

# Clinical Response to COVID-19: Lifestyle Strategies to Mitigate Risk

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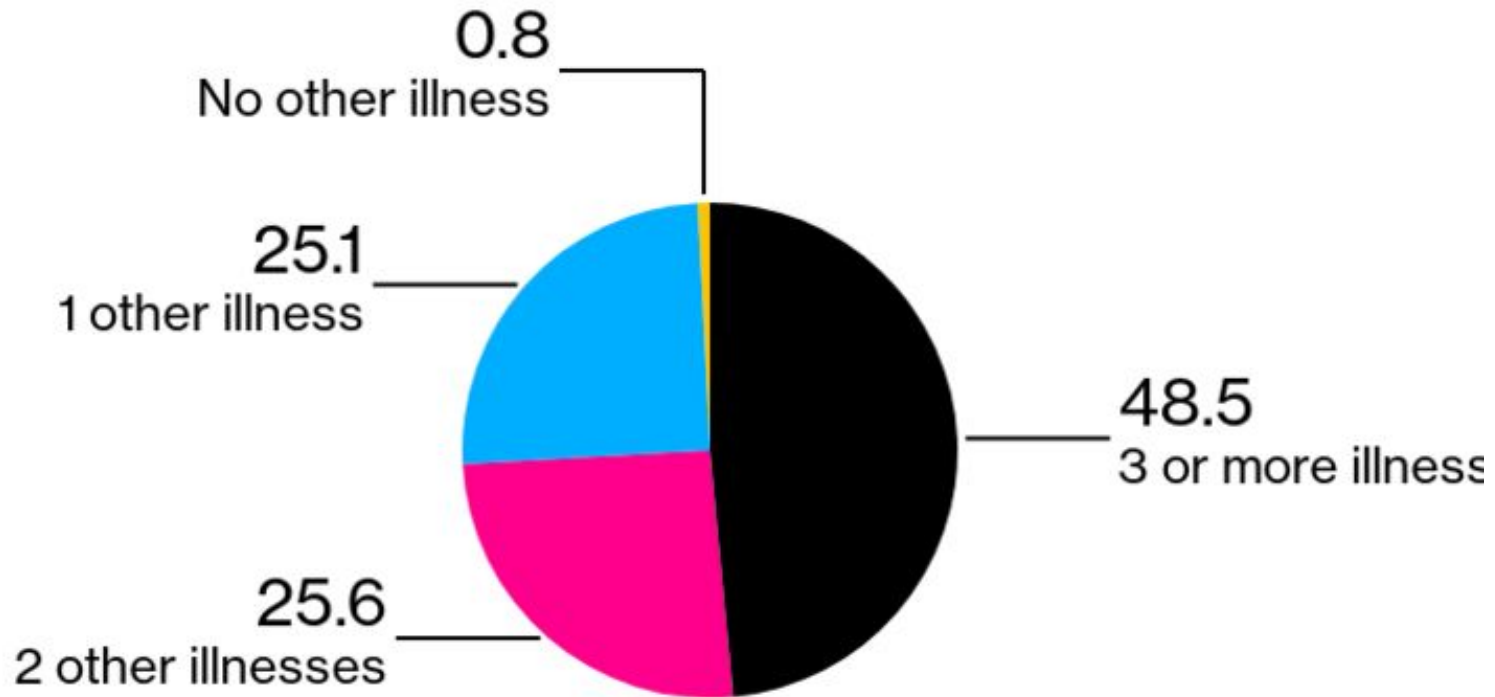
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# Italy Coronavirus Deaths

By prior illnesses (%)



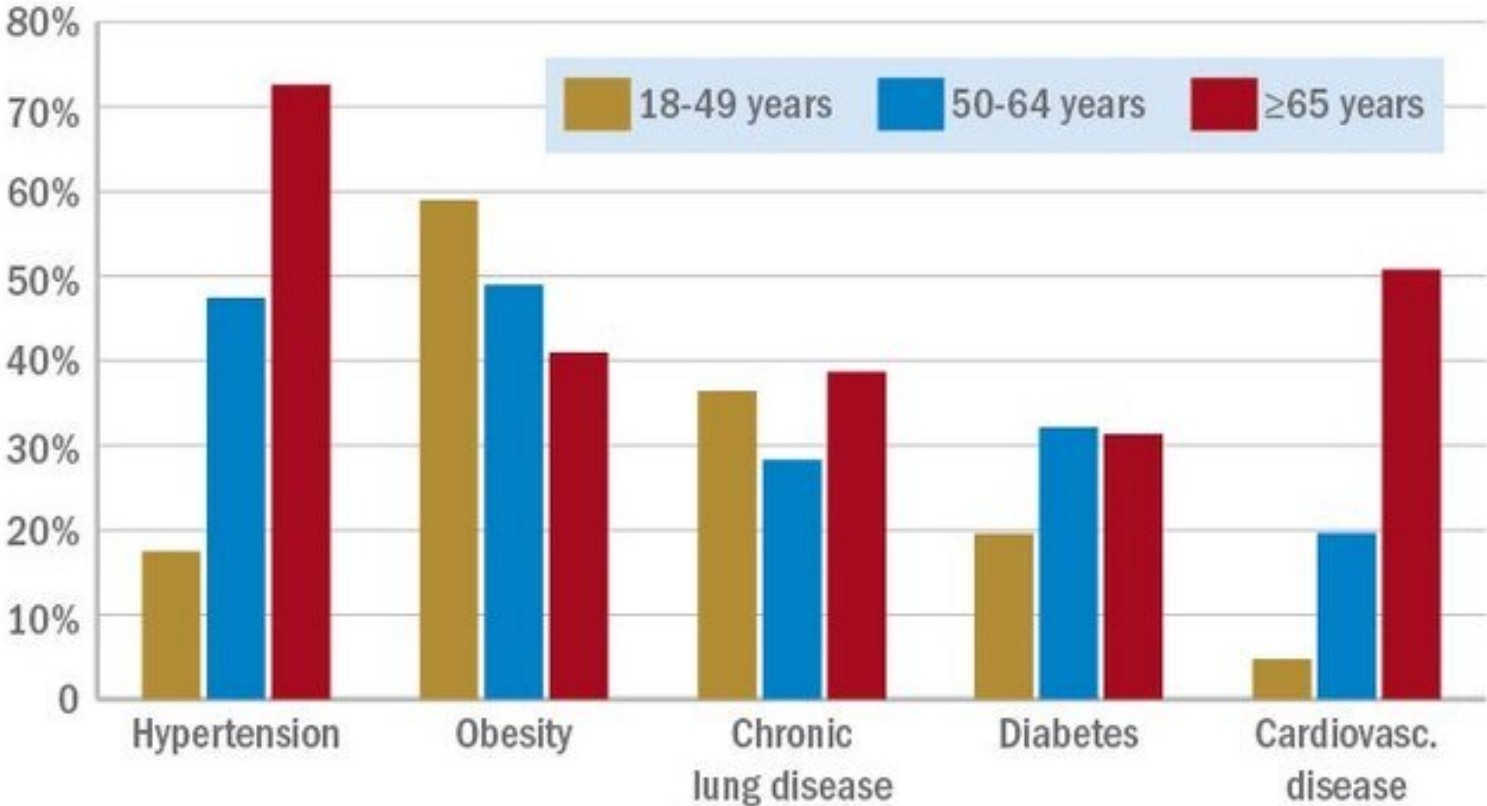
Source: ISS Italy National Health Institute, March 17 sample

**Bloomberg**



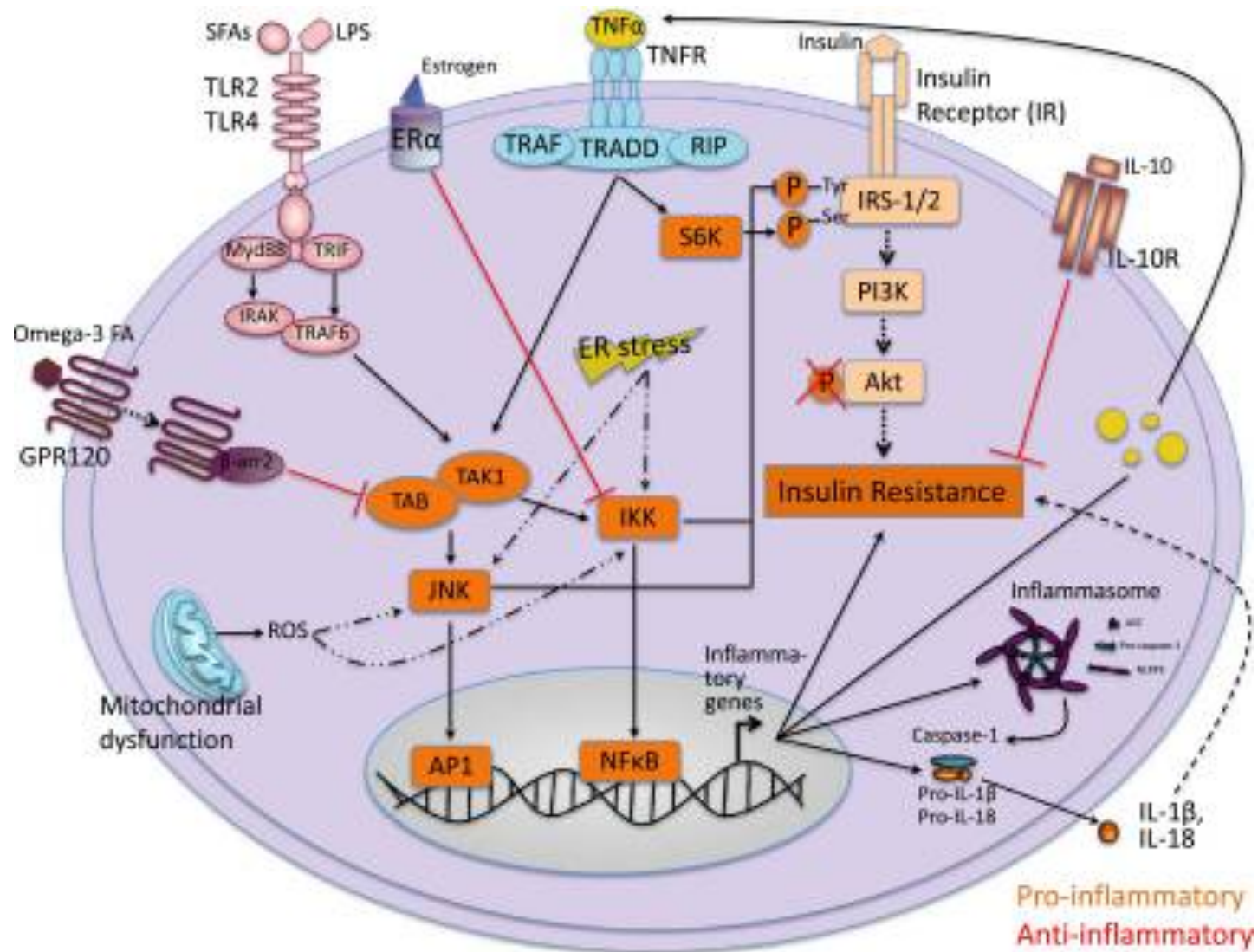
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# Underlying conditions among adults hospitalized with COVID-19

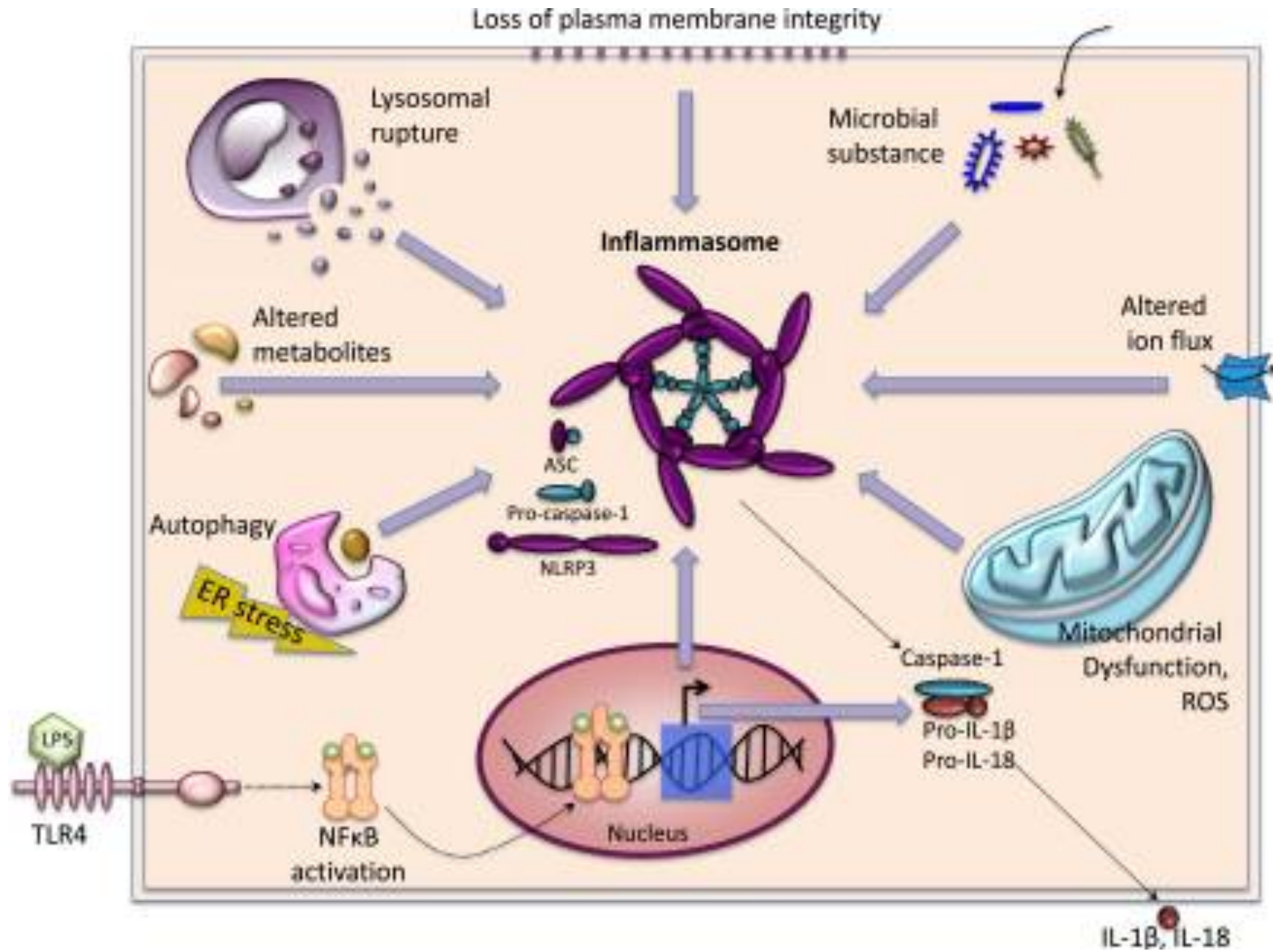


Note: Based on data from the COVID-19–Associated Hospitalization Surveillance Network for patients hospitalized in 99 counties in 14 states from March 1-30, 2020.

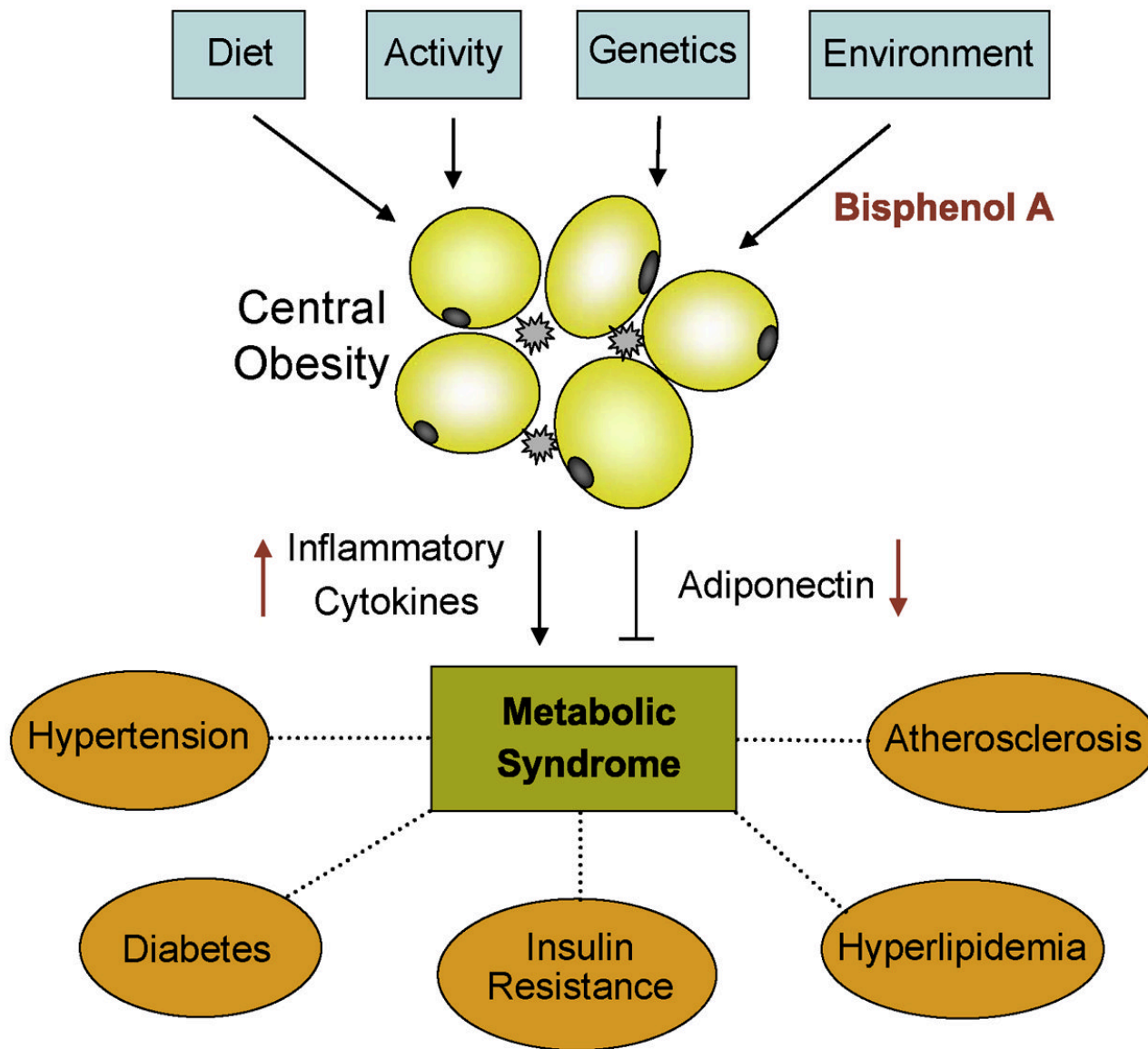
Source: MMWR. 2020 Apr 8;69(early release):1-7



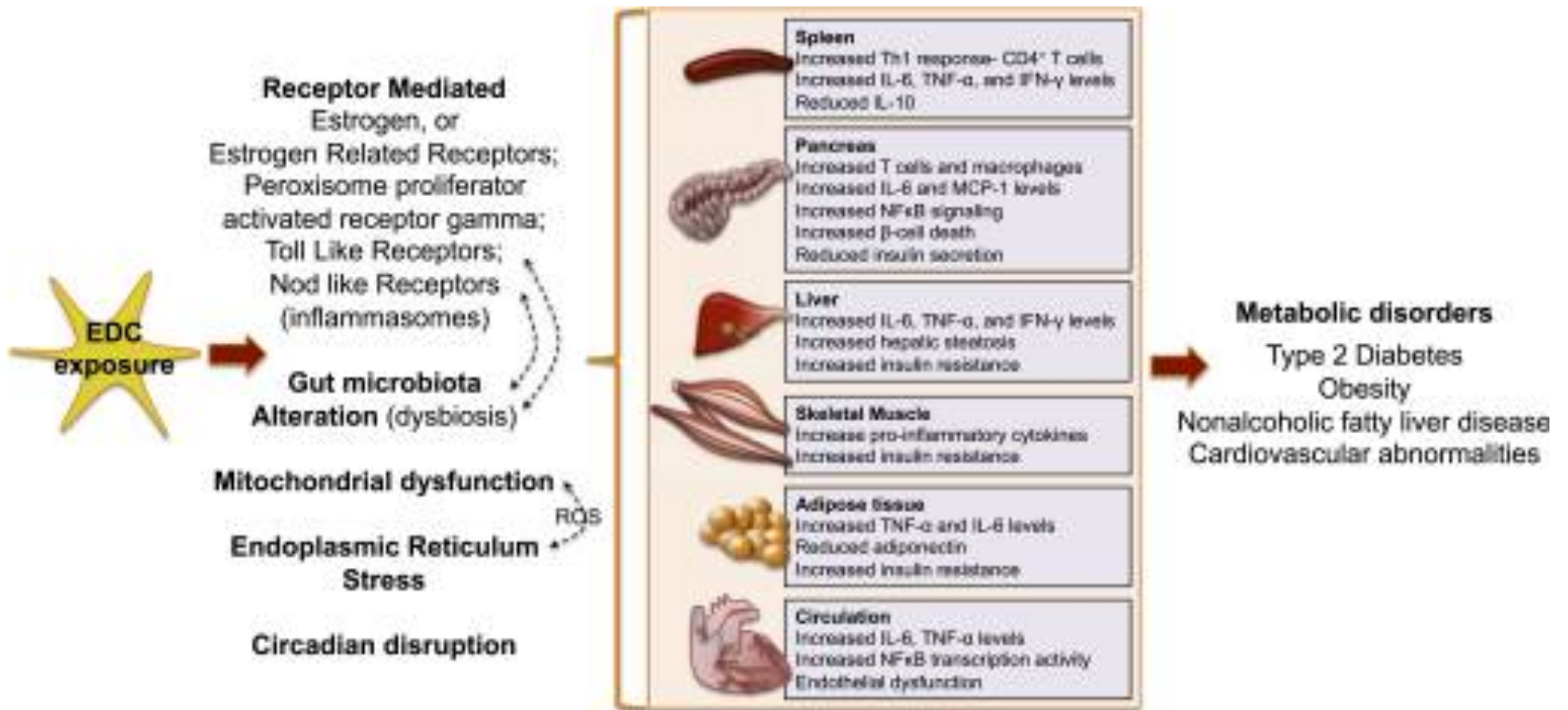
Bansal A, Henao-Mejia J, Simmons RA. Immune System: An Emerging Player in Mediating Effects of Endocrine Disruptors on Metabolic Health. *Endocrinology*. 2018;159(1):32-45.



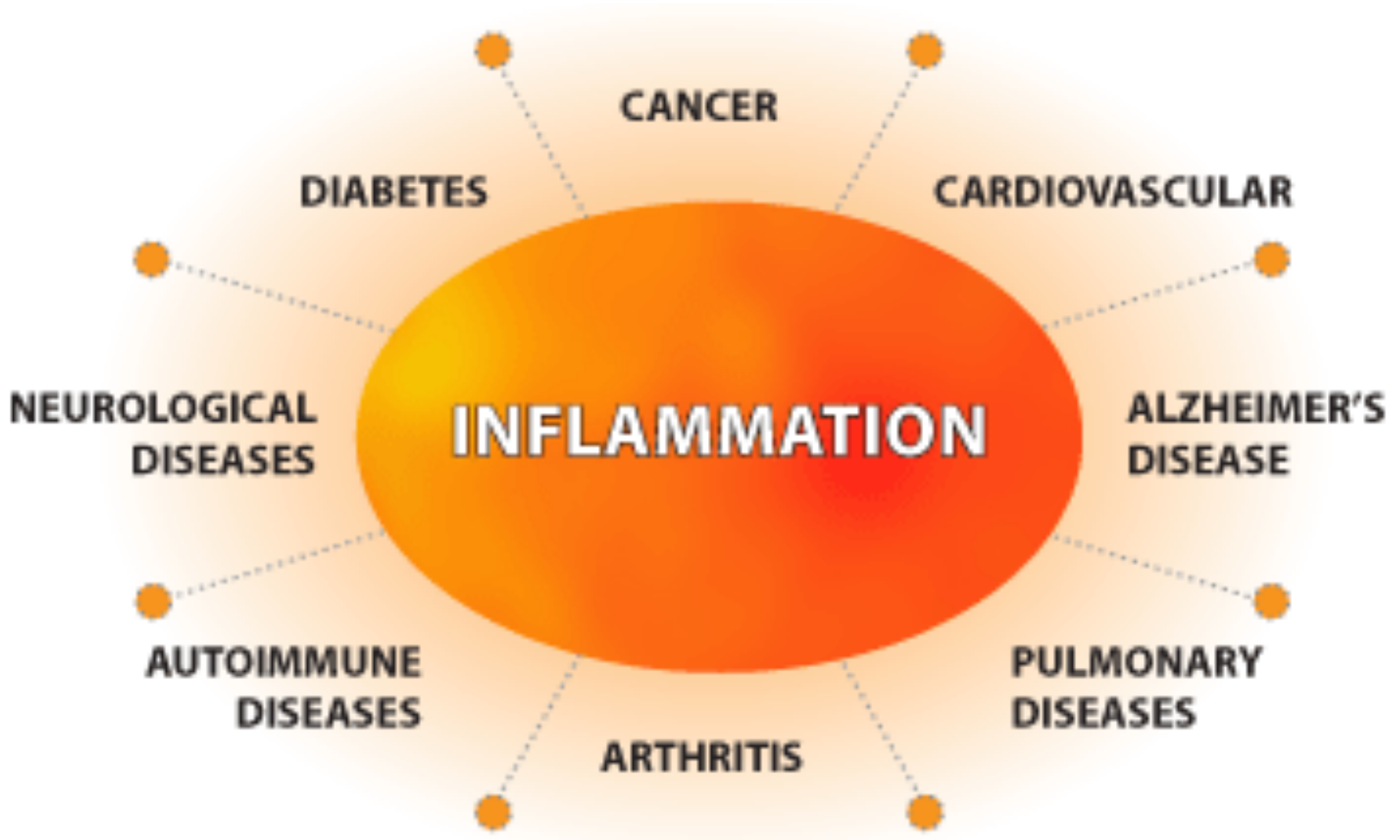
Bansal A, Henao-Mejia J, Simmons RA. Immune System: An Emerging Player in Mediating Effects of Endocrine Disruptors on Metabolic Health. *Endocrinology*. 2018;159(1):32-45.



Ben-Jonathan N, Hugo ER, Brandebourg TD. Effects of bisphenol A on adipokine release from human adipose tissue: Implications for the metabolic syndrome. *Molecular and cellular endocrinology*. 2009;304(1-2):49-54.

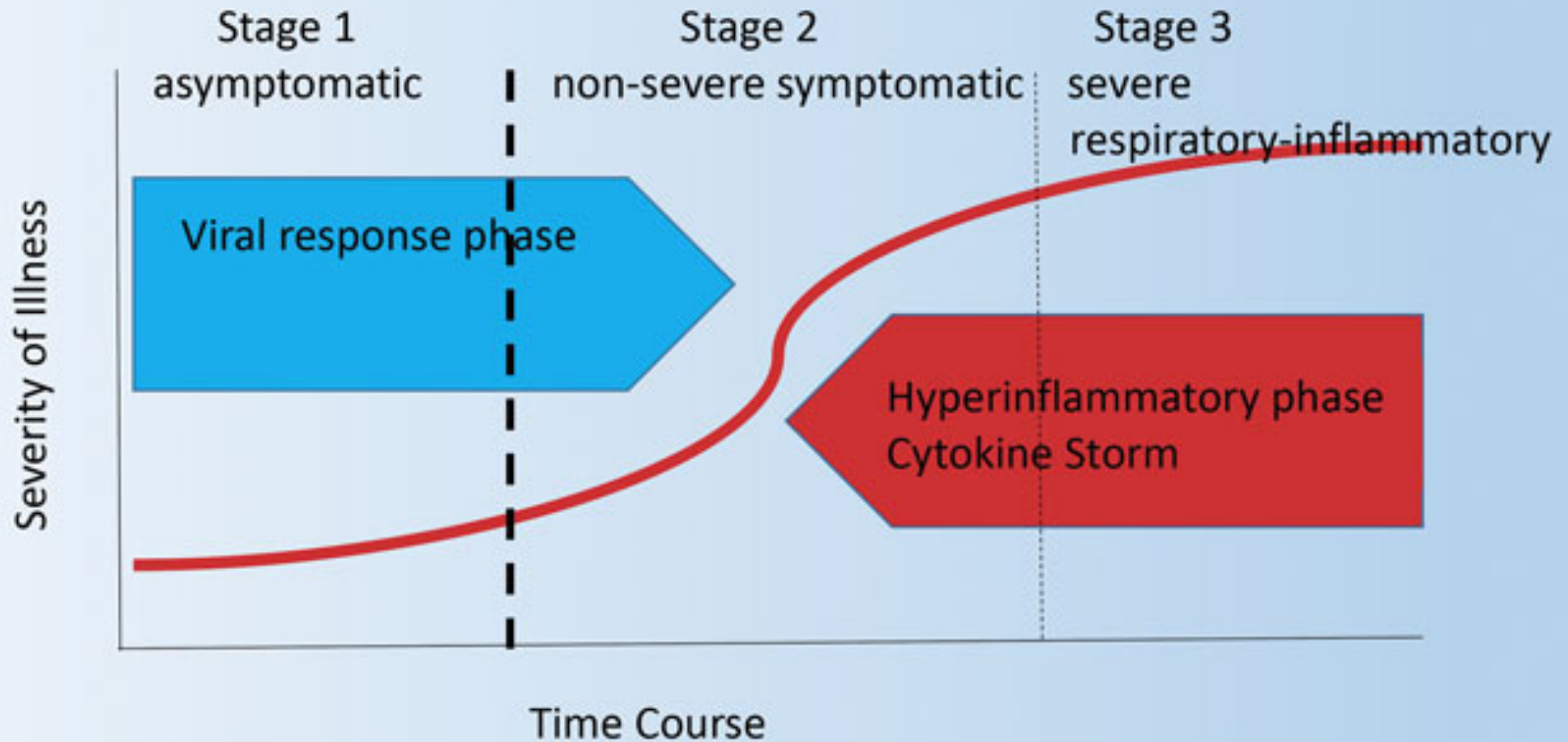


Bansal A, Henao-Mejia J, Simmons RA. Immune System: An Emerging Player in Mediating Effects of Endocrine Disruptors on Metabolic Health. *Endocrinology*. 2018;159(1):32-45.





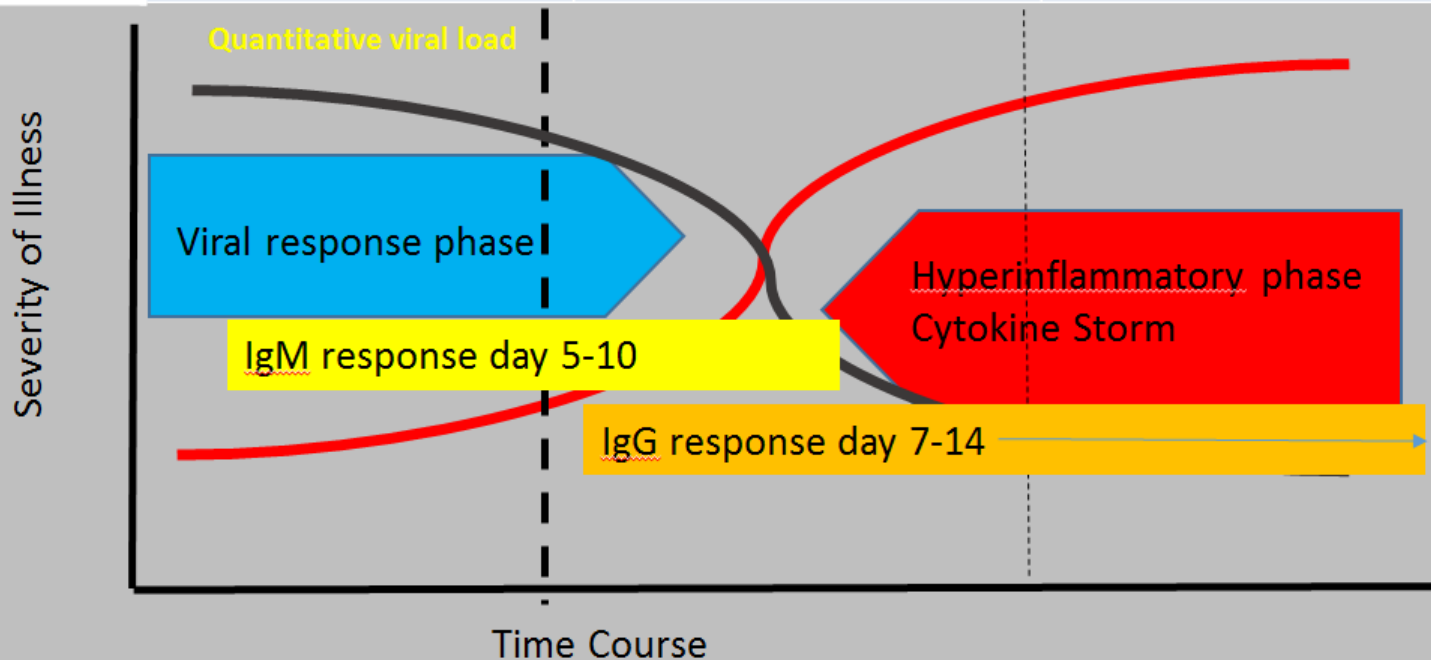
# Course of COVID-19 Infection



# Course of COVID-19 Infection – A paradigm for therapy

Stage 1                      Stage 2                      Stage 3  
 asymptomatic                      non-severe symptomatic                      severe respiratory-inflammatory

IMMUNE RESPONSE OVER TIME	INNATE IMMUNE ACTIVATION	ADAPTIVE IMMUNE ACTIVATION	CYTOKINE RELEASE SYNDROME
Self limiting in 80% Severe in 15-20% Fatal 1-2%	Viral engagement of PAMPs Low Type 1 IFN	Generation of specific Abs and T cell response Release of DAMPS	IL-6, IL-1, TNF, GM-CSF, IFN, IFN Coagulopathy Complement

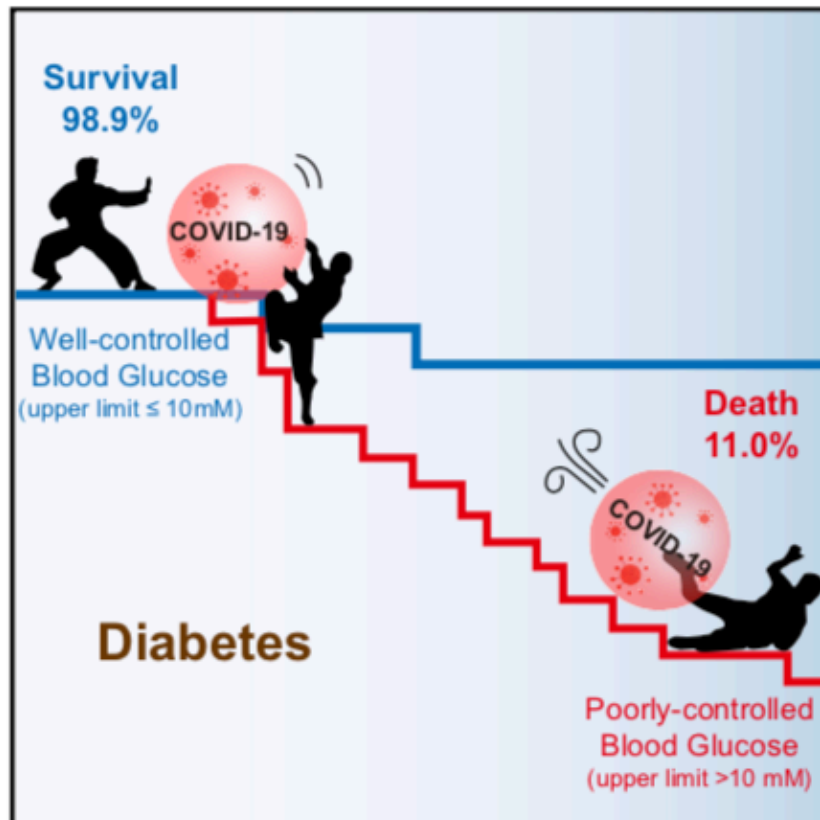


# Cell Metabolism

Clinical and Translational Report

## Association of Blood Glucose Control and Outcomes in Patients with COVID-19 and Pre-existing Type 2 Diabetes

### Graphical Abstract



### Authors

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Jiao Guo, Bing-Hong Zhang,  
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### In Brief

Type 2 diabetes (T2D) correlates with a worse outcome for COVID-19. Here, Zhu et al. show that among  $\sim 7,300$  cases of COVID-19, T2D is associated with a higher death rate, but diabetics with better controlled blood glucose die at a lower rate than diabetics with poorly controlled blood glucose.



Developmental Cell

Available online 16 May 2020

In Press, Journal Pre-proof 

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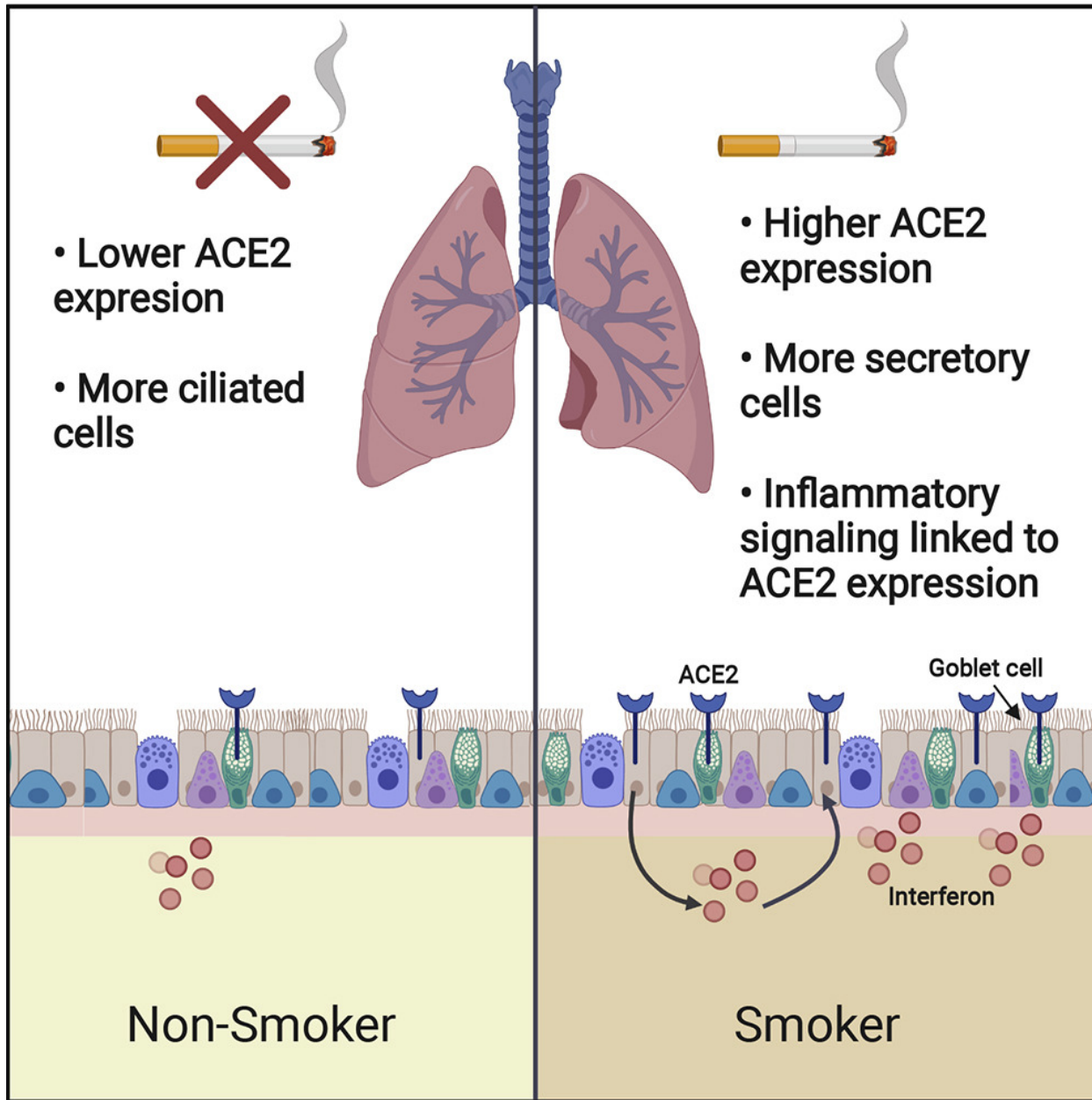
Article

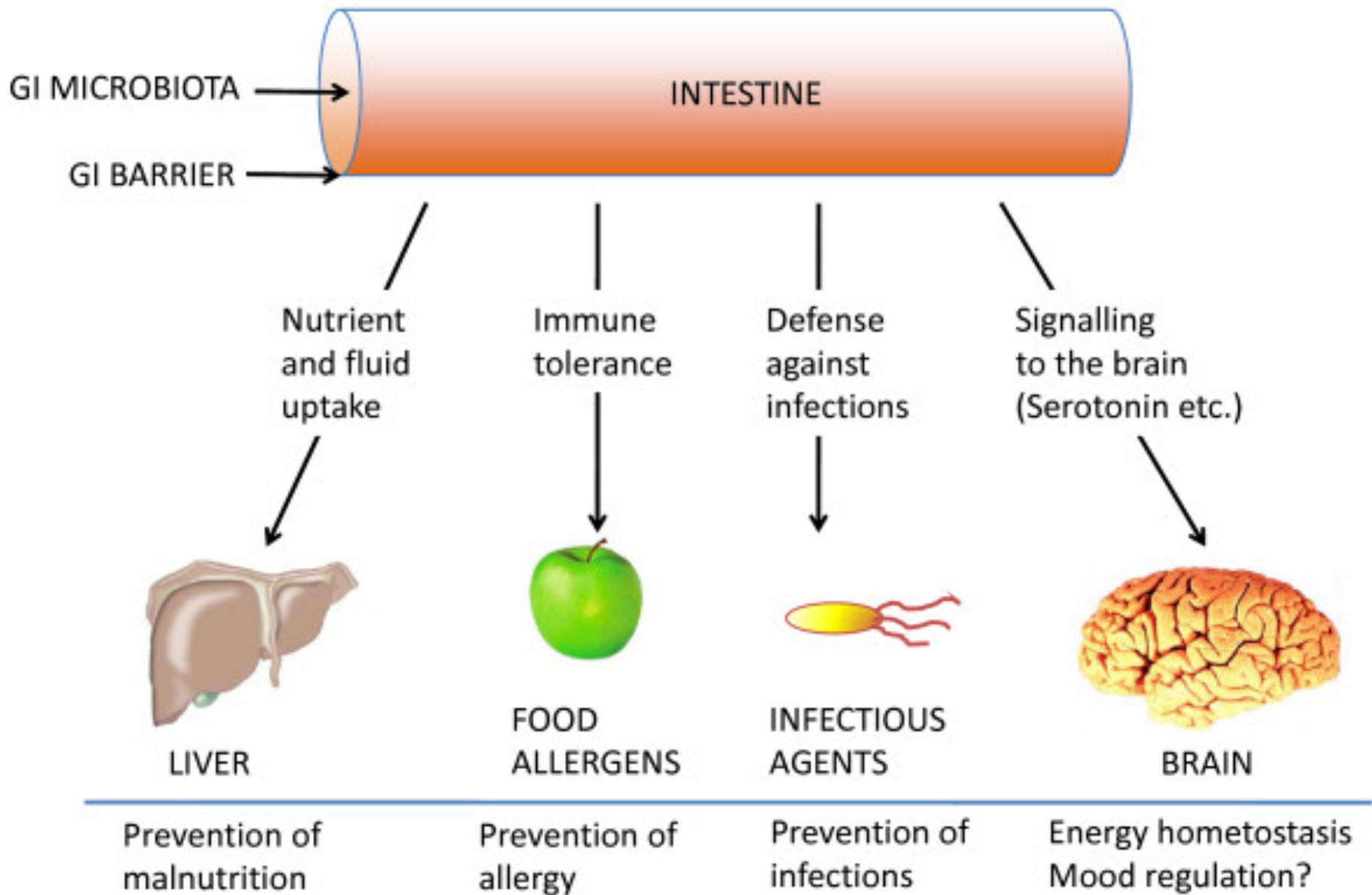
# Cigarette smoke exposure and inflammatory signaling increase the expression of the SARS-CoV-2 receptor ACE2 in the respiratory tract

Joan C. Smith <sup>1, 2</sup>, Erin L. Sausville <sup>2</sup>, Vishruth Girish <sup>2, 3</sup>, Monet Lou Yuan <sup>2, 4</sup>, Anand Vasudevan <sup>2</sup>, Kristen M. John <sup>2, 5</sup>, Jason M. Sheltzer <sup>2</sup>  



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# Extensive impact of non-antibiotic drugs on human gut bacteria

Lisa Maier<sup>1\*</sup>, Mihaela Pruteanu<sup>1†\*</sup>, Michael Kuhn<sup>2\*</sup>, Georg Zeller<sup>2</sup>, Anja Telzerow<sup>1</sup>, Exene Erin Anderson<sup>1</sup>, Ana Rita Brochado<sup>1</sup>, Keith Conrad Fernandez<sup>1</sup>, Hitomi Dose<sup>3</sup>, Hirotada Mori<sup>3</sup>, Kiran Raosaheb Patil<sup>2</sup>, Peer Bork<sup>2,4,5,6</sup> & Athanasios Typas<sup>1,2</sup>

A few commonly used non-antibiotic drugs have recently been associated with changes in gut microbiome composition, but the extent of this phenomenon is unknown. Here, we screened more than 1,000 marketed drugs against 40 representative gut bacterial strains, and found that 24% of the drugs with human targets, including members of all therapeutic classes, inhibited the growth of at least one strain *in vitro*. Particular classes, such as the chemically diverse antipsychotics, were overrepresented in this group. The effects of human-targeted drugs on gut bacteria are reflected on their antibiotic-like side effects in humans and are concordant with existing human cohort studies. Susceptibility to antibiotics and human-targeted drugs correlates across bacterial species, suggesting common resistance mechanisms, which we verified for some drugs. The potential risk of non-antibiotics promoting antibiotic resistance warrants further exploration. Our results provide a resource for future research on drug-microbiome interactions, opening new paths for side effect control and drug repurposing, and broadening our view of antibiotic resistance.

Pharmaceutical agents have both beneficial and undesirable effects. Studies on the mechanisms of action and off-target spectra of various drugs aim to improve their efficacy and reduce their side effects. Although many drugs have gastrointestinal side effects and the gut microbiome itself is pivotal for human health<sup>1</sup>, the role of the gut microbiota in these processes is rarely considered. Recently, consumption of drugs designed to target human cells and not microbes, such as anti-

All compounds were screened at 20 μM, which is within the range of what is commonly used in high-throughput drug screens<sup>9</sup>.

For our screen to be representative of the gut microbiome of healthy individuals, we selected a set of ubiquitous gut bacterial species (Supplementary Table 2). Prevalence and abundance in the human gut, and phylogenetic diversity, were our main selection criteria (Extended Data Fig. 1b), although we were occasionally constrained by strain un-

total, we included 40 genera (*Escherichia*




24% of these human targeted pharmaceuticals inhibited growth of at least one important gut bacterial species...Study also implies an increasing risk of acquiring antibiotic resistance by being exposed to *non-antibiotic* drugs





Review

# Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19 Infections and Deaths

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Received: 12 March 2020; Accepted: 31 March 2020; Published: 2 April 2020



**Abstract:** The world is in the grip of the COVID-19 pandemic. Public health measures that can reduce the risk of infection and death in addition to quarantines are desperately needed. This article





**Lifestyle** plays a **critical** role in the cellular and clinical response to COVID-19

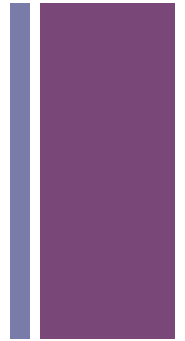


# Lifestyle Changes to Reduce Inflammation

- Diet
- Exercise
- Sleep hygiene
- Stress management
- Smoking/vaping cessation
- Limit medication/USE appropriate medication
- Limit harmful chemical exposures
- Appropriate use of supplements



# + Key Supplements



- Vitamin D3
- Zinc
- Curcumin
- Vitamin C
- Quercetin
- B3 (niacin)
- Probiotic
- Vitamin A
- N-acetylcysteine (NAC)
- Melatonin
- Green tea (epigallocatechin gallate (EGCG))





Gasmi, A., Noor, S., Tippairote, T., Dadar, M., Menzel, A., & Bjørklund, G. (2020). Individual risk management strategy and potential therapeutic options for the COVID-19 pandemic. *Clinical immunology (Orlando, Fla.)*, 215, 108409.

## **Individual risk management strategy and potential therapeutic options for the COVID-19 pandemic**

Amin Gasmi<sup>1</sup>, Sadaf Noor<sup>2</sup>, Torsak Tippairote<sup>3,4</sup>, Maryam Dadar<sup>5</sup>, Alain Menzel<sup>1</sup>, Geir Bjørklund<sup>6\*</sup>

Among the virus-contracted hosts, their different metabolic status, as determined by their diet, nutrition, age, sex, medical conditions, lifestyle, and environmental factors, govern the personal fate toward different clinical severity of COVID-19, from asymptomatic, mild, moderate, to death.

