

World Journal of *Clinical Cases*

World J Clin Cases 2021 July 16; 9(20): 5352-5753



EDITORIAL

- 5352 COVID-19: Considerations about immune suppression and biologicals at the time of SARS-CoV-2 pandemic
Costanzo G, Cordeddu W, Chessa L, Del Giacco S, Firinu D

REVIEW

- 5358 Obesity in people with diabetes in COVID-19 times: Important considerations and precautions to be taken
Alberti A, Schuelter-Trevisol F, Iser Betine PM, Traebert E, Freiberger V, Ventura L, Rezin GT, da Silva BB, Meneghetti Dallacosta F, Grigollo L, Dias P, Fin G, De Jesus JA, Pertille F, Rossoni C, Hur Soares B, Nodari Junior RJ, Comim CM
- 5372 Revisiting delayed appendectomy in patients with acute appendicitis
Li J

MINIREVIEWS

- 5391 Detection of short stature homeobox 2 and RAS-associated domain family 1 subtype A DNA methylation in interventional pulmonology
Wu J, Li P
- 5398 Borderline resectable pancreatic cancer and vascular resections in the era of neoadjuvant therapy
Mikulic D, Mrzljak A
- 5408 Esophageal manifestation in patients with scleroderma
Voulgaris TA, Karamanolis GP
- 5420 Exploration of transmission chain and prevention of the recurrence of coronavirus disease 2019 in Heilongjiang Province due to in-hospital transmission
Chen Q, Gao Y, Wang CS, Kang K, Yu H, Zhao MY, Yu KJ
- 5427 Role of gastrointestinal system on transmission and pathogenesis of SARS-CoV-2
Simsek C, Erul E, Balaban HY

ORIGINAL ARTICLE**Case Control Study**

- 5435 Effects of nursing care in fast-track surgery on postoperative pain, psychological state, and patient satisfaction with nursing for glioma
Deng YH, Yang YM, Ruan J, Mu L, Wang SQ

Retrospective Study

- 5442 Risk factors related to postoperative recurrence of dermatofibrosarcoma protuberans: A retrospective study and literature review
Xiong JX, Cai T, Hu L, Chen XL, Huang K, Chen AJ, Wang P

- 5453** Prediction of presence and severity of coronary artery disease using prediction for atherosclerotic cardiovascular disease risk in China scoring system

Hong XL, Chen H, Li Y, Teeroovengadum HD, Fu GS, Zhang WB

- 5462** Effects of angiotensin receptor blockers and angiotensin-converting enzyme inhibitors on COVID-19

Li XL, Li T, Du QC, Yang L, He KL

- 5470** Prognostic factors and its predictive value in patients with metastatic spinal cancer

Gao QP, Yang DZ, Yuan ZB, Guo YX

Clinical Trials Study

- 5479** Prospective, randomized comparison of two supplemental oxygen methods during gastro-scopy with propofol mono-sedation in obese patients

Shao LJZ, Hong FX, Liu FK, Wan L, Xue FS

SYSTEMATIC REVIEWS

- 5490** Herb-induced liver injury: Systematic review and meta-analysis

Ballotin VR, Bigarella LG, Brandão ABM, Balbinot RA, Balbinot SS, Soldera J

META-ANALYSIS

- 5514** Type 2 diabetes mellitus increases liver transplant-free mortality in patients with cirrhosis: A systematic review and meta-analysis

Liu ZJ, Yan YJ, Weng HL, Ding HG

CASE REPORT

- 5526** Duplication of 19q (13.2-13.31) associated with comitant esotropia: A case report

Feng YL, Li ND

- 5535** Multiple left ventricular myxomas combined with severe rheumatic valvular lesions: A case report

Liu SZ, Hong Y, Huang KL, Li XP

- 5540** Complete pathological response in locally advanced non-small-cell lung cancer patient: A case report

Parisi E, Arpa D, Ghigi G, Micheletti S, Neri E, Tontini L, Pieri M, Romeo A

- 5547** Successful reversal of ostomy 13 years after Hartmann procedure in a patient with colon cancer: A case report

Huang W, Chen ZZ, Wei ZQ

- 5556** Delayed papillary muscle rupture after radiofrequency catheter ablation: A case report

Sun ZW, Wu BF, Ying X, Zhang BQ, Yao L, Zheng LR

- 5562** Temporary coronary sinus pacing to improve ventricular dyssynchrony with cardiogenic shock: A case report

Ju TR, Tseng H, Lin HT, Wang AL, Lee CC, Lai YC

- 5568** Hemoglobin Fukuoka caused unexpected hemoglobin A_{1c} results: A case report
Lin XP, Yuan QR, Niu SQ, Jiang X, Wu ZK, Luo ZF
- 5575** Giant androgen-producing adrenocortical carcinoma with atrial flutter: A case report and review of the literature
Costache MF, Arhirii RE, Mogos SJ, Lupascu-Ursulescu C, Litcanu CI, Ciumanghel AI, Cucu C, Ghiciuc CM, Petris AO, Danila N
- 5588** Can kissing cause paraquat poisoning: A case report and review of literature
Lv B, Han DF, Chen J, Zhao HB, Liu XL
- 5594** Spinal dural arteriovenous fistula 8 years after lumbar discectomy surgery: A case report and review of literature
Ouyang Y, Qu Y, Dong RP, Kang MY, Yu T, Cheng XL, Zhao JW
- 5605** Perianal superficial CD34-positive fibroblastic tumor: A case report
Long CY, Wang TL
- 5611** Low-dose clozapine-related seizure: A case report and literature review
Le DS, Su H, Liao ZL, Yu EY
- 5621** Rapid diagnosis of disseminated *Mycobacterium mucogenicum* infection in formalin-fixed, paraffin-embedded specimen using next-generation sequencing: A case report
Liu J, Lei ZY, Pang YH, Huang YX, Xu LJ, Zhu JY, Zheng JX, Yang XH, Lin BL, Gao ZL, Zhuo C
- 5631** Cytomegalovirus colitis induced segmental colonic hypoganglionosis in an immunocompetent patient: A case report
Kim BS, Park SY, Kim DH, Kim NI, Yoon JH, Ju JK, Park CH, Kim HS, Choi SK
- 5637** Primary extra-pancreatic pancreatic-type acinar cell carcinoma in the right perinephric space: A case report and review of literature
Wei YY, Li Y, Shi YJ, Li XT, Sun YS
- 5647** Muscular atrophy and weakness in the lower extremities in Behçet's disease: A case report and review of literature
Kim KW, Cho JH
- 5655** Novel technique of extracorporeal intrauterine morcellation after total laparoscopic hysterectomy: Three emblematic case reports
Macciò A, Sanna E, Lavra F, Calò P, Madeddu C
- 5661** Rare isolated extra-hepatic bile duct injury: A case report
Zhao J, Dang YL, Lin JM, Hu CH, Yu ZY
- 5668** Gelfoam embolization for distal, medium vessel injury during mechanical thrombectomy in acute stroke: A case report
Kang JY, Yi KS, Cha SH, Choi CH, Kim Y, Lee J, Cho BS

- 5675** Oncocytic adrenocortical tumor with uncertain malignant potential in pediatric population: A case report and review of literature
Chen XC, Tang YM, Mao Y, Qin DR
- 5683** Submucosal hematoma with a wide range of lesions, severe condition and atypical clinical symptoms: A case report
Liu L, Shen XJ, Xue LJ, Yao SK, Zhu JY
- 5689** Chorioamnionitis caused by *Serratia marcescens* in a healthcare worker: A case report
Park SY, Kim MJ, Park S, Kim NI, Oh HH, Kim J
- 5695** Endoscopic management of biliary ascariasis: A case report
Wang X, Lv YL, Cui SN, Zhu CH, Li Y, Pan YZ
- 5701** Role of ranulas in early diagnosis of Sjögren's syndrome: A case report
Chen N, Zeng DS, Su YT
- 5709** Sacral chondroblastoma — a rare location, a rare pathology: A case report and review of literature
Zheng BW, Niu HQ, Wang XB, Li J
- 5717** Primary liver actinomycosis in a pediatric patient: A case report and literature review
Liang ZJ, Liang JK, Chen YP, Chen Z, Wang Y
- 5724** Splenosis masquerading as gastric stromal tumor: A case report
Zheng HD, Xu JH, Sun YF
- 5730** Hemorrhagic transformation of ischemic cerebral proliferative angiopathy: A case report
Xia Y, Yu XF, Ma ZJ, Sun ZW
- 5737** Multidisciplinary team therapy for left giant adrenocortical carcinoma: A case report
Zhou Z, Luo HM, Tang J, Xu WJ, Wang BH, Peng XH, Tan H, Liu L, Long XY, Hong YD, Wu XB, Wang JP, Wang BQ, Xie HH, Fang Y, Luo Y, Li R, Wang Y
- 5744** Histopathology and immunophenotyping of late onset cutaneous manifestations of COVID-19 in elderly patients: Three case reports
Mazzitelli M, Dastoli S, Mignogna C, Bennardo L, Lio E, Pelle MC, Treccarichi EM, Pereira BI, Nisticò SP, Torti C

CORRECTION

- 5752** Corrigendum to "Probiotic mixture VSL#3: An overview of basic and clinical studies in chronic diseases"
Sang LX

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Fan-Zheng Meng, MD, PhD, Director, Professor, Department of Pediatrics, The First hospital of Jilin University, Changchun 130021, Jilin Province, China. mengfanzheng1972@163.com

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases (WJCC, World J Clin Cases)* is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The *WJCC* is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for *WJCC* as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The *WJCC*'s CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Jia-Hui Li; Production Department Director: Yu-Jie Ma; Editorial Office Director: Jin-Lai Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

July 16, 2021

COPYRIGHT

© 2021 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>

COVID-19: Considerations about immune suppression and biologicals at the time of SARS-CoV-2 pandemic

Giulia Costanzo, William Cordeddu, Luchino Chessa, Stefano Del Giacco, Davide Firinu

ORCID number: Giulia Costanzo 0000-0003-2269-0439; William Cordeddu 0000-0003-0770-6084; Luchino Chessa 0000-0002-9474-0995; Stefano Del Giacco 0000-0002-4517-1749; Davide Firinu 0000-0002-5768-391X.

Author contributions: All the authors contributed equally to this work.

Conflict-of-interest statement: The authors declare that they do not have any conflict of interest to declare.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Invited manuscript

Specialty type: Medicine, research and experimental

Giulia Costanzo, William Cordeddu, Luchino Chessa, Stefano Del Giacco, Davide Firinu, Department of Medical Sciences and Public Health, University of Cagliari, Monserrato 09042, Cagliari, Italy

Corresponding author: Davide Firinu, MD, PhD, Assistant Professor, Doctor, Research Fellow, Department of Medical Sciences and Public Health, University of Cagliari, Asse Didattico "E1" Medicina, Cittadella Universitaria, Monserrato 09042, Cagliari, Italy. davide.firinu@unica.it

Abstract

The extent of the profound immunological and nonimmunological responses linked to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection is currently being investigated worldwide due to the large burden associated with death due to SARS-CoV-2 and the short-term consequences of coronavirus disease 2019 (COVID-19). It has been hypothesized that patients on immunosuppressive treatments, including biologics, may have an augmented risk of being infected by SARS-CoV-2; however, there are currently no definitive data about biological drugs and COVID-19 in immune-mediated inflammatory diseases. Current epidemiological models developed to understand how long the COVID-19 epidemic may last are not conclusive and range from sustained epidemics to complete elimination. Nevertheless, even in the best-case scenario of apparent elimination, there is concordance about a possible contagion resurgence as late as 2024. Therefore, knowledge of the impact of SARS-CoV-2 on immune-mediated diseases and among patients treated with biologicals, together with the results of novel and promising COVID-19 treatment strategies targeting the virus and the host immune response (or both), will help us to best manage our patients during this pandemic over the next few years.

Key Words: COVID-19; Immune-mediated diseases; Biological drugs; Targeted therapies; Cytokine storm; Immunosuppressive drugs

©The Author(s) 2021. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: The severe acute respiratory syndrome coronavirus 2 pandemic has changed health systems worldwide and the current approach to patients affected by chronic diseases such as immune-mediated disorders. To apply personalized medicine,

Country/Territory of origin: Italy**Peer-review report's scientific quality classification**Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): C
Grade D (Fair): D
Grade E (Poor): 0**Received:** January 29, 2021**Peer-review started:** January 29, 2021**First decision:** February 28, 2021**Revised:** March 29, 2021**Accepted:** May 20, 2021**Article in press:** May 20, 2021**Published online:** July 16, 2021**P-Reviewer:** Kotanidou A, Long X**S-Editor:** Fan JR**L-Editor:** Filipodia**P-Editor:** Yuan YY

knowledge of the impact of severe acute respiratory syndrome coronavirus 2 during the course of immune-mediated diseases and particularly among patients treated with biologicals, together with the results of novel coronavirus disease 2019 treatment strategies targeting the virus and the host immune response, will help us to best manage our patients during this pandemic.

Citation: Costanzo G, Cordeddu W, Chessa L, Del Giacco S, Firinu D. COVID-19: Considerations about immune suppression and biologicals at the time of SARS-CoV-2 pandemic. *World J Clin Cases* 2021; 9(20): 5352-5357**URL:** <https://www.wjgnet.com/2307-8960/full/v9/i20/5352.htm>**DOI:** <https://dx.doi.org/10.12998/wjcc.v9.i20.5352>

INTRODUCTION

The extent of the profound immunological and nonimmunological responses linked to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection is currently being investigated worldwide due to the very large death toll of the SARS-CoV-2 pandemic and the short-term consequences of coronavirus disease 2019 (COVID-19).

It is well known that patients undergoing immunosuppressive treatment may have increased morbidity and mortality related to infectious diseases. The risk varies according to age, sex, years of disease, number of comorbidities, type of drugs administered, and the number of treatment failures. This increased risk may occur due to a disease-specific alteration of cellular immunity or as a consequence of the drug used to treat the disease[1]. On the other hand, the possible risk of infections related to conventional disease-modifying anti-rheumatic drugs (DMARDs) has not been completely clarified. For instance, methotrexate may increase the infectious risk, but its beneficial effect on disease activity results in a reduction in additional risk factors for infections. Whether there is an augmented risk of pneumonia or reactivation of silent infections remains controversial[2].

Concerning the most commonly used biologic drugs, it is known that the risk of serious infection usually increases in the first 6 mo after initiating therapy; this risk is higher than that of conventional DMARDs. Emerging data also suggest that the risk of serious infections, including those leading to hospitalization, may differ among biologics[3]. The glucocorticoid dose and older age are additional predictors of the risk of serious infections in patients treated with biologics.

CLINICAL IMPLICATIONS

There are currently no definitive data about biological drugs and COVID-19 in immune-mediated inflammatory diseases. However, we can consider data from phase III clinical trials of biologics on rates of upper respiratory infection, influenza, and serious infections[4]. These data show that, on the whole, biologics do not show major increases in infection risk compared to placebo during the course of these trials. However, as SARS-CoV-2 is a new pathogen related to high mortality and a long-term disease burden in a subset of patients, a cautious approach is warranted. Preventive withholding of biologics should be carefully weighed on the basis of the risk of exposure to SARS-CoV-2, comorbidities and the risk of increased morbidity or mortality from relapse or worsening of the disease for which the patient is being treated[4]. A systematic review and meta-analysis conducted on the few available studies so far concluded that patients with immunosuppression and immunodeficiency seem to have a trend toward an increased risk of severe COVID-19 disease; however, the differences did not reach statistical significance[5]. Major rheumatology societies now recommend the interruption of treatments only during the occurrence of documented SARS-CoV-2 infection for patients treated with DMARDs, biologicals, and small molecules[6].

Mechanistically, the pulmonary damage and acute respiratory distress syndrome due to SARS-CoV, Middle East respiratory syndrome coronavirus, and SARS-CoV-2 infections is caused by inflammatory dysregulation leading to cytokine storms and consequent lung injury[7]. Since these observations were conducted during the SARS

and Middle East respiratory syndrome outbreaks, we are aware of the high expression of interleukin (IL)-1, IL-2, IL-6, IL-12, and interferon-gamma[8], along with inappropriate complement activation in coronavirus-related pneumonia[9]; these findings have been widely confirmed to also occur in COVID-19. Specific human leukocyte antigen haplotypes have a protective effect against SARS-CoV-2 infection, while others (such as human leukocyte antigen-DRB1*08:01) have a negative influence on the disease course[10]. Some authors divide the natural history of SARS-CoV-2 infection into different stages: early infection, pulmonary involvement, and systemic hyperinflammation, with the first phase showing a predominantly antiviral response and a second phase where the host response and organ damage mediated by inflammation is predominant[11]. A complex immune-mediated and coagulation derangement linked to thromboinflammation is a key element in this process, mediating the variety of multiple organ dysfunctions described to date[12].

Based on the abovementioned considerations, several immunomodulatory drugs have been used compassionately or in clinical trials early in the pandemic, hypothesizing that targeted interventions for immune dysregulation may change COVID-19 pneumonia outcomes. This has partially derived from previous experiences with acute respiratory distress syndrome, sepsis, and other “cytokine storm” diseases[13,14], representing a change of paradigm that has not been fully demonstrated to be safe and effective.

In patients with autoimmune or oncological diseases, Janus kinase inhibitors have been associated with an increased risk of viral and bacterial infection, probably secondary to a cytotoxic T lymphocyte-dependent mechanism and a noncytolytic cytokine-dependent mechanism mediated by inflammatory cytokines[15]. However, despite the lack of large multicenter studies, there is some evidence that patients treated with Janus kinase inhibitors do not have a higher risk of developing severe forms of COVID-19 infection[16].

Baricitinib has been proposed as a therapeutic option in COVID-19, given its activity in modulating inflammation and its ability to inhibit AP2-associated protein kinase, which mediates virus entry in cells through endocytosis, possibly resulting in a decreased viral load[17].

In a recent trial, patients with COVID-19 were assigned to receive either remdesivir (up to 10 d) and baricitinib (up to 14 d) or remdesivir plus placebo[18]. Patients who were treated with baricitinib beyond standard care showed a slightly faster median time to recovery (7 d *vs* 8 d). Moreover, patients receiving supplemental oxygen, noninvasive ventilation, or using high-flow devices at baseline (which accounted for approximately 75% of the population in both treatment groups) recovered in a median of 10 d in the combination group *vs* 18 d in the control group. Interestingly, patients receiving baricitinib did not show an increase in infectious and thrombotic complications; rather, all adverse events had a significantly lower incidence in the combination group[18]. If their safety and efficacy are confirmed, Janus kinase inhibitors could be useful in subgroups of COVID-19 pneumonia (or other manifestations of the disease) due to their short half-life, as their administration could be promptly stopped in cases of superinfection.

As far as rheumatology scientific societies are concerned, current European League Against Rheumatism recommendations suggest not stopping previous treatment with synthetic DMARDs or biologic DMARDs[19]. There is no evidence that these therapies could increase the risk of infection or adverse outcomes in COVID-19[20]. Nevertheless, in individuals with current or suspected COVID-19, the American College of Radiology recommends stopping immunosuppressants and biologics, except non-IL-6 inhibitors and Janus kinase inhibitors[21]. Focusing on rheumatologic patients on anti-tumor necrosis factor therapy, data analyzed from the rheum-COVID registry show that therapy with tumor necrosis factor blockers reduced the risk of hospitalization (odds ratio: 0.40, 95% confidence interval: 0.19-0.81) in contrast to therapy with antimalarials, which did not (odds ratio: 0.94, 95% confidence interval: 0.57-1.57)[22].

Regarding biologicals approved for allergic diseases, such as those for severe asthma, their effect is mainly focused on eosinophils and, in general, on the T-helper type 2 response. Therefore, the question to be asked is which role is involved in the T-helper type 2 response in COVID-19 infection. The evidence to date shows that, in general, there is a reduced risk of CoV-2 infection and a reduction in severity among subjects with a genetic predisposition to allergic diseases[23]. In an Italian cohort of admitted patients affected by COVID-19, asthma did not seem to be a risk factor for susceptibility to COVID-19[24].

Omalizumab, an anti-immunoglobulin E (IgE) monoclonal antibody approved for severe asthma and chronic spontaneous urticaria, has shown immunomodulatory effects mediated through the restoration of the capacity of human plasmacytoid

dendritic cells to produce interferon- α , increasing its antiviral activity and reducing viral-induced asthma exacerbations[25]. A recent trial investigated whether the administration of omalizumab could reduce the symptoms of an experimental infection with rhinovirus in asthmatic patients[26]. These data showed that immunoglobulin E blockade seemed to reduce lower respiratory tract symptoms. To date, there are no data on the increased severity of COVID-19 in asthmatic patients receiving omalizumab, and the Food and Drug Administration has approved omalizumab for short-term home administration during the COVID-19 outbreak to reduce hospital visits.

There are no data yet on the risk of SARS-CoV-2 infection during the use of monoclonal antibodies targeting IL-5 pathways. Therefore, in the absence of any data suggesting potential damage, it is justified to proceed with the administration of biological drugs during the COVID-19 pandemic for patients who have experienced a positive impact from them on their asthmatic symptoms and lung function[27].

Overall, to date, the available data preliminarily suggest that monoclonal antibodies currently licensed for severe asthma treatment do not impair the immunological response or outcomes in patients affected by CoV-2 infection[27]. A paper by Chhiba *et al*[28] analyzed the prevalence of asthma and comorbidities associated with asthma in both inpatients and outpatients with COVID-19[28]. They did not find that asthma was associated with an increased risk of COVID-19 hospitalization. However, biologicals used to treat severe asthma or allergic diseases may have a role in the risk of SARS-CoV-2 infection and in the course of COVID-19, potentially mediated by their steroid-sparing effect. This possibility has not been investigated.

CONCLUSION

Current epidemiological models developed to understand how long the COVID-19 epidemic may last range from suggestions of sustained epidemics to complete elimination. Nevertheless, even in the best-case scenario of apparent elimination, there is concordance about possible contagion resurgences as late as 2024[29,30]. Therefore, additional studies to improve our knowledge of the impact of SARS-CoV-2 on immune-mediated diseases and among patients treated with biologicals are needed. Together with the results of novel and promising COVID-19 treatment strategies targeting the virus and the host immune response (or both), they will provide optimal management for our patients in the next few years when we still need to be vigilant.

REFERENCES

- 1 **Georgiev T**, Angelov AK. Complexities of diagnosis and management of COVID-19 in autoimmune diseases: Potential benefits and detriments of immunosuppression. *World J Clin Cases* 2020; **8**: 3669-3678 [PMID: [32953843](#) DOI: [10.12998/wjcc.v8.i17.3669](#)]
- 2 **Lacaille D**, Guh DP, Abrahamowicz M, Anis AH, Esdaile JM. Use of nonbiologic disease-modifying antirheumatic drugs and risk of infection in patients with rheumatoid arthritis. *Arthritis Rheum* 2008; **59**: 1074-1081 [PMID: [18668604](#) DOI: [10.1002/art.23913](#)]
- 3 **Singh JA**. Infections With Biologics in Rheumatoid Arthritis and Related Conditions: a Scoping Review of Serious or Hospitalized Infections in Observational Studies. *Curr Rheumatol Rep* 2016; **18**: 61 [PMID: [27613285](#) DOI: [10.1007/s11926-016-0609-5](#)]
- 4 **Brownstone ND**, Thibodeaux QG, Reddy VD, Myers BA, Chan SY, Bhutani T, Liao W. Novel Coronavirus Disease (COVID-19) and Biologic Therapy in Psoriasis: Infection Risk and Patient Counseling in Uncertain Times. *Dermatol Ther (Heidelb)* 2020; 1-11 [PMID: [32300516](#) DOI: [10.1007/s13555-020-00377-9](#)]
- 5 **Gao Y**, Chen Y, Liu M, Shi S, Tian J. Impacts of immunosuppression and immunodeficiency on COVID-19: A systematic review and meta-analysis. *J Infect* 2020; **81**: e93-e95 [PMID: [32417309](#) DOI: [10.1016/j.jinf.2020.05.017](#)]
- 6 **Misra DP**, Agarwal V, Gasparyan AY, Zimba O. Rheumatologists' perspective on coronavirus disease 19 (COVID-19) and potential therapeutic targets. *Clin Rheumatol* 2020; **39**: 2055-2062 [PMID: [32277367](#) DOI: [10.1007/s10067-020-05073-9](#)]
- 7 **Yao Z**, Zheng Z, Wu K, Junhua Z. Immune environment modulation in pneumonia patients caused by coronavirus: SARS-CoV, MERS-CoV and SARS-CoV-2. *Ageing (Albany NY)* 2020; **12**: 7639-7651 [PMID: [32364527](#) DOI: [10.18632/aging.103101](#)]
- 8 **Channappanavar R**, Perlman S. Pathogenic human coronavirus infections: causes and consequences of cytokine storm and immunopathology. *Semin Immunopathol* 2017; **39**: 529-539 [PMID: [28466096](#) DOI: [10.1007/s00281-017-0629-x](#)]
- 9 **Gralinski LE**, Sheahan TP, Morrison TE, Menachery VD, Jensen K, Leist SR, Whitmore A, Heise

MT, Baric RS. Complement Activation Contributes to Severe Acute Respiratory Syndrome Coronavirus Pathogenesis. *mBio* 2018; **9** [PMID: 30301856 DOI: 10.1128/mBio.01753-18]

10 **Littera R**, Campagna M, Deidda S, Angioni G, Cipri S, Melis M, Firinu D, Santus S, Lai A, Porcella R, Lai S, Rassu S, Scioscia R, Meloni F, Schirru D, Cordeddu W, Kowalik MA, Serra M, Ragatzu P, Carta MG, Del Giacco S, Restivo A, Orrù S, Palimodde A, Perra R, Orrù G, Conti M, Balestrieri C, Serra G, Onali S, Marongiu F, Perra A, Chessa L. Human Leukocyte Antigen Complex and Other Immunogenetic and Clinical Factors Influence Susceptibility or Protection to SARS-CoV-2 Infection and Severity of the Disease Course. The Sardinian Experience. *Front Immunol* 2020; **11**: 605688 [PMID: 33343579 DOI: 10.3389/fimmu.2020.605688]

11 **Siddiqi HK**, Mehra MR. COVID-19 illness in native and immunosuppressed states: A clinical-therapeutic staging proposal. *J Heart Lung Transplant* 2020; **39**: 405-407 [PMID: 32362390 DOI: 10.1016/j.healun.2020.03.012]

12 **Perico L**, Benigni A, Casiraghi F, Ng LFP, Renia L, Remuzzi G. Immunity, endothelial injury and complement-induced coagulopathy in COVID-19. *Nat Rev Nephrol* 2021; **17**: 46-64 [PMID: 33077917 DOI: 10.1038/s41581-020-00357-4]

13 **Copaescu A**, Smibert O, Gibson A, Phillips EJ, Trubiano JA. The role of IL-6 and other mediators in the cytokine storm associated with SARS-CoV-2 infection. *J Allergy Clin Immunol* 2020; **146**: 518-534.e1 [PMID: 32896310 DOI: 10.1016/j.jaci.2020.07.001]

14 **Zhu HM**, Li Y, Li BY, Yang S, Peng D, Yang X, Sun XL, Zhang M. Effect of methylprednisolone in severe and critical COVID-19: Analysis of 102 cases. *World J Clin Cases* 2020; **8**: 5952-5961 [PMID: 33344594 DOI: 10.12998/wjcc.v8.i23.5952]

15 **Sant'Antonio E**, Bonifacio M, Breccia M, Rumi E. A journey through infectious risk associated with ruxolitinib. *Br J Haematol* 2019; **187**: 286-295 [PMID: 31468506 DOI: 10.1111/bjh.16174]

16 **Haberman R**, Axelrad J, Chen A, Castillo R, Yan D, Izmirlly P, Neimann A, Adhikari S, Hudesman D, Scher JU. Covid-19 in Immune-Mediated Inflammatory Diseases - Case Series from New York. *N Engl J Med* 2020; **383**: 85-88 [PMID: 32348641 DOI: 10.1056/NEJMc2009567]

17 **Richardson P**, Griffin I, Tucker C, Smith D, Oechsle O, Phelan A, Rawling M, Savory E, Stebbing J. Baricitinib as potential treatment for 2019-nCoV acute respiratory disease. *Lancet* 2020; **395**: e30-e31 [PMID: 32032529 DOI: 10.1016/S0140-6736(20)30304-4]

18 **Kalil AC**, Patterson TF, Mehta AK, Tomashek KM, Wolfe CR, Ghazaryan V, Marconi VC, Ruiz-Palacios GM, Hsieh L, Kline S, Tapson V, Iovine NM, Jain MK, Sweeney DA, El Sahly HM, Branche AR, Regalado Pineda J, Lye DC, Sandkovsky U, Luetkemeyer AF, Cohen SH, Finberg RW, Jackson PEH, Taiwo B, Paules CI, Arguinchona H, Erdmann N, Ahuja N, Frank M, Oh MD, Kim ES, Tan SY, Mularski RA, Nielsen H, Ponce PO, Taylor BS, Larson L, Roupheal NG, Saklawi Y, Cantos VD, Ko ER, Engemann JJ, Amin AN, Watanabe M, Billings J, Elie MC, Davey RT, Burgess TH, Ferreira J, Green M, Makowski M, Cardoso A, de Bono S, Bonnett T, Proschan M, Deye GA, Dempsey W, Nayak SU, Dodd LE, Beigel JH; ACTT-2 Study Group Members. Baricitinib plus Remdesivir for Hospitalized Adults with Covid-19. *N Engl J Med* 2021; **384**: 795-807 [PMID: 33306283 DOI: 10.1056/NEJMoa2031994]

19 **Landewé RB**, Machado PM, Kroon F, Bijlsma HW, Burmester GR, Carmona L, Combe B, Galli M, Gossec L, Iagnocco A, Isaacs JD, Mariette X, McInnes I, Mueller-Ladner U, Openshaw P, Smolen JS, Stamm TA, Wiek D, Schulze-Koops H. EULAR provisional recommendations for the management of rheumatic and musculoskeletal diseases in the context of SARS-CoV-2. *Ann Rheum Dis* 2020; **79**: 851-858 [PMID: 32503854 DOI: 10.1136/annrheumdis-2020-217877]

20 **Fitzgerald GE**, Maguire S, Haroon N. COVID-19: What Do Rheumatologists Need to Know? *Curr Rheumatol Rep* 2021; **23**: 5 [PMID: 33403528 DOI: 10.1007/s11926-020-00971-y]

21 **Mikuls TR**, Johnson SR, Fraenkel L, Arasaratnam RJ, Baden LR, Bermas BL, Chatham W, Cohen S, Costenbader K, Gravalles EM, Kalil AC, Weinblatt ME, Winthrop K, Mudano AS, Turner A, Saag KG. American College of Rheumatology Guidance for the Management of Rheumatic Disease in Adult Patients During the COVID-19 Pandemic: Version 1. *Arthritis Rheumatol* 2020; **72**: 1241-1251 [PMID: 32349183 DOI: 10.1002/art.41301]

22 **Gianfrancesco M**, Hyrich KL, Al-Adely S, Carmona L, Danila MI, Gossec L, Izadi Z, Jacobsohn L, Katz P, Lawson-Tovey S, Mateus EF, Rush S, Schmajuk G, Simard J, Strangfeld A, Trupin L, Wysham KD, Bhana S, Costello W, Grainger R, Hausmann JS, Liew JW, Sirocich E, Sufka P, Wallace ZS, Yazdany J, Machado PM, Robinson PC; COVID-19 Global Rheumatology Alliance. Characteristics associated with hospitalisation for COVID-19 in people with rheumatic disease: data from the COVID-19 Global Rheumatology Alliance physician-reported registry. *Ann Rheum Dis* 2020; **79**: 859-866 [PMID: 32471903 DOI: 10.1136/annrheumdis-2020-217871]

23 **Larsson SC**, Gill D. Genetic predisposition to allergic diseases is inversely associated with risk of COVID-19. *Allergy* 2020 [PMID: 33382452 DOI: 10.1111/all.14728]

24 **Caminati M**, Lombardi C, Micheletto C, Roca E, Bigni B, Furci F, Girelli D, Senna G, Crisafulli E. Asthmatic patients in COVID-19 outbreak: Few cases despite many cases. *J Allergy Clin Immunol* 2020; **146**: 541-542 [PMID: 32620309 DOI: 10.1016/j.jaci.2020.05.049]

25 **Teach SJ**, Gill MA, Trogias A, Sorkness CA, Arbes SJ Jr, Calatroni A, Wildfire JJ, Gergen PJ, Cohen RT, Pongracic JA, Kercsmar CM, Khurana Hershey GK, Gruchalla RS, Liu AH, Zoratti EM, Kattan M, Grindle KA, Gern JE, Busse WW, Szeffler SJ. Preseasonal treatment with either omalizumab or an inhaled corticosteroid boost to prevent fall asthma exacerbations. *J Allergy Clin Immunol* 2015; **136**: 1476-1485 [PMID: 26518090 DOI: 10.1016/j.jaci.2015.09.008]

26 **Heymann PW**, Platts-Mills TAE, Woodfolk JA, Borish L, Murphy DD, Carper HT, Conaway MR,

- Steinke JW, Muehling L, Gerald Teague W, Kennedy JL, Irani AM, McGraw MD, Early SV, Wheatley LM, Adams AP, Turner RB. Understanding the asthmatic response to an experimental rhinovirus infection: Exploring the effects of blocking IgE. *J Allergy Clin Immunol* 2020; **146**: 545-554 [PMID: 32018030 DOI: 10.1016/j.jaci.2020.01.035]
- 27 **Morais-Almeida M**, Aguiar R, Martin B, Ansotegui IJ, Ebisawa M, Arruda LK, Caminati M, Canonica GW, Carr T, Chupp G, Corren J, Dávila I, Park HS, Hanania NA, Rosenwasser L, Sánchez-Borges M, Virchow JC, Yáñez A, Bernstein JA, Caraballo L, Chang YS, Chikhladze M, Fiocchi A, González-Díaz SN, Tanno LK, Levin M, Ortega-Martell JA, Passalacqua G, Peden DB, Rouadi PW, Sublett JL, Wong GWK, Bleecker ER. COVID-19, asthma, and biological therapies: What we need to know. *World Allergy Organ J* 2020; **13**: 100126 [PMID: 32426090 DOI: 10.1016/j.waojou.2020.100126]
- 28 **Chhiba KD**, Patel GB, Vu THT, Chen MM, Guo A, Kudlaty E, Mai Q, Yeh C, Muhammad LN, Harris KE, Bochner BS, Grammer LC, Greenberger PA, Kalhan R, Kuang FL, Saltoun CA, Schleimer RP, Stevens WW, Peters AT. Prevalence and characterization of asthma in hospitalized and nonhospitalized patients with COVID-19. *J Allergy Clin Immunol* 2020; **146**: 307-314.e4 [PMID: 32554082 DOI: 10.1016/j.jaci.2020.06.010]
- 29 **Saad-Roy CM**, Wagner CE, Baker RE, Morris SE, Farrar J, Graham AL, Levin SA, Mina MJ, Metcalf CJE, Grenfell BT. Immune life history, vaccination, and the dynamics of SARS-CoV-2 over the next 5 years. *Science* 2020; **370**: 811-818 [PMID: 32958581 DOI: 10.1126/science.abd7343]
- 30 **Kissler SM**, Tedijanto C, Goldstein E, Grad YH, Lipsitch M. Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period. *Science* 2020; **368**: 860-868 [PMID: 32291278 DOI: 10.1126/science.abb5793]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

