

New coronavirus disease and maternal-fetal repercussions sars-cov-2 infection from pregnancy to the puerperium

The SARS-CoV-2 virus accumulates more than 397 million cases and almost 5.8 million deaths worldwide. It is an agent transmitted by droplets of infected secretions. During pregnancy, a variety of circumstances can affect maternal health, fetal development, and neonatal health, and the environment to which the expectant mother is exposed can leave a permanent imprint on the baby's physiology. Thus, there is a real need for special attention in the relationship of pregnant women with SARS-CoV-2 infection. Therefore, it is important to raise the new findings relating to COVID-19 throughout the period from pregnancy to the puerperium, including childbirth and breastfeeding. The objective of this work was to analyze the existing literature in order to raise knowledge of the relationship between COVID-19 and the entire period involving pregnancy. It is a qualitative, basic, exploratory work and an integrative bibliographic procedure. The search was carried out in the repositories: Pubmed, Bireme, Lilacs and Scielo using the descriptors: Infection, COVID-19 and New born, in English, Portuguese and Spanish, published in 2020 and 2021. The literature (24 articles) showed that there is conflict between multiple data. A gravidez e os períodos neonatais são considerados de alto risco para a infecção por SARS-CoV-2. O mecanismo da infecção neonatal não é claro, existindo casos de transmissão transplacentária, infectados ao nascer, por contato direto e que não se infectaram. Com relação à evolução e prognóstico da doença, quando sintomáticos, os bebês apresentam predominantemente disfunções respiratórias. Não há consenso se o aleitamento materno deve ser feito de modo direto ou indireto e se o bebê deve ser imediatamente separado da mãe positivada. Considera-se que há muita informação inconclusiva acerca dos assuntos analisados e que muito ainda deve ser feito para se construir uma evidência científica forte sobre o assunto.

Keywords: Pregnancy; Parturition; Breast Feeding; Neonatology; Coronavirus Infections.

Doença do novo coronavírus e repercussões materno-fetais infecção por sars-cov-2 da gravidez ao puerpério

O vírus SARS-CoV-2 acumula mais de 397 milhões de casos e quase 5,8 milhões de mortes em todo o mundo. É um agente transmitido por gotículas de secreções infectadas. Durante a gravidez, uma variedade de circunstâncias pode afetar a saúde materna, o desenvolvimento fetal e a saúde neonatal e o ambiente ao qual a gestante está exposta pode deixar uma marca permanente na fisiologia do bebê. Assim, existe uma necessidade real de atenção especial na relação das gestantes com a infecção pelo SARS-CoV-2. Por isso, se torna importante levantar quais os novos achados relacionando a COVID-19 em todo o período da gestação ao puerpério, passando pelo parto e a amamentação. O objetivo deste trabalho foi analisar a literatura já existente a fim de levantar os conhecimentos da relação da COVID-19 com todo o período que envolve a gestação. Trata-se de um trabalho qualitativo, básico, exploratório e de procedimento bibliográfico integrativo. A busca foi realizada nos repositórios: Pubmed, Bireme, Lilacs e Scielo utilizando os descritores: Infection, COVID-19 e New born, em inglês, português e espanhol, publicados em 2020 e 2021. A literatura (24 artigos) mostrou que há conflito entre vários dados. A gravidez e os períodos neonatais são considerados de alto risco para a infecção por SARS-CoV-2. O mecanismo da infecção neonatal não é claro, existindo casos de transmissão transplacentária, infectados ao nascer, por contato direto e que não se infectaram. Com relação à evolução e prognóstico da doença, quando sintomáticos, os bebês apresentam predominantemente disfunções respiratórias. Não há consenso se o aleitamento materno deve ser feito de modo direto ou indireto e se o bebê deve ser imediatamente separado da mãe positivada. Considera-se que há muita informação inconclusiva acerca dos assuntos analisados e que muito ainda deve ser feito para se construir uma evidência científica forte sobre o assunto.


Palavras-chave: Gravidez; Parto; Aleitamento Materno; Neonatologia; Infecções por coronavírus.


Topic: Ginecologia e Medicina Biofetal


Received: 03/03/2022


Approved: 04/04/2022


Reviewed anonymously in the process of blind peer.


Marcos Lorrain Paranhos Leão 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/7449167140800038>
<https://orcid.org/0000-0002-6259-2430>
marcos.leao@upe.br


Iago José Cunha Silva 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/4112412429318796>
<https://orcid.org/0000-0002-3933-0926>
iago.icsilva@upe.br


Livia Sonale da Rocha Pantoja Enes 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/9423795649141855>
<https://orcid.org/0000-0002-5055-5114>
livia.enes@upe.br


Mateus Faria Pereira 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/4438595327724175>
<https://orcid.org/0000-0002-7603-4317>
mateus.pereira@upe.br


Ana Beatriz Barros Porpino do Prado 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/0987034480042021>
<https://orcid.org/0000-0003-3231-4664>
anadopradofcm@gmail.com


Danielly Silva Gomes 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/7166133138034631>
<https://orcid.org/0000-0002-7080-3082>
danielly.sgomes@upe.br

Amanda Carla Corrêa Viana 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/6972561434908756>
<https://orcid.org/0000-0002-4442-7140>
amanda.correa@upe.br

Luan Nilton da Silva 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/5305359714768599>
<https://orcid.org/0000-0002-1406-5580>
luan.nilton@upe.br

Pedro Henrique de Oliveira Branco 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/1952000544515542>
<https://orcid.org/0000-0001-8440-8799>
pedro.branco@upe.br

Gustavo Ferreira Carvalhais 
Centro Universitário Campo Real, Brasil
<http://lattes.cnpq.br/9623038051107100>
<https://orcid.org/0000-0002-5987-5034>
gustavofc.7@hotmail.com

Marianne Regina Araújo Sabino 
Universidade de Pernambuco, Brasil
<http://lattes.cnpq.br/6938261055207172>
<https://orcid.org/0000-0002-6748-8077>
marianne.sabino@upe.br



DOI: 10.6008/CBPC2236-9600.2022.002.0021

Referencing this:

LEÃO, M. L. P.; SILVA, I. J. C.; ENES, L. S. R. P.; PEREIRA, M. F.; PRADO, A. B. B. P.; GOMES, D. S.; VIANA, A. C. C.; SILVA, L. N.; BRANCO, P. H. O.; CARVALHAIS, G. F.; SABINO, M. R. A.. New coronavirus disease and maternal-fetal repercussions sars-cov-2 infection from pregnancy to the puerperium. *Scire Salutis*, v.12, n.2, p.201-206, 2022. DOI: <http://doi.org/10.6008/CBPC2236-9600.2022.002.0021>

INTRODUCTION

The new coronavirus pandemic has already more than 397 million and 963 thousand infected and almost 5 million and 753 thousand deaths worldwide until 24th March , 2021 (JHU, 2022). The so-called SARS-CoV-2, which causes COVID-19 (Coronavirus Disease 19), emerged in China in December 2019 and quickly spread worldwide with impressive speed and efficiency (RADU et al., 2021). This is due to its high rate of community contagion through the secretions of infected people, mainly through direct contact with droplets produced when breathing, talking, coughing or sneezing (CARRÁSICO, 2020).

In this way, since 11th March, when the spread of SARS-CoV-2 was declared a pandemic, the medical world has changed, priorities have changed and everyone must adapt to the new situation, including, and especially, health professionals and patients. Thus, a certain group, represented by pregnant women, cannot choose to wait for a better world condition to perform childbirth. Therefore, it is up to the health professional to perform the necessary procedures in the best possible way, respecting the protocols, for a better evolution and prognosis (DUMIRASCU et al., 2021).

During pregnancy, a variety of circumstances can affect maternal health, fetal development, and neonatal health. In this way, the environment to which the pregnant woman is exposed can leave a permanent mark on fetal physiology (GONZALES, 2020). Furthermore, pregnant women and babies have a unique interdependent immune system from before birth to a considerable time afterward (KUBIAK et al., 2021). Therefore, the most important question is whether COVID-19 impacts the pregnant woman differently and whether it could be transmitted vertically to the fetus and cause a clinically significant infection (CHEN et al., 2020).

Also, although it was initially stated that there is no evidence that pregnant women are at greater risk compared to the general population (WHO, 2020), currently, as a precautionary measure, they are considered at risk of developing severe forms of infection with the new coronavirus (RCOG, 2020). It is known that changes in immunity during pregnancy predispose to several diseases. In addition to physiological cardiopulmonary adaptation, pregnant patients may develop a more severe form of respiratory infections due to the sensitivity and effort required of these systems at this stage (POON et al., 2020).

The human being needs, since birth, intimate contact with the mother and is fed through breastfeeding; the use of this milk has an important impact on present and future maternal and child health (NAGY, 2018). In this first contact and relationship with the environment, the baby stabilizes its vital signs (BRAHM et al., 2017). In these first hours, breastfeeding should be started, which has numerous protective properties, including immunological, reducing the risk of infections by viruses or bacteria, which help protect the newborn from possible environmental aggressions (CARRASCO et al., 2020). However, direct breastfeeding, although beneficial, may be related to favoring the transmission of the new virus to the baby (DUMIRASCU et al., 2021).

Regarding neonatology, several adverse events have been reported in babies who contracted SARS-

CoV-2 and/or who were born to infected mothers, such as preterm neonates who had respiratory problems and who required ventilatory support (VARDHELLI et al., 2020).

Finally, in general, there is a real need for special attention for this group of patients (DUMIRASCU et al., 2021). Therefore, the objective of this work is to analyze the current knowledge published in the literature about the influence of SARS-CoV-2 on pregnancy, childbirth, breastfeeding and the neonatal period published in 2020 and 2021.

METHODOLOGY

This is a work with a qualitative approach, of a basic nature, with an exploratory objective and a bibliographic procedure. Thus, this is an integrative bibliographic review carried out in February and March 2021 and carried out in the repositories: Pubmed, Bireme, Lilacs and Scielo, using the Descriptors in Health Sciences (DeCS): Infection, Coronavirus Infection and New born, in English, Portuguese and Spanish published in 2020 and 2021. In addition, works that did not fit the selected languages, in the years, in the descriptors, that were very far from the proposed theme, that were still in the process of publication and that did not were published in full. In addition, as this is a research that uses publicly accessible information, defined by Law N°. 12,527, of November 18, 2011, it does not need prior authorization from an ethics committee, supported by the sole paragraph of Art 1 of resolution 510 /2016, resolved by the National Research Ethics Committee (CONEP) of the National Health Council (CNS) (CNS, 2016).

RESULTS AND DISCUSSION

A total of 62 articles were found at the end of the pre-selection, of which 24 met the inclusion criteria and did not meet the exclusion criteria established for this review. These works are primarily divided into case reports and field studies. Of the analyzed works, 21 (twenty-one) are from 2020 and 3 (three) are from 2021.

After analyzing the selected literature, it was noticed that in relation to the form of delivery, COVID-19 infection alone cannot be the main cause for delivery (CDCP, 2020). The route and time of delivery should be assessed individually, in consultation with the team and assessing the status of patients (QI et al., 2020). However, it is recommended that severe and critical cases should be surgically terminated (DUMIRASCU et al., 2021). In mild cases with adequate evolution, normal delivery may be indicated (WANG et al., 2020). Cesarean section is the predominant method of delivery in the context of SARS-CoV-2 infection (DUMIRASCU et al., 2021). In addition to COVID-19 increasing the risk of complications such as severe pneumonia or premature delivery, it can complicate delivery if acquired in the last week of pregnancy (RADU et al., 2021). Enabling fetal distress, premature birth, respiratory distress, thrombocytopenia accompanied by abnormal liver function, and even death among newborns (ZHU et al., 2020). Additionally, pregnant women infected with COVID-19 are at an increased risk for other morbidities, such as higher rates of cesarean delivery, increased postpartum complications (including fever, hypoxia, and hospital readmissions), and placental pathology such as poor fetal vascular perfusion (ALLOTEY et al.,

2020; ANTOUN et al., 2020; DEBOLT et al., 2020; ELLINGTON et al., 2020; MARÍN et al., 2020; PRABHU et al., 2020; PIRJANI et al., 2020; TORO et al., 2021).

There have also been reports of transplacental transmission of SARS-CoV-2 and of symptomatic newborns who tested positive for the virus after being born to mothers with positive PCR test results (ALZAMORA et al., 2020; DONG et al., 2020; LAMOUREUX et al., 2020; SHAH et al., 2020; VIVANTI et al., 2020; ZENG et al., 2020). But another study of a case series of ten newborns born to COVID-19 positive mothers reported no evidence of vertical transmission of SARS-CoV-2 (AYED et al., 2020). Therefore, as the disease is highly transmissible, it is essential to recognize the symptoms as soon as possible in order to avoid transmission to the neonate (RADU et al., 2021).

The severity of the acquired disease in the newborn is unknown (AYED et al., 2020), but the most common symptom in these patients was the respiratory problem. Respiratory support was required in 7.6% of neonates in one study, 1.8% of infants required mechanical ventilation, others required non-invasive ventilation, and others required nasal oxygen. In a field study, only 35 of 629 newborns tested (5.5%) were positive for COVID-19, of 35 positive newborns, 14 (40%) were symptomatic. COVID-19 appears to have favorable neonatal outcomes and most newborns are asymptomatic (VARDHELLI et al., 2020).

With regard to the postpartum approach, the selected data state that in the context of the pandemic, family and maternal contact with the newborn should be postponed. But, demonstrating that such restrictions can have negative consequences, they also claim that contact control can be responsible for negative situations such as postpartum depression, low lactation rates and poor connection between mother and baby. Finally, it is concluded that all possible care and precautions must be taken, but in a way that preserves as much of the mother-child relationship as possible (DUMIRASCU et al., 2021).

Dumitrascu et al. (2021) state that direct breastfeeding can favor the transmission of the virus from a mother infected with COVID-19 to her baby (DUMIRASCU et al., 2021), Davanzo et al. (2020) contradict themselves saying that, if the mother is asymptomatic or little symptomatic, there should be an effort for the puerperal woman to feed her child directly, as it is not yet clear whether breast milk is capable of making the transmission of the virus viable (DAVANZO et al., 2020).

It is debatable whether the newborn should be immediately separated from the COVID-19 positive mother (RCOG1, 2020). A study composed of outcomes of 7 newborns concluded that it is necessary to separate newborns from mothers immediately to avoid potential threats of SARS-CoV-2 infection (YANG et al., 2020). However, unlike the previous one, another study concluded that separation may not prevent infection, in addition to increasing the risk of neonatal pneumonia if done early (STUEBE, 2020).

CONCLUSION

Thus, it is considered that there are discrepancies in the information on transplacental transmission and on the separation or not of the baby and the mother. However, there is consensus regarding the outcome of the delivery, which is usually a cesarean section and may present complications; that perinatal infection can lead to a poor course of pregnancy and that the neonate has more frequent respiratory

symptoms when symptomatic.

It is concluded that due to the amount of dissonant and inconclusive information, the recent emergence of the theme and the global scope of the subject, more analyzes are needed for several questions that were presented.

REFERÊNCIAS

ALLOTEY, J.; STALLINGS, E.; BONET, M.. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *Bmj*, v.370, p.3320, 2020.

ALZAMORA, M. C.; PAREDES, T.; CACERES, D.; WEBB, C. M.; VALDEZ, L. M.; ROSA, M.. Severe COVID-19 during pregnancy and possible vertical transmission. *Am J Perinatol*, v.37, p.861-865, 2020.

ANTOUN, L.; TAWHEEL, N. E.; AHMED, I.; PATNI, S.; HONEST, H.. Maternal COVID-19 infection, clinical characteristics, pregnancy, and neonatal outcome: a prospective cohort study. *Eur J Obstet Gynecol Reprod Biol*, v.252, p.559-562, 2020.

AYED, A.; EMBAIREEG, A.; BENAWADH, A.; FOUZAN, W.; HAMMOUD, M.; HATHAL, M.. Maternal and perinatal characteristics and outcomes of pregnancies complicated with COVID-19 in Kuwait. *Bmc Pregnancy Childbirth*, v.20, n.1, p.754, 2020.

BRAHM, P.; VALDÉS, V.. Beneficios de la lactancia materna y riesgos de no amamantar. *Rev. Chil. Pediatr*, v.88, n.1, p.7-14, 2017.

GONZALEZ, R. A. C.. Consecuencias maternas y neonatales de la infección por coronavirus COVID-19 durante el embarazo: una scoping review. *Rev Esp Salud Publica*, v.94, 2020.

CDCP. Centers for Disease Control and Prevention. **Operational Considerations for Maintaining Essential Services for and Providing Maternal, Newborn, and Child Healthcare in Low-Resource Countries**. 2020.

CHEN, Y.; PENG, H.; WANG, L.; ZHAO, Y.; ZENG, L.; GAO, H.. Infants Born to Mothers With a New Coronavirus (COVID-19). *Front Pediatr*, v.8, p.104, 2020.

CNS. Conselho Nacional de Saúde. **Resolução nº 510, de 07 de abril de 2016**. Brasília: Conselho Nacional de Saúde, 2016.

NAGY, N. C.; BÓKKON, I.. Mother-newborn separation at birth in hospitals: a possible risk for neurodevelopmental disorders. *Neuroscience and Biobehavioral Reviews*, v.84, p.337-351, 2018.

DAVANZO, R.; MORO, G.; SANDRI, F.; AGOSTI, M.; MORETTI, C.; MOSCA, F.. Breastfeeding and Coronavirus Disease-2019. Ad interim indications of the Italian society of neonatology endorsed by the union of European neonatal & perinatal societies. *Matern Child Nutr*, v.16, 2020.

DEBOLT, C. A.; BIANCO, A.; LIMAYE, M. A.; SILVERSTEIN, J.; PENFIELD, C. A.; ROMAN, A. S.. Pregnant women with severe or critical coronavirus disease 2019 have increased composite morbidity compared with nonpregnant matched controls. *Am J Obstet Gynecol*, n.20, p.31312-31320, 2020.

TORO, F.; GJOKA, M.; LORENZO, G.. Impact of COVID-19 on maternal and neonatal outcomes: a systematic review and meta-analysis. *Clin Microbiol Infect*, v.27, p.36-46, 2021.

DONG, L.; TIAN, J.; HE, S.. Possible vertical transmission of SARS-CoV-2 from an infected mother to her newborn. *Jama*, v.323, p.1846-1848, 2020.

DUMITRASCU, M. C.; CIRSTOIU, M. M.; NENCIU, A. E.; PETCA, A.; SANDRU, F.; PETCA, R. C.. Delivery and breastfeeding in pregnant patients with COVID-19 (Review). *Exp Ther Med*, v.21, n.3, p.278, 2021.

ELLINGTON, S.; STRID, P.; TONG, V. T.. Characteristics of women of reproductive age with laboratory-confirmed SARS-CoV-2 infection by pregnancy status. United States, January 22-June 7, 2020. *MMWR Morb Mortal Wkly Rep*, v.69, p.769-775, 2020.

CARRASCO, F. J. F.; LARA, J. M. V.; MEY, U. G.; SALGADO, J. G.; CARREÑO, T. P.; DÍAZ, L. R.. Infección por coronavirus Covid-19 y lactancia materna: una revisión exploratoria. *Rev Esp Salud Publica*, v.94, p.2020.

JHU. Johns Hopkins University. **COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University**. 2022.

KUBIAK, J. M.; MURPHY, E. A.; YEE, J.; CAGINO, K. A.; FRIEDLANDER, R. L.; GLYNN, S.. Severe acute respiratory syndrome coronavirus 2 serology levels in pregnant women and their neonates. *Am J Obstet Gynecol*, n.21, 2021.

LAMOUREUX, A.; BITACH, T. A.; MARTINOVIC, J.; VILLE, M.; VILLE, Y.. Evidence for and against vertical transmission for severe acute respiratory syndrome coronavirus 2. *Am J Obstet Gynecol*, v.223, p.91-91, 2020.

GABRIEL, M. A. M.; VERGELI, M. R.; CARBONERO, S. C.. Maternal, perinatal and neonatal outcomes with COVID-19: a multicenter study of 242 pregnancies and their 248 infant newborns during their first month of life. *Pediatr Infect Dis J*, v.39, p.393-397, 2020.

PIRJANI, R.; HOSSEINI, R.; SOORI, T.. Maternal and neonatal outcomes in COVID-19 infected pregnancies: a prospective cohort study. *J Travel Med*, v.27, p.158, 2020.

POON, L. C.; YANG, H.; LEE, J. C. S.; COPEL, J. A.; LEUNG, T. Y.; ZHANG, Y.. ISUOG interim guidance on 2019 novel

coronavirus infection during pregnancy and puerperium: Information for healthcare professionals. **Ultrasound Obstet Gynecol**, v.55, p.700-708, 2020.

PRABHU, M.; CAGINO, K.; MATTHRS, K. C.. Pregnancy and postpartum outcomes in a universally tested population for SARS-CoV-2 in New York City: a prospective cohort study. **Bjog**, v.127, p.1548-1556, 2020.

QI, H.; CHEN, D.; FENH, L.; ZOU, L.; LI, J.. Obstetric considerations on delivery issues for pregnant women with COVID-19 infection. **Chin J Obstet Gynecol**, v.55, n.1, 2020.

RADU, M. C.; BOERU, C.; MARIN, M.; MANOLESCU, L. S.. SARS-CoV-2 Infection in Seven Childbearing Women at the Moment of Delivery, a Romanian Experience. **Cureus**, v.13, n.1, p.12811, 2021.

RCOG. The Royal College of Obstetricians and Gynaecologists. **Coronavirus infection and pregnancy**. 2020.

RCOG1. Royall College of Obstetricians and Gynecologists. **Coronavirus (COVID-19) Infection in Pregnancy**. 2020.

SHAH, P. S.; DIAMBOMBA, Y.; ACHARVA, G.; MORRIS, S. K.; BITNUN, A.. Classification system and case definition for SARS-CoV-2 infection in pregnant women, fetuses, and neonates. **Acta Obstet Gynecol Scand**, v.99, p.565-568, 2020.

STUEBE, A.. Should infants be separated from mothers with COVID-19? First, Do No Harm. **Breastfeed Med**, v.15, p.351-352, 2020.

VARDHELLI, V.; PANDITA, A.; PILLAI, A.; BADATYA, S. K.. Perinatal COVID-19: review of current evidence and practical approach towards prevention and management. **Eur J Pediatr**, v.12, p.1-23, 2020.

VIVANTI, A. J.; FELLOUS, C. V.; PREVOT, S.. Transplacental transmission of SARS-CoV-2 infection. **Nat Commun**, v.11, p.3572, 2020.

WANG, S. S.; ZHOU, X.; LIN, X. G.; LIU, Y. Y.; WU, J. L.; SHARIFU, L. M.. Experience of Clinical Management for Pregnant Women and Newborns with Novel Coronavirus Pneumonia in Tongji Hospital, China. **Curr Med Sci**, v.40, p.285-289, 2020.

WHO. World Health Organization. **Coronavirus disease (COVID-19): Pregnancy and childbirth**. 2020.

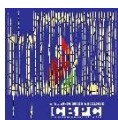
YANG, P.; WANG, X.; LIU, P.; WEI, C.; HE, B.; ZHENG, J.. Clinical characteristics and risk assessment of newborns born to mothers with COVID-19. **J Clin Virol**, v.127, p.104356, 2020.

ZENG, L.; XIA, S.; YUAN, W.. Neonatal early-onset infection with SARS-CoV-2 in 33 neonates born to mothers with COVID-19 in Wuhan, China. **JAMA Pediatr**, v.174, p.722-725, 2020.

ZHU, H.; WANG, L.; FANG, C.; PENG, S.; ZHANG, L.; CHANG, G.. Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. **Transl Pediatr**, v.9, p.51-60, 2020.

Os autores detêm os direitos autorais de sua obra publicada. A CBPC – Companhia Brasileira de Produção Científica (CNPJ: 11.221.422/0001-03) detém os direitos materiais dos trabalhos publicados (obras, artigos etc.). Os direitos referem-se à publicação do trabalho em qualquer parte do mundo, incluindo os direitos às renovações, expansões e disseminações da contribuição, bem como outros direitos subsidiários. Todos os trabalhos publicados eletronicamente poderão posteriormente ser publicados em coletâneas impressas ou digitais sob coordenação da Companhia Brasileira de Produção Científica e seus parceiros autorizados. Os (as) autores (as) preservam os direitos autorais, mas não têm permissão para a publicação da contribuição em outro meio, impresso ou digital, em português ou em tradução.

Todas as obras (artigos) publicadas serão tokenizadas, ou seja, terão um NFT equivalente armazenado e comercializado livremente na rede OpenSea (https://opensea.io/HUB_CBPC), onde a CBPC irá operacionalizar a transferência dos direitos materiais das publicações para os próprios autores ou quaisquer interessados em adquiri-los e fazer o uso que lhe for de interesse.



Os direitos comerciais deste artigo podem ser adquiridos pelos autores ou quaisquer interessados através da aquisição, para posterior comercialização ou guarda, do NFT (Non-Fungible Token) equivalente através do seguinte link na OpenSea (Ethereum). *The commercial rights of this article can be acquired by the authors or any interested parties through the acquisition, for later commercialization or storage, of the equivalent NFT (Non-Fungible Token) through the following link on OpenSea (Ethereum).*



<https://opensea.io/assets/ethereum/0x495f947276749ce646f68ac8c248420045cb7b5e/44951876800440915849902480545070078646674086961356520679561157666964359872513>