



## Western Season with Epidemic Flu, SARS-CoV-2 Omicron Strains and hRSV

Giulio Tarro

T.&L. de Beaumont Bonelli Foundation for Cancer Research, Naples, Italy

### ABSTRACT

**Last Fall/Winter season there was not only the ghost of COVID-19 in circulation, but many other respiratory microbic agents were present with the return of influenza viruses and of the RSV, also it is worthy to mention the adenoviruses family and even the streptococcus haemolytic. The main reason of this paper is the description of what happened with the final goal to be prepared for an early diagnosis and a prompt therapy that put *in primis* the prevention with specific vaccines when there is the possibility.**

**Keywords:** Flu virus, SARS-CoV-2, hRSV, Influenza, Vaccine

### INTRODUCTION

Respiratory infections caused by influenza-type viruses, of which the syncytial virus is also a part, are seasonal phenomena that recur every year in our climates at the beginning of winter: they are mainly benign infections that can affect up to 50% of children and which in the majority of cases are limited to an inflammation of the upper respiratory tract which lasts 5-7 days; in a minimal percentage of cases the infection can extend to the bronchi and lungs and the disease which then develops is serious and, especially for children in the first six months of life, can be dangerous, so much that in almost all western countries from 1 to 5% of infants who are affected by bronchiolitis die or go into a coma due to the lack of oxygen that reaches the brain following a malfunction of the respiratory system (1).

The hRSV viruses (Human respiratory syncytial virus) have a biological cycle of 4 - 5 years, in the sense that the greatest number of patients occurs after 3-4 years. This was also the case in Naples where, for example in 1975, there had been a morbidity and mortality from respiratory diseases quite similar to those of 1978. In 1975, however, no one spoke of "Male Oscuro", perhaps due to the dispersion on the territory of children who died of respiratory diseases, perhaps because then there was no will - probably present in 1978 - to create a climate of panic by flaunting a "Dark Evil" heralding new funding for health care facilities.

### METHODS

For the emergency created by the epidemic of "influenza of the pigs" in Mexico it was correct not to create alarmism being victims of a bad information. The possibility that the virus arrives in other parts of the world is real as for all the types of influenza virus. In order that a strain has a wide distribution, its antigenic characteristics must ensure that it escapes the neutralization of antibodies of the host and of the surrounding population. So the outbreaks will happen with those strains that have dominant antigens that fit the deficiency, or better, the absences of

antibody in the population. It seems, in conclusion that the flu virus shows an ability and an aptitude for survival built on the possibility of emergence of new models that allow the virus being confused easily through populations still partly immune to previous antigenic forms. According to this view, the changes in the influenza A can be designed in single meaning, in the context of a principle and of an evolutionary progress, from Burnet named immunological drift or steering immunology. The antiviral drugs (inhibitors of the neuraminidase, receptor of the virus surface) should be assumed within 48 hours by the appearance of the influenza symptoms and for the subjects that have had a close contact with people infected by the flu virus. The vaccination against the influenza is the most effective method to prevent the illness. From the moment that we find the isolation of a new flu virus, we must wait for the preparation of a new specific vaccine that will be ready for the next influenza season in Autumn (2).

### RESULTS

With the Food and Drugs Administration (FDA) and Centers for Disease Control and Prevention (CDC) approval of bivalent vaccines, it appears that we finally have an advantage with COVID-19 vaccines, as they are able to neutralize circulating BA.4/BA.5 strains (3). While there are no other transmissible variants still in circulation. The CDC recommends a six-month interval after a previous booster or natural infection because the new vaccines meet a population that has already had a post-vaccination infection with the omicron variants this year and therefore have strong ongoing protection in regarding reinfection with BA. 5 (4).

According to recent studies a booster now protects for at least six months. Another study showed that antibody levels stabilize six to nine months after vaccination for subjects with or without previous infection (5).

### DISCUSSION

The history of flu viruses teaches that the influenza has origin from animals birds, generically aquatic, then transferred to man through the leap into pigs. The promiscuity of the herds, as it is in use in Asia, determines this transition and then the spread. The Spanish influenza (1918, H1N1), the one from ASIA (1957, H2N2), that of Hong Kong (1968, H3N2) and so on have had this origin (6).

The strains common in some years may have also relations with those of other years.

The persons mostly old people have antibodies directed towards the antigens more important of the strains with which they were in contact. With the progress of the age it is a broader spectrum immunity that is reflected in antibodies polyvalent made through the contact with many antigens primary and secondary present in strains that they meet during the following years.

But each contact following with a flu virus of type A involves not only of specific antibodies, but also an increase in those directed towards the strain responsible for the first flu infection of the subject (phenomenon of Davenport or doctrine of original sin). In this way, the immunization to a particular strain, spread in a certain period, involves progressively increasing difficulty in its further distribution and creates the selective advantage, for some variant of the virus, to multiply and spread. The new strains will be in conditions of an increase in visitors, regardless of whether they have or not an immunologic experience with the previous

strains. As a result of that, shortly after the appearance of a new type, the old forms will disappear and the new family will become dominant for a period which, in general covers 10-20 years, in which there is, for the emergence of minor antigenic variation, the subdivision in various subtypes.

The outcrops of a new epidemic strain may, therefore, be regarded as a process of development interesting the characteristics of the strain and the susceptibility of the population. In order that a strain has a wide distribution, its antigenic characteristics must ensure that it escapes the neutralization of antibodies of the host and of the surrounding population. So the outbreaks will happen with those strains that have dominant antigens that fit the deficiency, or better, the absences of antibody in the population. It seems, in conclusion, that the flu virus shows an ability and an aptitude for survival built on the possibility of emergence of new models that allow the virus being confused easily through populations still partly immune to previous antigenic forms. According to this view, the changes in the influenza A can be designed in single meaning, in the context of a principle and of an evolutionary progress, from Burnet said immunological drift or steering immunology. Very important to remember that it was demonstrated the presence of antibodies to the more recent strains of 1957 Asian flu (A2) in older segment of that population: in Asian influenza there were obviously strains with dominant characters, other than those that had characterized the previous years, more or less, but similar to those of the strains widespread much before (1889-90 pandemic).

For the emergency created by epidemic of avian flu in Asia it was right not to create panic as victims of a bad information (7). The possibility that the avian virus enters in other parts of the world it was like the rest for all types of flu viruses. It is clear that the dead animal is harmless, and therefore there are other veterinary and agricultural interests. There is a potential risk of genetic recombination with human flu viruses that might hesitate to do a viral variant capable of a transmission from human to human.

In the course of epidemic of avian influenza that struck in 2005 10 Asian countries (China, Pakistan, Thailand, Cambodia, Indonesia, North Korea-South Korea, Taiwan, Laos, Vietnam) with 80 million chickens died or sacrificed and 42 fatal human cases was identified H5N1 as an etiologic agent, the same as the one that in 1997 had caused an epidemic outbreak in Hong Kong with 18 human subjects infected and 6 dead and with the sacrifice of 1.5 million chickens (8).

The avian influenza recent outbreaks with involvement of viral strains as H9N2 in 1999, infected two children and other individuals, and in 2003, infected a boy in, Hong Kong, while H5N1 hit three subjects of a family killing two in 2003. At the same time in the Netherlands an epidemic from avian influenza viruses H7N7 hit 83 people and led to death a veterinarian.

In 2005 in the USA outbreaks of avian influenza have been identified in Texas and in Delaware (virus H7N2), and in the last State together with territories of Maryland and of Virginia there are working 14,000 people and 1,900 families that produce the 8% of the meat of American poultry, with a budget of one and a half billion dollars. In 2003 the American export in Europe has reached the share of eight million and eight hundred thousand eggs and 452 thousand chicks, respectively for 20 million and 3 million of Euro.

For the emergency created by the 'epidemic of "influenza of the pigs" in Mexico it is correct not to create alarmisms being victims of a bad information (9). The possibility that the virus arrives in other parts of the world is real as for all the types of influenza virus (10). For the SARS a direct contact was necessary, in practical terms the so-called droplets of Pflugge, for this swine influenza it is different, in fact, it also spreads through the air to distance. And a potential risk exists of a panic syndrome that it often happens through a bad information or a scarce knowledge of the phenomenon. Then no alarmism because the number of the victims is decidedly inferior to other pandemics (11).

### CONCLUSION

The vaccination against the influenza is the most effective method to prevent the illness. From the moment that we find the isolation of a new flu virus, we must wait for the preparation of a new specific vaccine that will be ready for the next influenza season in Autumn.

The antiviral drugs (inhibitors of the neuraminidasis, receptor of the virus surface) should be assumed within 48 hours by the appearance of the influenza symptoms and in the subjects that have had a close contact with people infected by the flu virus.

In conclusion the history of flu viruses teaches that influenza originates from birds, usually aquatic, then it is transferred to man through the lea pinto pigs. The promiscuity of the herds, facilitates this transition and then the spread. Three pandemics caused by influenza A viruses, which occurred in the 20th century, have all had this origin: the "Spanish flu" (1918, H1N1), the "Asian flu" (1957, H2N2) and the "Hong Kong flu" (1968, H3N2).

The 2009 H1N1 influenza virus acted during the winter in Australia and New Zealand yielding a pattern effect for the treatment of patients during the winter in the Norther Hemisphere. The performance of rapid diagnostic test for the detection of novel influenza A (H1N1) virus was evaluated by the Center for Disease Control and Prevention (12,13).

The finding of severe respiratory disease concurrent with the circulation of H1N1 influenza was proved by the aforementioned test. Even the potential impact of pandemic influenza during the Hajj pilgrimage was taken in account to reduce the substantial effect on the crowd to spread the infection.

Whenever the next pandemic influenza arises, many more lives may be at risk. By heeding the lessons from the 2009 H1N1 pandemic, the international community will be able to cope more successfully the next time (14).

Of course it is very important, if research could yield a universal (non-strain-specific), long-lasting, safe and effective vaccine against influenza in order that the annual frenzy of action against influenza would be trasformed into an efficient, long-term prevention program (15,16,17).

Finally after the global enviroment with the COVID-19, the discovery of a sistematic therapy of SARS-CoV-2 (18), the "pros and cons" of COVID-19 vaccines (19), we can go back to the priorities and threats of antibiothic resistance as a top priority of the American Society of Microbiology (20).

## ACKNOWLEDGMENTS

The author thanks for their support: Foundation T. & L. De Beaumont Bonelli for Cancer Research. Naples, Italy.

## References

1. Tarro G. The Epidemiy of Bronchiolitis in Children. *Messina Medica* 2.0. January 9, 2023.
2. Tarro G. Epidemic Flu Viruses. *EC Microbiology* 15.4 (2019): 304-308.
3. Collie S and Nayager J. Effectiveness and Durability of the BNT162b2 Vaccine against Omicron Sublineages in South Africa. *New Engl J Med* 387;14. October 6, 2022.
4. Malato J, Gomes MC and Graca L. Risk of BA.5 Infection among Persons Exposed to Previous SARS-CoV-2 Variants. *New Engl J Med* 387;10. September 8, 2022.
5. Tarro G. On the End of a Nightmare (COVID-19). The Role of the Immune System. *British Journal of Healthcare and Medical Research - Vol. 9, No. 6.* December, 25, 2022.
6. Zimmer SM and Burke DS. "Historical perspective--Emergence of influenza A (H1N1) viruses". *New England Journal of Medicine* 361.3 (2009): 279-285.
7. Enserink M, Cohen J (2009) Virus of the year. The novel H1N1 influenza. *Science* 326: 1607.
8. Tarro G, Esposito C. emerging viral agents at risk in global health approaches to early diagnosis and prompt therapy. *International Conference on Bioinformatics and Computational Biology.* CS Red Press. Las Vegas USA 2011.
9. Chowell G, Bertozzi SM, Colchero MA, Lopez-Gatell H, Alpuche-Aranda C, et al. ) Severe respiratory disease concurrent with the circulation of H1N1 influenza. *N Engl J Med* 361: 674-679, 2009.
10. Dawood FS, Jain S, Finelli L, Shaw MW, Lindstrom S, Garten RJ, Gubareva LV, Xu X, Bridges CB, Uyeki TM. Emergence of a novel swine-origin influenza A (H1N1) virus in humans. *N Engl J Med* 360:2605–2615, 2009
11. Lister P, Reynolds F, Parslow R, Chan A, Cooper M, et al. Swine-origin influenza virus H1N1, seasonal influenza virus, and critical illness in children. *Lancet* 374: 605-607, 2009.
12. ANZIC Influenza Investigators: Webb SA, Pettilä V, Seppelt I, Bellomo R, et al. Critical care services and 2009 H1N1 influenza in Australia and New Zealand. *N Engl J Med* 361: 1925-1934, 2009.
13. Centers for Disease Control and Prevention (CDC) Evaluation of rapid influenza diagnostic tests for detection of novel influenza A (H1N1) Virus - United States, 2009. *MMWR Morb Mortal Wkly Rep* 58: 826-82, 2009.
14. Esposito C, Di Spirito A, Cuomo N, Tarro G et al. Tracking the 2009 H1N1 Influenza Virus in the Italian Region Campania. *Journal of Cellular Physiology.* Vol 227: 2813-2817, July 2012.
15. Tarro G. Analyzing the risk of Flu for understanding a better prevention. *International Conference on Flu.* Chicago, USA June 8-10 2015.
16. Tarro G. Emerging Influenza Viruses at Risk in Global Health. *2nd International Conference on Flu.* San Francisco, USA, November 28-30, 2016.

17. 23. Tarro G. Emerging H1N1 Influenza A Virus and its Specific Prevention. 13th Annual Congress on Vaccines, Therapeutics & Travel Medicine: Influenza and Infectious Disease, Atlanta, USA, December 01/02, 2016.
18. Tarro G. Enviroment and Virus Interctions: Towards a Systematic Therapy of SARS-CoV-2. *British Journal of Healthcare and Medical Research* - Vol. 9, No. 4 August, 25, 2022.
19. Tarro G. Pros and Cons of COVID-19 Vaccines. *British Journal of Healthcare and Medical Research* - Vol. 10, No. 1 February 25, 2023.
20. Tarro G. Priorities and Threats of Antibiotic Resistance. *British Journal of Healthcare and Medical Research* - Vol. 10, No. 2 April 5, 2023.