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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии
საქართველოს სამედიცინო სიახლე

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и http://www.nlm.nih.gov/bsd/uniform_requirements.html В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned
Requirements are not Assigned to be Reviewed.**

ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგების ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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THE IMPORTANCE OF ONE HEALTH IN PREVENTING THE SPREAD OF HIGHLY PATHOGENIC AVIAN INFLUENZA/H5N1

Takuma Hayashi^{1*}, Krishna Prasad Acharya², Sarita Phuyal³, Ikuo Konishi¹.

¹National Hospital Organization, Kyoto Medical Center, Cancer Medicine, Kyoto, Kyoto, Japan.

²Animal Disease Investigation and Control Division (ADICD), Department of Livestock Services (DLS), Hariharbhawan, Lalitpur, Nepal.

³Central Referral Veterinary Hospital (CRVH), Department of Livestock Services (DLS), Tripureshwar, Kathmandu, Nepal.

Abstract.

Infections with H5N1, a type of pathogenic avian influenza (HPAI) virus, are spreading among livestock farmers, particularly among dairy cows in the United States. Until now, HPAI/H5N1 has rarely infected humans, but transmission from H5N1-infected dairy cows to dairy workers has been reported. Additionally, cases of human-to-human transmission of H5N1 have been reported. It is thought that perhaps during the process of repeated amplification and replication of H5N1 viral genes in the mammary tissue of dairy cows, genetic mutations occurred that make H5N1 more susceptible to human infection. As more human spillover events are identified, there is pressing need to apply a one health approach to better characterize circulating highly pathogenic avian influenza (HPAI) viruses in wild migratory birds globally. It is important to develop a comprehensive international strategy for surveillance and monitoring systems in wild birds so the epidemiology of HPAI can be compared between countries and regions. In this review, we discuss the importance of One Health in preventing the spread of highly pathogenic avian influenza/H5N1.

Key words. Highly pathogenic avian influenza, H5N1, influenza virus, Bird.

Introduction.

High pathogenicity avian influenza (HPAI) H5N1 clade 2.3.4.4b has caused ongoing outbreaks of disease ("H5 bird flu") in wild birds, from 2021, throughout much of North and South America, Europe, Asia and Africa, and into Antarctica and its islands. HPAI/H5N1 clade 2.3.4.4b is an infectious disease caused by influenza A viruses of the family orthomyxoviridae, specifically strains H5N1 or H7N1 [1] that cause morbidity and mortality in both birds and mammals including humans. Outbreaks of HPAI cause significant economic loss in the poultry sector, amounting to billions of dollars globally, with low and middle-income countries (LMICs) bearing the brunt of such outbreaks [2].

HPAI viral infections are a major problem for poultry farms, with occasional outbreaks in humans that have led to 888 human deaths between January 1, 2003 and 28 March 2024 [3]. HPAI has been detected in over 400 species of poultry and wild birds [4]. Although it was traditionally thought that domestic poultry largely maintained and transmitted HPAI, more recent research findings have established that wild, migratory birds are a major risk factor for the transmission of different HPAI genotype HPAI virus and are the vectors of long-distance dispersal of HPAI viruses [5-9]. Furthermore, the emergence of different HPAI genotypes and the rapid diversification of HPAI viruses via recombination events seems to be occurring in wild birds [10,11]. Thus, to effectively monitor and control HPAI globally,

it is necessary to have timely detection, prevention, and control the HPAI virus in wild birds.

To date, most plans and policies related to HPAI control have focused on preventive and control measures on domestic poultry. Not enough attention has been paid to prevention and control measures in wild birds, which is likely due to limited surveillance and research of HPAI among wild birds and the competing priorities of other public health problems. It is necessary to identify and address key knowledge gaps of HPAI in wild birds to direct surveillance and monitoring programs, understand their role in transmission of the HPAI viruses, and characterize transmission dynamics of HPAI in wild birds, as such efforts could potentially identify efficient and cost-effective interventions. The United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is taking emergency action to help protect the critically endangered California condors after several have died from HPAI [12]. APHIS has approved the emergency use of HPAI vaccine in an attempt to prevent additional deaths of these birds. The U.S. Fish and Wildlife Service (USFWS) approached APHIS about vaccination after a California condor was found dead in late March and then confirmed positive for HPAI at APHIS' National Veterinary Services Laboratories. Since then, 13 condors have died and were confirmed to have HPAI, and two others are in recovery at a rehabilitation center.

In contrast to domestic poultry, which primarily relies of bird culling and habitat destruction as the control measures, innovative alternative strategies are important to monitor and control HPAI in wild birds. First risk- assessment is necessary to understand the population and area at high risks. Then risk-based active surveillance and monitoring involving both domestic and wild birds should be targeted to those areas and population at high risks such as water bodies, wild bird migration stopover sites, and common foraging areas for wild birds and domestic birds where aquatic birds and migratory birds are concentrated. This proactive targeted surveillance and monitoring system may aid better understanding of the epidemiology of HPAI virus, drivers of virus maintenance, and transmission pathways and help in implementing measures to early detect and response to HPAI virus and help break the chain of transmission of the virus. Thus, continuous vigilance, strict biosecurity measures and hygiene on poultry farms, and public health measures such as use of personal protective equipment (PPE) while visiting poultry farms and following proper cleaning and disinfection before and after visiting wild bird habitats including wetlands would be the best feasible option to control HPAI in both domestic and wild birds.

Finally, in order to effectively prevent and control HPAI in wild birds, rigorous surveillance, early detection and control



Figure 1. As the concept of One Health indicates, the conservation of the Earth's ecosystems can only be achieved through the cooperation of both human and animal health. To achieve and maintain this, efforts to maintain the health of both humans and animals are necessary. One Health initiative is important for preventing the spread of emerging infectious diseases.

and biosecurity measures and development and dissemination of vaccines to prevent the spread of HPAI infection are the keys; thus, current employed plans and policies related to HPAI control should be revised and active framework for the risk assessment, surveillance and monitoring of HPAI in wild birds should be incorporated into HPAI control plan so as to effectively control HPAI in wild birds and domestic birds and safeguard poultry industry, wild bird species and protecting humans health. This should involve joint action by professionals from wildlife sectors, animal health sectors and scientists working on avian influenza through coordinated “One-health” approach (Figure 1). The areas where wild birds are concentrated should be under an increased state of alertness, closely monitored and any unusual deaths in those areas should be investigated promptly to track the possible source of infections and possible contacts and reported to higher authority, which help to better monitor and control the spread of HPAI.

Currently, there is no N5H1 vaccine on the market to prevent the spread of infection by N5H1, so vaccines to prevent the spread of infection by other types of influenza viruses are administered in combination [13]. Vaccination with successive heterologous vaccines may represent the best alternative to widely protect valuable or endangered bird species against HPAI virus infection [13,14]. Vaccination with successive heterologous vaccines may represent the best alternative to widely protect valuable and/or endangered bird species against highly pathogenic AI virus infection. In 2005, European Commission directive 2005/744/EC allowed controlled vaccination against avian influenza (AI) virus of valuable avian species housed in zoos. In 2006, 15 Spanish zoos and wildlife centers began a vaccination program with a commercial inactivated H5N9 vaccine.

In the past, preclinical studies using mice and other small animals have been conducted to examine the efficacy of vaccines against novel viruses. Currently, preclinical studies using fillets are being conducted to examine the anti-infectious effect of novel vaccines against highly pathogenic avian

influenza virus (HPAI) H5N1 [15,16]. Preclinical results have shown that serum collected from fillets vaccinated with mRNA-based (HPAI) H5N1 vaccines protected fillets from HPAI/H5N1 infection [15,16].

Other preclinical studies using mice and fillets have shown that even if vaccination has an inhibitory effect on novel virus infection, it does not necessarily mean that vaccination in humans will have an inhibitory effect on virus infection. Constructing new vaccines against novel viruses therefore requires sufficient virological and biotechnological knowledge.

Some may argue that investing in the control of HPAI in wild birds is a waste of resources as the majority of cases of HPAI are found in domestic birds with only sporadic cases seen in wild birds. However, recent published papers have shown that preventive and control measures in wild birds can significantly reduce the incidence of HPAI outbreaks in domestic poultry [17,18], indicating that preventing and controlling HPAI in wild birds is a cost-effective strategy for the control of HPAI.

Therefore, there is an urgent need to control HPAI in wild migratory birds, which can be accomplished by developing and implementing a system for comprehensive surveillance and monitoring systems in wild birds to identify the situation of HPAI in wild birds and enforcing preventive and control measures at wild-and-domestic bird interface. Control measures should be designed to interrupt transmission within wildlife and spillover events between domestic and wild birds, as HPAI virus has been shown to readily recombine with a high risk of cross-species transmission events.

Competing interests:

The authors declare no conflict of interest.

Author contribution:

TH, KPA, and SP were involved in the study design, data collection, data review and interpretation, and manuscript writing. TH, KPA, and SP were involved in the literature search, study design, data collection, data interpretation, and

manuscript writing. TH, KPA, and SP were involved in data collection and interpretation. TH, KPA, and SP were involved in data collection and interpretation and manuscript writing. TH, KPA, and SP were involved in the study conception and design, data analysis and interpretation, and manuscript writing. TH and IK were the medical leads for AstraZeneca, and they participated in the data collection and evaluation and manuscript writing and editing. TH and IK were the lead physicians and were involved in the study design and conduct, data analysis and interpretation, and manuscript review.

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Data are available on various websites and have also been made publicly available. More information can be found in the first paragraph of the Results section. The transparency document associated with this article can be found in the online version at https://kyoto.hosp.go.jp/html/guide/medicalinfo/clinical_research/expand/gan.html (accessed on 18 May 2024).

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This research is not clinical research, therefore Informed consent is not required.

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REFERENCES

1. Verhagen J.H, Fouchier R. A. M, Lewis N. Highly pathogenic avian influenza viruses at the wild-domestic bird interface in Europe: Future directions for research and surveillance. *Viruses*. 2021;13:212.
2. Mcleod A, Morgan N, Prakash A, et al. Economic and social impacts of avian influenza. *FAO Emergency Centre for Transboundary Animal Diseases Operations (ECTAD)*. 2005.
3. FAO. Human infection with avian influenza A(H5) viruses. *Avian Influenza Weekly Update Number 983*. World Health Organization. 2024.
4. FAO. Scientific Task Force on Avian Influenza and Wild Birds statement on: H5N1 High pathogenicity avian influenza in wild birds - Unprecedented conservation impacts and urgent needs. 2023.
5. Global Consortium for H5N8 and Related Influenza Viruses. Role for migratory wild birds in the global spread of avian influenza H5N8. *Science*. 2016;354:213-217.
6. Van der Kolk J. H. Role for migratory domestic poultry and/or wild birds in the global spread of avian influenza? *Veterinary Quarterly*. 2019;39:161-167.
7. Wille M, Waldenström J. Weathering the Storm of High Pathogenicity Avian Influenza in Waterbirds. *Waterbirds*. 2023;46:100-109.
8. Lv X, Li X, Sun H, et al. Highly Pathogenic Avian Influenza A(H5N8) Clade 2.3.4.4b Viruses in Satellite-Tracked Wild Ducks, Ningxia, China, 2020. *Emerg Infect Dis*. 2022;28:1039-1042.
9. Teitelbaum CS, Mastro NM, Sullivan JD, et al. North American wintering mallards infected with highly pathogenic avian influenza show few signs of altered local or migratory movements. *Sci. Rep*. 2023;13.
10. Dugan V.G, Chen, Spiro DJ, et al. The evolutionary genetics and emergence of avian influenza viruses in wild birds. *PLoS Pathog*. 2008.
11. Avian Flu Diary. Continued expansion of high pathogenicity avian influenza H5 in wildlife in South America and incursion into the Antarctic region. *OFFLU statement*. 2023.
12. USDA. USDA takes action to help protect endangered California Condors from highly pathogenic avian influenza. *Animal and Plant Health Inspection Service U.S. DEPARTMENT OF AGRICULTURE*. 2023. <https://www.aphis.usda.gov/news/agency-announcements/usda-takes-action-help-protect-endangered-california-condors-highly>
13. Vergara-Alert J, Fernández-Bellón H, Busquets N, et al. Comprehensive serological analysis of two successive heterologous vaccines against H5N1 avian influenza virus in exotic birds in zoos. *Clin. Vaccine Immunol*. 2011;18.
14. WOA. Considerations for emergency vaccination of wild birds against high pathogenicity avian influenza in specific situations. 2023.
15. Chiba S, Kiso M, Yamada S, et al. Protective effects of an mRNA vaccine candidate encoding H5HA clade 2.3.4.4b against the newly emerged dairy cattle H5N1 virus. *EBioMedicine*. 2024;109:105408.
16. Hatta M, Hatta Y, Choi A, et al. An influenza mRNA vaccine protects ferrets from lethal infection with highly pathogenic avian influenza A(H5N1) virus. *Sci Transl Med*. 2024;16:eads1273.
17. Pandit P.S, Bunn D.A, Pande S.A, et al. Test-Modeling highly pathogenic avian influenza transmission in wild birds and poultry in West Bengal, India. *Sci. Rep*. 2013;3:1-8.
18. Keawcharoen J, van den Broek J, Bouma A, et al. Wild birds and increased transmission of highly pathogenic avian influenza (H5N1) among poultry, Thailand. *Emerg. Infect. Dis*. 2011;17:1016-22.