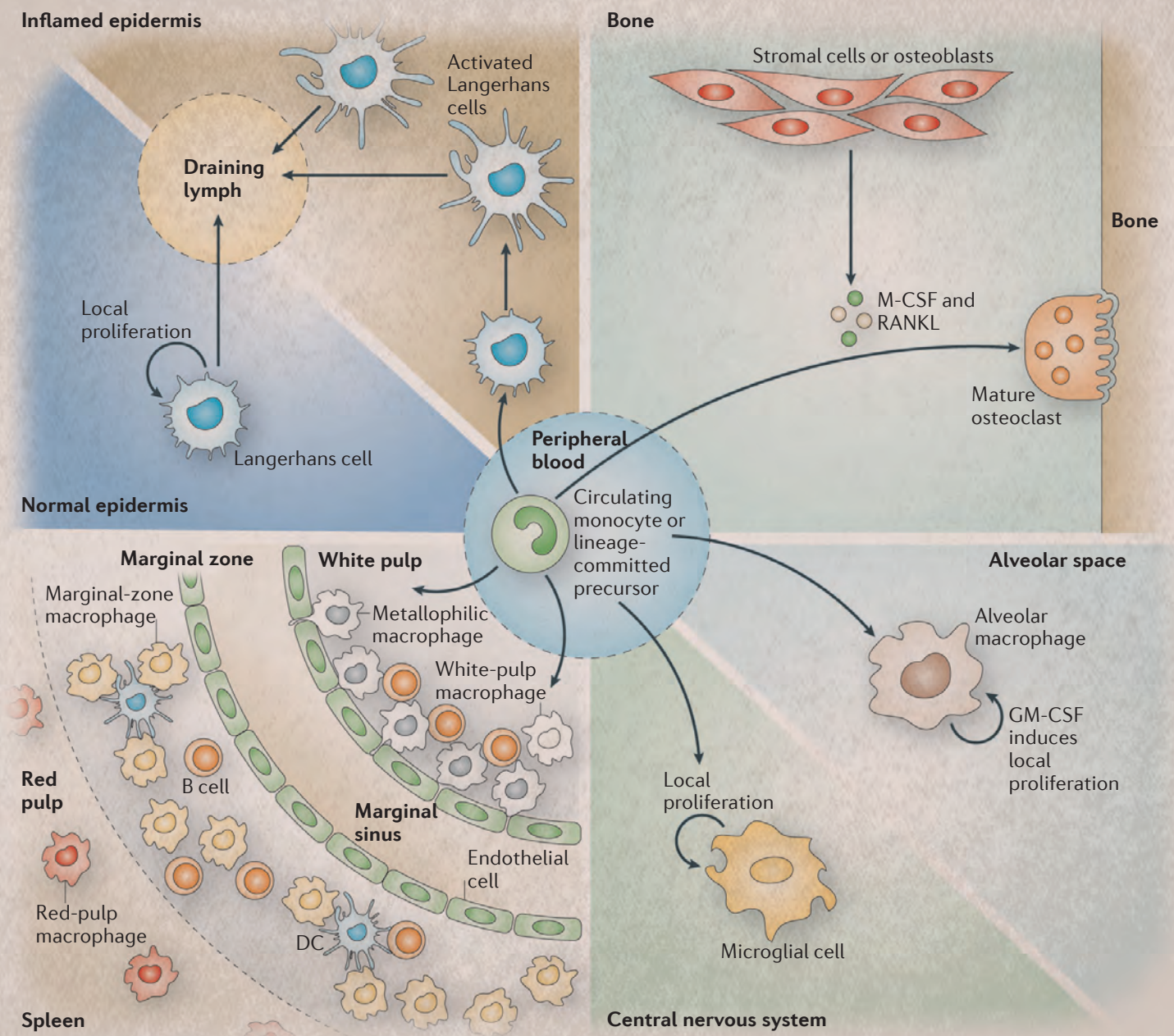
Evolution of the immune system

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Asthma and allergy

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Monocyte and macrophage plasticity

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
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31						

# READING LIST

## JANUARY

### HIV INFECTION

Adapted from Hladik, F. & McElrath, M. J. Setting the stage: host invasion by HIV. *Nature Rev. Immunol.* **8**, 447–457 (2008)

#### FURTHER READING

- Altfeld, M. et al. DCs and NK cells: critical effectors in the immune response to HIV-1. *Nature Rev. Immunol.* **11**, 176–186 (2011)
- Koup, R. A., Graham, B. S. & Douek, D. C. The quest for a T cell-based immune correlate of protection against HIV: a story of trials and errors. *Nature Rev. Immunol.* **11**, 65–70 (2011)
- McMichael, A. J. et al. The immune response during acute HIV-1 infection: clues for vaccine development. *Nature Rev. Immunol.* **10**, 11–23 (2009)



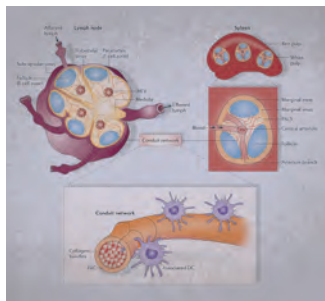
## MARCH

### SECONDARY LYMPHOID TISSUES

Adapted from Batista, F. D. & Harwood, N. E. The who, how and where of antigen presentation to B cells. *Nature Rev. Immunol.* **9**, 15–27 (2009)

#### FURTHER READING

- Turley, S. J., Fletcher, A. L. & Elpek, K. G. The stromal and haematopoietic antigen-presenting cells that reside in secondary lymphoid organs. *Nature Rev. Immunol.* **10**, 813–825 (2010)
- van de Pavert, S. A. & Mebius, R. E. New insights into the development of lymphoid tissues. *Nature Rev. Immunol.* **10**, 664–674 (2010)
- Vinuesa, C. G., Sanz, I. & Cook, M. C. Dysregulation of germinal centres in autoimmune disease. *Nature Rev. Immunol.* **9**, 845–857 (2009)



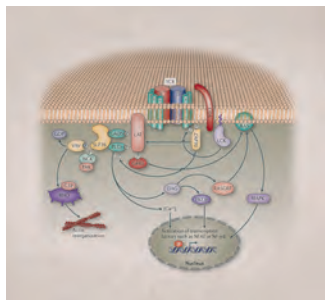
## MAY

### T CELL RECEPTOR SIGNALLING

Adapted from Koretzky, G. A. & Myung, P. S. Positive regulation of T-cell activation by adaptor proteins. *Nature Rev. Immunol.* **1**, 95–107 (2001)

#### FURTHER READING

- Dustin, M. L. & Depoil, D. New insights into the T cell synapse from single molecule techniques. *Nature Rev. Immunol.* **11**, 672–684 (2011)
- van der Merwe, P. A. & Dushek, O. Mechanisms for T cell receptor triggering. *Nature Rev. Immunol.* **11**, 47–55 (2011)
- Palmer, E. & Naeher, D. Affinity threshold for thymic selection through a T-cell receptor-co-receptor zipper. *Nature Rev. Immunol.* **9**, 207–213 (2009)



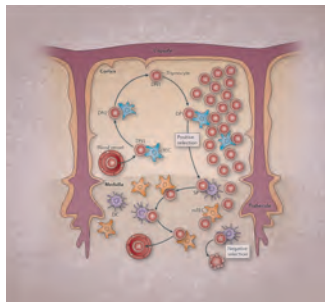
## JULY

### THE THYMUS

Adapted from Klein, L. et al. Antigen presentation in the thymus for positive selection and central tolerance induction. *Nature Rev. Immunol.* **9**, 833–844 (2009)

#### FURTHER READING

- Love, P. E. & Bhandoola, A. Signal integration and crosstalk during thymocyte migration and emigration. *Nature Rev. Immunol.* **11**, 469–477 (2011)
- Miller, J. F. The golden anniversary of the thymus. *Nature Rev. Immunol.* **11**, 489–495 (2011)
- Ciofani, M. & Zúñiga-Pflücker, J. C. Determining  $\gamma\delta$  versus  $\alpha\beta$  T cell development. *Nature Rev. Immunol.* **10**, 657–663 (2010)



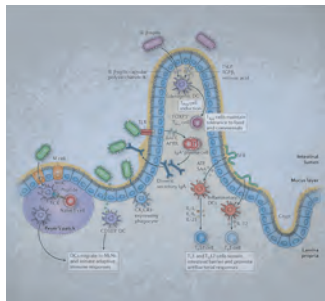
## SEPTEMBER

### THE INTESTINAL MICROBIOTA

Adapted from Cerf-Bensussan, N. & Gaboriau-Routhiau, V. The immune system and the gut microbiota: friends or foes? *Nature Rev. Immunol.* **10**, 735–744 (2010)

#### FURTHER READING

- Varol, C., Zsigmond, E. & Jung, S. Securing the immune tightrope: mononuclear phagocytes in the intestinal lamina propria. *Nature Rev. Immunol.* **10**, 415–426 (2010)
- Hooper, L. V. & Macpherson, A. J. Immune adaptations that maintain homeostasis with the intestinal microbiota. *Nature Rev. Immunol.* **10**, 159–169 (2010)
- Abreu, M. T. Toll-like receptor signalling in the intestinal epithelium: how bacterial recognition shapes intestinal function. *Nature Rev. Immunol.* **10**, 131–144 (2010)



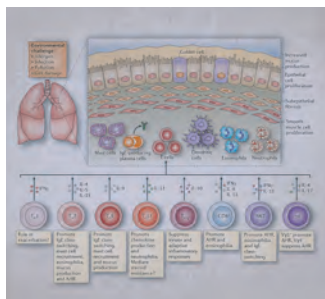
## NOVEMBER

### ASTHMA AND ALLERGY

Adapted from Lloyd, C. M. & Hessel, E. M. Functions of T cells in asthma: more than just  $T_H2$  cells. *Nature Rev. Immunol.* **10**, 838–848 (2010)

#### FURTHER READING

- von Mutius, E. & Vercelli, D. Farm living: effects on childhood asthma and allergy. *Nature Rev. Immunol.* **10**, 861–868 (2010)
- Paul, W. E. & Zhu, J. How are  $T_H2$ -type immune responses initiated and amplified? *Nature Rev. Immunol.* **10**, 225–235 (2010)
- Focus on Asthma and allergy. *Nature Rev. Immunol.* (Mar 2008)



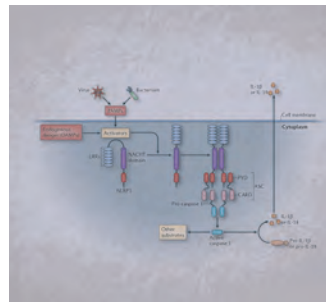
## FEBRUARY

### THE INFLAMMASOME

Adapted from Tschopp, J. & Schroder, K. NLRP3 inflammasome activation: the convergence of multiple signalling pathways on ROS production? *Nature Rev. Immunol.* **10**, 210–215 (2010)

#### FURTHER READING

- West, A. P., Shadel, G. S. & Ghosh, S. Mitochondria in innate immune responses. *Nature Rev. Immunol.* **11**, 389–402 (2011)
- Lamkanfi, M. Emerging inflammasome effector mechanisms. *Nature Rev. Immunol.* **11**, 213–220 (2011)
- Kanneganti, T. D. Central roles of NLRs and inflammasomes in viral infection. *Nature Rev. Immunol.* **10**, 688–698 (2010)
- Hornung, V. & Latz, E. Intracellular DNA recognition. *Nature Rev. Immunol.* **10**, 123–130 (2010)



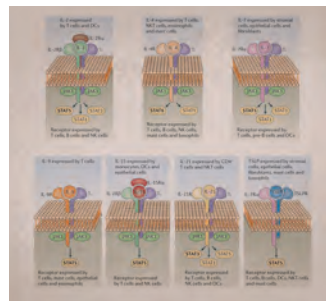
## APRIL

### CYTOKINES

Adapted from Rochman, Y., Spolski, R. & Leonard, W. J. New insights into the regulation of T cells by  $\gamma\gamma$  family cytokines. *Nature Rev. Immunol.* **9**, 480–490 (2009)

#### FURTHER READING

- Sims, J. E. & Smith, D. E. The IL-1 family: regulators of immunity. *Nature Rev. Immunol.* **10**, 89–102 (2010)
- Gaffen, S. L. Structure and signalling in the IL-17 receptor family. *Nature Rev. Immunol.* **9**, 556–567 (2009)
- Croft, M. The role of TNF superfamily members in T-cell function and diseases. *Nature Rev. Immunol.* **9**, 271–285 (2009)
- Focus on Cytokines & cytokine therapies. *Nature Rev. Immunol.* (Jun 2007)



## JUNE

### NEUROIMMUNOLOGY

Adapted from Sternberg, E. M. Neural regulation of innate immunity: a coordinated nonspecific host response to pathogens. *Nature Rev. Immunol.* **6**, 318–328 (2006)

#### FURTHER READING

- Irwin, M. R. & Cole, S. W. Reciprocal regulation of the neural and innate immune systems. *Nature Rev. Immunol.* **11**, 625–632 (2011)
- Focus on Neuroimmunology. *Nature Rev. Immunol.* (Jun 2009)



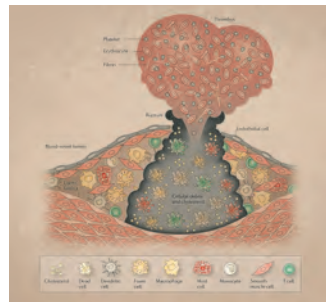
## AUGUST

### PLAQUE RUPTURE IN ATHEROSCLEROSIS

Adapted from Hansson, G. K. & Libby, P. The immune response in atherosclerosis: a double-edged sword. *Nature Rev. Immunol.* **6**, 508–519 (2006)

#### FURTHER READING

- Focus on Metabolism and immunology. *Nature Rev. Immunol.* (Feb 2011)
- Tabas, I. Macrophage death and defective inflammation resolution in atherosclerosis. *Nature Rev. Immunol.* **10**, 36–46 (2010)
- Weber, C., Zernecke, A. & Libby, P. The multifaceted contributions of leukocyte subsets to atherosclerosis: lessons from mouse models. *Nature Rev. Immunol.* **8**, 802–815 (2008)



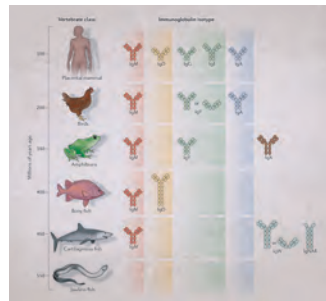
## OCTOBER

### EVOLUTION OF THE IMMUNE SYSTEM

Adapted from Flajnik, M. F. Comparative analyses of immunoglobulin genes: surprises and portents. *Nature Rev. Immunol.* **2**, 688–698 (2002)

#### FURTHER READING

- Boehm, T. Design principles of adaptive immune systems. *Nature Rev. Immunol.* **11**, 307–317 (2011)
- Litman, G. W., Rast, J. P. & Fugmann, S. D. The origins of vertebrate adaptive immunity. *Nature Rev. Immunol.* **10**, 543–553 (2010)
- Irazoqui, J. E., Urbach, J. M. & Ausubel, F. M. Evolution of host innate defence: insights from *Caenorhabditis elegans* and primitive invertebrates. *Nature Rev. Immunol.* **10**, 47–58 (2010)



## DECEMBER

### MONOCYTE AND MACROPHAGE PLASTICITY

Adapted from Gordon, S. & Taylor, P. R. Monocyte and macrophage heterogeneity. *Nature Rev. Immunol.* **5**, 953–964 (2005)

#### FURTHER READING

- Focus on Monocytes and macrophages. *Nature Rev. Immunol.* (Nov 2011)
- Soehnlein, O. & Lindbom, L. Phagocyte partnership during the onset and resolution of inflammation. *Nature Rev. Immunol.* **10**, 427–439 (2010)
- Geissmann, F. et al. Unravelling mononuclear phagocyte heterogeneity. *Nature Rev. Immunol.* **10**, 453–460 (2010)



	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
<b>JANUARY</b>	2	3	4	5	6	7	1 8 <b>Keystone:</b>
	9 <b>Chemokines &amp; leukocyte trafficking, Colorado, USA</b>			12	13	14	15
	16	17	18 <b>Nature: Immunity &amp; inflammation, La Jolla, California, USA</b>			21 <b>Keystone: Rheumatoid arthritis,</b>	
	23 <b>Santa Fe, USA</b>	24	25	26	27	28 <b>Midwinter Conference: Asilomar,</b>	
	30 <b>California, USA</b>	31					
<b>FEBRUARY</b>			1	2	3 <b>T cell differentiation &amp; plasticity, California, USA</b>		
	6 <b>Keystone: Cytokines/ T<sub>H</sub>17 cells, Colorado, USA</b>			9	10	11	12
	13	14	15 <b>Lorne infection &amp; immunity, Victoria, Australia</b>			18	19 <b>Models for</b>
	20 <b>analysis of lymphocyte repertoire generation, Jerusalem, Israel</b>				24	25	26
	27	28	29				
<b>MARCH</b>				1	2	3	4 <b>Keystone:</b>
	5 <b>Sensing microbes &amp; damage/The microbiome, Colorado, USA</b>				9	10	11 <b>Keystone:</b>
	12 <b>Regulation of lymphocyte signalling, Colorado, USA</b>			15	16	17	18 <b>WIRM VI,</b>
	19 <b>Davos, Switzerland</b>		21 <b>Keystone: HIV vaccines/ Viral immunity, Colorado, USA</b>				25
	26 <b>Gordon: Antibody biology &amp; engineering, Galveston, Texas, USA</b>				30	31	
<b>APRIL</b>							1 <b>Nature:</b>
	2 <b>Resolving inflammation, Oxford, UK</b>	4		5	6	7	8
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	23	24	25	26 <b>Immune tolerance &amp; autoimmune disease, Cambridge, UK</b>			29
31							
<b>MAY</b>		1	2	3	4 <b>Immunology 2012: AAI annual meeting, Boston, USA</b>		
	7	8	9 <b>8<sup>th</sup> International congress on autoimmunity, Granada, Spain</b>			12	13
	14	15	16	17	18	19 <b>Immunity to infection, Heidelberg</b>	
	21	22	23 <b>Keystone: Inflammation &amp; carcinogenesis, Dublin, Ireland</b>			26	27 <b>Gordon:</b>
	28 <b>Chemotactic cytokines, Lucca, Italy</b>		30	31			
<b>JUNE</b>							
						1 <b>Reproductive Immunology, Hamburg, Germany</b>	
	4	5	6	7	8	9	10 <b>Gordon:</b>
	11 <b>Host-parasite interactions, Rhode Island, USA</b>			14	15	16 <b>European Academy of Allergy &amp;</b>	
	18 <b>Clinical Immunology, Geneva, Switzerland</b>			21 <b>FOCIS 2012, Vancouver, Canada</b>		23	24
25 <b>Aegean: 9<sup>th</sup> Innate immunity conference, Rhodes, Greece</b>			28	29	30		
<b>JULY</b>							1 <b>Frontiers in</b>
	2 <b>immunology research network, Salzburg, Austria</b>			5	6	7	8 <b>FASEB:</b>
	9 <b>Immunoreceptors, Colorado, USA</b>		11	12	13	14	15
	16 <b>14<sup>th</sup> International congress of the Transplantation Society, Berlin, Germany</b>				20	21	22
	23	24	25	26	27	28	29
30	31						
<b>AUGUST</b>			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		
<b>SEPTEMBER</b>						1	2
	3	4	5 <b>3<sup>rd</sup> European Congress of Immunology, Glasgow, UK</b>			8	9
	10	11 <b>ICS/ISICR joint meeting, Geneva, Switzerland</b>			14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
<b>OCTOBER</b>	1	2	3	4	5	6	7 <b>DC2012:</b>
	8 <b>Daegu, Korea</b>	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28 <b>Society for</b>
	29 <b>Leukocyte Biology, Hawaii, USA</b>		31				
<b>NOVEMBER</b>				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30		
<b>DECEMBER</b>						1	2
	3	4	5	6 <b>World Allergy Organization, Hyderabad, India</b>			9
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	24	25	26	27	28	29	30
31							





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