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Influenza and Its Symptoms

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INTRODUCTION

Influenza, also known as "the flu", is an infectious disease caused by the influenza virus [1-3]. Influenza is one of the most prevalent respiratory viruses responsible for annual epidemics as well as occasional pandemics which sometimes have devastating results [4-5]. The virus is classically considered to mainly infect the upper, and sometimes lower respiratory tract, clinically giving rise to upper respiratory symptoms and respiratory diseases [6-10]. In addition to respiratory disease, extra-respiratory complications have been described, including neurological as well as ocular. Furthermore, associations between respiratory viral infections and the development of neuro-inflammatory and neurodegenerative diseases have been found out [11-20].

Influenza viruses are highly contagious and can spread easily in all geographical regions. Although it results show mild symptoms in the majority of cases, illnesses can result in hospitalizations and deaths mainly among high-risk groups who are the very young, elderly or chronically ill patients [21-30].

Classification of Influenza

Influenza is classified into three types

Influenza is an extremely variable, fast-mutating virus. It is basically classified as
Influenza virus A
Influenza virus B and
Influenza virus C
Although these three seems to be related to each other it has different disease characteristics [31-35] .

Influenza A : In the early 21st century only we were warned about Influenza virus A, Interspecies transmission of influenza A viruses circulating in wild aquatic birds occasionally results in influenza outbreaks in mammals, including humans [36].

Influenza virus A are of many types, some of the types and their diseases are
H1N1: - Spanish Flu , Swine Flu
H2N2: -Asian Flu
H3N2: - Hong Kong Flu
H5N1: - Bird Flu
As Per antigenicity of Hemagglutinin (HA) and Neuraminidase (NA) molecules Type A is classified into 16 HA subtypes (H1-H16) and 9 NA subtypes (N1-N9)[37-47] .

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H1N1 Infection causes Acute Respiratory Distress Syndrome (ARDS). H5N1, H1N1 and the novel H7N9 are type A influenza viruses which belongs to the RNA viral family Orthomyxoviridae [48]. Unlike type B and C, Influenza A virus spreads very rapidly and are capable birds and animal infections. Specifically, H5N1 viruses mainly effects the respiratory tract and causes severe pneumonia, lymphopenia, hypercytokinemia and hyperchemokinemia [49-55]

The viral RNA polymerase of influenza A virus lacks a proofreading mechanism. Thus, it is able to produce accumulating point mutations, which eventually results in amino acid substitutions [56-62]. Changes in hamaglutinin and neuraminidase are the most crucial and may affect both the infection rate and the immunogenicity of the viral strain, explaining how influenza virus can cause epidemics year after year producing mild to severe respiratory illness in 30-50 million people [63-70]

Influenza Virus B

Influenza virus B is a genus in the virus family Orthomyxoviridae. The only species in this genus is called "Influenza B virus. Influenza B is found to infect only humans and seals giving Influenza [71-75]. It causes a less severe reaction than Influenza A virus, but occasionally, Influenza B virus can still be extremely harmful. Influenza B does not have classification and do not cause pandemics [76-80]. The symptoms of Influenza B infections are similar to that of Influenza A. Further diminishing the impact of this virus "in man, influenza B viruses evolve slower than A viruses and faster than C viruses". Influenza virus B mutates at a rate 2 to 3 times low than type A

The fever , aches, and pains begin to go away on days 2 through 4. But new symptoms occur, including:

- Dry cough
- Increased symptoms that affect breathing
- Runny nose (clear and watery)
- Sneezing
- Sore throat

Most symptoms go away in 4 to 7 days. The cough and tired feeling may last for weeks and sometimes the fever again retreats. Some people may lose their appetite. The flu can make asthma, breathing problems, and other long-term illnesses and conditions worse [81-95].

Influenza virus C

Influenza C virus is a member of the Orthomyxoviridae, which is characterised by a single segmented RNA genome strand of negative polarity. Whereas, influenza A and B viruses bear eight RNA segments, the genome of influenza C virus bears only seven RNA segments. The two other family members, Thogotovirus and Isavirus, have six and eight RNA segments, respectively [96-110].

The generation of recombinant influenza C viruses from seven bi-directional plasmids is an efficient system with regards to virus yield and time spent. Employing certified Vero and MDCK cells, this system is independent of the use of de-embryonated chicken eggs for virus augmentation [111-117]. Studies on the generation of influenza C viruses with mutations in the nc ends of Polybutylene 1 indicate that base pairing between the viral ends is indispensable for virus rescue, and the exact nature of each nucleotide in the nc regions strongly influences viral titres [118-125].

Technology used in detecting Influenza virus

Microarray technology

Microarray technology is one of the primary evolutions in the field of genome biology in recent years. Microarrays are arrangement of biomolecules on a solid surface like glass slide. Based on the principle of homology, any target material (e.g. RNA, DNA, proteins etc.) can be detected on the basis of suplimentarity/homology with the spotted probes [126-130].

Statastics

Influenza virus infection or influenza vaccine administration seldom induces ITP. Shizuma summarized 9 reported cases of ITP [2 cases (22.2%) involved children], including Evans syndrome after influenza Infection (2 cases) or after influenza vaccine administration (7 cases), and recent definition and current management of ITP [131-133]. All the 9 reported patients who developed ITP after influenza

virus infection or influenza vaccine administration were treated with steroids, immunoglobulin, or both. Nonetheless, 1 of 9 cases of ITP, including Evans syndrome, associated with influenza virus infection or influenza vaccine administration died, possibly because of a poor condition at diagnosis. Moreover, 1 of the 8 surviving patients developed chronic ITP, and the other 7 entered remission [134-136].

Davidson HA et al., identified 364 patients hospitalized with laboratory-confirmed 2009 H1N1 influenza in Georgia from December 1, 2009 through April 30, 2010. Sixteen patients died prior to survey implementation and were excluded, leaving 348 patients who met our case definition; 146 patients (42%) agreed to participate in the study and were interviewed by telephone. The remaining 202 patients refused or could not be reached. The majority of survey respondents (75%) were over 24 years of age (mean age: 41 years); 78 (53%) were female, and 60% were white and 32% were black. Demographic data from hospitalization records for 133 of the 202 patients who did not participate in the survey indicated that non - respondents were a mean age of 39 years, 49% were female; 36% were white and 50% were black [137-139].

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CONCLUSION

The easiest way to prevent Influenza is to get vaccination each year. The vaccination is to be given only under the supervision of doctor or health care professional

Although vaccination is the mainstay of influenza control and prevention, the average vaccination rate among in Dutch nursing homes is low (20%).Therefore, the use of (a combination of vaccination and) PEP with oseltamivir during an influenza outbreak may play an important role in preventing influenza transmission in nursing homes .By providing social support and education with reliable information about the perceived benefits, efficacy, and safety could raise awareness and improve knowledge of appropriate influenza outbreak interventions and confidence in antivirals among the nursing staff [140-144]

Future Perspective

Pandemic influenza still remains as one of the most serious threats to global public health. Continuous global vigilance to monitor unfolding ultimatums is crucial. Of the weapons available to control a pandemic, vaccination is potentially the most powerful, but currently there are serious limitations to expedient availability of vaccine supply in an emergency. Many novel influenza vaccines are in evolution, some of which have the possibilities to deliver the huge quantities of vaccine that would be required in a pandemic in a short period of time. However, for the near future, it is likely that the principal vaccine that will be established in a pandemic will be an inactivated egg-derived vaccine of the kind that has been available for several decades. There needs to be a continued focus on improvement to the vaccine response system that will require close association between influenza and vaccine experts, manufacturers, regulators and public health authorities around the world [145-150]

REFERENCES

1. Salah Thabit Al Awaidy, Idris Al Obeidani, Jeffrey V. Singh, Salim Al Mahrouqi, Suleiman Salim Al Busaidy, et. al. Epidemiology of Pandemic H1N1 in Oman and Public Health Response, 2009. J Community Med Health Educ. 2015; 5:343.
2. Gabriel Aringnestad, Kirsti Vainio and Olav Hungnes. Does Virus Interference Account for the Multiple Epidemic Waves that are Characteristic of the 1918 Spanish Influenza and other Influenza Pandemics? J Anc Dis Prev Rem. 2015; 3: 121.
3. Camila S Silva, Lisa B Mullis, Olavo Pereira Jr, Linda J Saif, Anastasia Vlasova, et. al. Human Respiratory Coronaviruses Detected In Patients with Influenza- Like Illness in Arkansas, USA. Virol Mycol. 2014; S2: 004.
4. Heidi A Davidson, Erin Kennedy, Michael A Jhung, Cherie Drenzek, Ariane Reeves. et. al. Knowledge, Attitudes and Practices Regarding 2009 H1N1 Vaccine Among Patients Hospitalized With Influenza A (H1N1) pdm09. Virol Mycol. 2014; S2: 002.

5. Gregorius J Sips, Andrew Pekosz, Anke Huckriede, Diane E Griffin, Jan C Wilschutbr nbsp, et. al. Interaction of Influenza A/H1N1pdm Virus with Human Neuronal and Ocular Cells. Virol Mycol. 2014; S2: 001.
6. Esperanza Romero Fernaacutendez, Carlos Enrique Suarez Acosta and Calvo Elpidio. Parainfluenza Virus Type 4b Infection in a Patient with Mixed Connective Tissue Disease. Rheumatology (Sunnyvale). 2015; 1000149.
7. Lai KY, Wing Yiu George NG and Cheng FF. The W-Shaped Mortality-Age Distribution of Novel H1N1 Influenza Virus Helps Reconstruct the Second Wave of Pandemic 1918 Spanish Flu. J Pulm Respir Med. 2015; 5: 245.
8. Marc Souris, Daniel Gonzalez, Witthawat Wiriyarat, Kamlang Chumpolbanchorn, Supaluk Khaklang, et. al. Potential Role of Fresh Water Apple Snails on H5N1 Influenza Virus Persistence and Concentration in Nature. Air Water Borne Diseases. 2015.
9. Maceacute M Schuurmans and Nicolas J Mueller. Prolonged Viral Shedding of Influenza Virus: Which Definition? J Med Microb Diagn. 2014; 3: 171.
10. Tecu C, Mihai ME, Alexandrescu VI and Lupulescu E. Concise Communications: Death of a Patient Aged 2.5 Years after Infection Cause Parainfluenza Virus Type 1. J Med Microb Diagn. 2014; 3: 166.
11. Lai KY, George WYN and Fanny FC. The 1918 Spanish Influenza Pandemic. J Pulm Respir Med. 2015; 5: 233.
12. Ana Priscila Perini. Influenza, What's Is Going On? J Infect Dis Ther. 2014; 2:e105.
13. Jonn CW Bailey. Employing a Multifaceted Approach Aimed at Increasing Influenza Vaccination Rates. J Infect Dis Ther. 2014; 2:190.
14. Yoshiki Katsumi, Osamu Otabe, Satoshi Sakaue, Yusuke Tsuma, Mihoko Yamaguchi, et. al. Incomplete Inhalation of Laninamivir Octanoate in Children with Influenza. Pediat Therapeut. 2015; 5: 225.
15. Rossella Sgarbanti, Donatella Amatore and Lucia Nencioni. Host Cell Redox-Regulated Pathways as Targets for Novel Anti-influenza Strategy. J Antivir Antiretrovir. 2014; 6: e118.
16. Guanghao Sun, Yu Yao, Ritsu Yoshinaka, Mayumi Ikegami, Seokjin Kim, et. al. A Pediatric Infection Screening System with a Radar Respiration Monitor for Rapid Detection of Seasonal Influenza among Outpatient Children. J Infect Dis Ther. 2014; 2:163.
17. Kshitija Iyer and Sumalatha Pola. Probable Bioweapon: Influenza Type A Virus A Short Case Report. J Bioterror Biodef. 2014; 5: R1101.
18. Masatoki Kaneko, Rie Yamashita, Tomoyuki Suzuki, Yuki Kodama, Hiroshi Sameshima and Tsuyomu Ikenoue, et. al. Early Onset Nontypable Haemophilus influenzae Sepsis in a Preterm Newborn Infant. J Clin Case Rep. 2014; 4:392.
19. Imran Sheikh, Ayesha Kanwal, Annette Kyprianou. The Role for Prudence before Describing Novel Infectious Etiologies for Acute Pancreatitis. The Experience of One Institution Before Describing Influenza B Pancreatitis. JOP. J Pancreas. 2011; 12.
20. Joel K Weltman. An Immunobioinformatic Comparison of Influenza A Subtype Hemagglutinins. J Med Microb Diagn. 2014; 3: 135.
21. YuJen Lin, ChiaYing Wu, Taiwei Li, PeiWen Hsiao and DingKwo Chang. A Rapid and Sensitive Early Diagnosis of Influenza Virus Subtype via Surface Enhanced Raman Scattering. J Biosens Bioelectron. 2014; 5:150.
22. Chengcai Lai, Xiliang Wang and Penghui Yang. Cytokines Network and Influenza Virus Infection. Clin Microbiol. 2014; 3: 147.
23. Pramoda Earla. Ancient Diseases-Microbial Impact. J Anc Dis Prev Rem. 2014; 2: R1-001.
24. Akira Ukimura, Kanta Kishi, Tomoyuki Yamada, Yuriko Shibata, Yukimasa Ooi, et. al. National Survey of Influenza Myocarditis in Japanese Children in Three Seasons. Clin Microbiol. 2014; 3: 143.
25. Mikhael Petrovich Kostinov, Andrey Dmitrievich Protasov, Alexander Victorovich Zhestkov, Dmitry Vladimirovich Pakhomov, Anna Vladimirovna Chebykina and Tatiana Alexandrovna Kostinova, et. al. Post-vaccination Immunity to Pneumococcal, Haemophilus Influenzae Type B Infection and Influenza in Patients with Chronic Obstructive Pulmonary Disease(COPD). J Vaccines Vaccin. 2014; 5: 221.
26. Toru Shizuma. Autoimmune Hemolytic Anemia Following Influenza Virus Infection or Administration of Influenza Vaccine. J Blood Disord Transfus. 2014; 5: 200.

27. Camila S Silva, Lisa B Mullis, Olavo Pereira Jr, Linda J Saif, Anastasia Vlasova, et. al. Human Respiratory Coronaviruses Detected In Patients with Influenza- Like Illness in Arkansas, USA. Virol Mycol. 2014; S2: 004.
28. Kunihiro Kaihatsu, Chiharu Kawakami and Nobuo Kato. Potential Anti-Influenza Virus Agents Based on Coffee Ingredients and Natural Flavonols. Nat Prod Chem Res. 2014; 2: 129.
29. Toru Shizuma. Immune Thrombocytopenia Following Influenza Virus Infection and Influenza Vaccine Administration. Virol Mycol. 2014; S2: 003.
30. Michele N Maughan, Travis W Bliss, Ida Chung, David L Suarez and Calvin L Keeler . Detection and Identification of Avian Influenza Virus by cDNA Microarray. J Microbial Biochem Technol. 2014; S2-005.
31. John A Loudon. Preventing and Correcting Communicable and Non-Communicable Chronic Disease via Amlexanox – Dual 'No-Nonsense' and Inflammatory Axis Targeting. J Bioanal Biomed. 2013; 5: 138.
32. Shakal MA, Youssef YI, El Zeedy SA, Ibrahim SM and Al Baroudi BM. Surveillance on Avian Influenza H5N1 and H9N2 Subtypes In Egypt 2012-2013. Poult Fish Wildl Sci. 2014; 2:111.
33. Heidi A Davidson, Erin Kennedy, Michael A Jhung, Cherie Drenzek, Ariane Reeves, et. al. Knowledge, Attitudes and Practices Regarding 2009 H1N1 Vaccine Among Patients Hospitalized With Influenza A (H1N1) pdm09. Virol Mycol. 2014; S2: 002.
34. Tatiana Baccin, Neacutelson Alexandre Kretzmann, Leticia Garay Martins, Gabriela Luchiari Tumioto, Tatiana Schaffer Gregianini, et. al. Epidemiological Profile of Influenza A Cases in Southern Brazil in the Post-Pandemic Period. J Antivir Antiretrovir. 2013; 5: 145.
35. Gregorius J Sips, Andrew Pekosz, Anke Huckriede, Diane E Griffin, and Jan C Wilschut, et. al. Interaction of Influenza A/H1N1pdm Virus with Human Neuronal and Ocular Cells. Virol Mycol. 2014; S2: 001.
36. Natalie Larionova, Irina Kiseleva, Irina IsakovaSivak, Andrey Rekstin, Irina Dubrovina, et. al. Live Attenuated Influenza Vaccines against Highly Pathogenic H5N1avian Influenza: Development and Preclinical Characterization. J Vaccines Vaccin. 2013; 4: 208.
37. Masafumi Seki. Mechanisms of Increased Severity of Influenza-Related Pneumonia. General Med. 2013;1:121.
38. Lauren B King, Bing Pang, Antonia C Perez, Jennifer L Reimche, Daniel J Kirse, et. al. Observation of Viable Nontypeable Haemophilus Influenzae Bacteria within Neutrophil Extracellular Traps in Clinical Samples from Chronic Otitis Media. Otolaryngology. 2013; 3: 145.
39. Kaissar Tabynov, Berik Khairullin, Zhailaubay Kydyrbayev, Nurlan Sandybayev, Marina Stukova, et. al. Preliminary Assessment of Safety and Immunogenicity of an Inactivated Whole-Virion Vaccine against Influenza ? (H1N1) Pdm09 Containing Aluminum Hydroxide Adjuvant: A Randomized, Blinded Phase I Clinical Study. J Vaccines Vaccin. 2013; 4: 205.
40. Motofumi Shimizu, Satomi Yanase, Chang Myint OO, Masatoshi Okamatsu, Yoshihiro Sakoda, et. al. Influenza Virus-like Particles Containing HA, NA, and M1 Induced Protection in Chickens against a Lethal Challenge with the Highly Pathogenic H5N1 Avian Influenza Virus. J Vaccines Vaccin. 2013; 4: 201.
41. Kristin Grevelsdahl Mohn, Birger N Lrum, Steinar Skrede, Rebecca Cox, Anne Ma DyrholRiise, et. al. Reduced Hospital Stay in Influenza Patients after Mass Vaccination during the 2009 Influenza Pandemic in Norway. J Vaccines Vaccin. 2013; 4: 197.
42. Nagase K, Hisatomi M, Okawa T, Misago N and Narisawa Y. Mucha-Habermann Disease-like Eruption Following Pandemic Influenza H1N1 Vaccination: Coincidence or Causal Relationship? J Clin Exp Dermatol Res. 2013; 4: 181.
43. VeldmanAriesen MJ, SenKerpiclik F, Enserink R, Van der Sande MAB and Van Delden JJM. Health Care Worker Intake of Oseltamivir as Post Exposure Prophylaxis (PEP) During a Nursing Home Influenza Outbreak: Predictors of PEP Willingness. Epidemiol. 2013; 3:132.
44. Jasmina Vidic, Ronan Le Goffic, Anna Miodek, Christiane Bourdieu, CharlesAdrien Richard, et. al. Detection of Soluble Oligomers Formed by PB1-F2 Influenza A Virus Protein in vitro. J Anal Bioanal Tech. 2013; 4: 169.
45. Kunihiro Kaihatsu, Shinjiro Sawada and Nobuo Kato.Rapid Identification of Swine-Origin Influenza A Virus by Peptide Nucleic Acid Chromatography. J Antivir Antiretrovir. 2013; 5: 077.

46. Abd ElKareem LM, Awad SA. Risk Factors Associated with Highly Pathogenic Avian Influenza in the Household Sector in Egypt. Poult Fish Wildl Sci. 2013; 1:107.
47. Terri Rebmann, Amy M Strawn, Zachary Swick and David Reddick. Personal Disaster and Pandemic Preparedness of U.S. Human Resource Professionals. J Biosafety Health Educ. 2013; 1:102.
48. Ralph A Tripp. Risk Assessment and Anti-Viral Approaches for Novel H7N9 Influenza Virus. J Antivir Antiretrovir. 2013; 5: e108.
49. Jasmina Vidic, Christophe Chevalier, Ronan Le Goffic, Anna Miodek, Christiane Bourdieu, et. al. Surface Plasmon Resonance Immunosensor for Detection of PB1-F2 Influenza A Virus Protein in Infected Biological Samples. J Anal Bioanal Tech. 2013; S7:006.
50. Francesca Ferrara, Eleonora Molesti, Eva Atildeparattcher Friebertsh Atildecurrenuser, Giovanni Cattoli, Davide Corti, et. al. The human Transmembrane Protease Serine 2 is necessary for the production of Group 2 influenza A virus pseudotypes. J Mol Genet Med. 2013; 7:55.
51. Ian H Brown, MJ Slomka. Influenza2010: Zoonotic Influenza and Human Health: Part-B. J Mol Genet Med 2010, 4:45.
52. Alberta Azzi, Geir Bredholt, Mamoona Chaudhry, Xiaowen Cheng, Cecilia Chui, et. al. Influenza2010: Zoonotic Influenza and Human Health: Part-A. J Mol Genet Med. 2010; 4: 44.
53. Mohammed Soliman, Abdullah Selim, Vivien J Coward, Mohammed K Hassan, Mona M Aly, et. al. Evaluation of two commercial lateral flow devices (LFDs) used for flockside testing of H5N1 highly-pathogenic avian influenza infections in backyard gallinaceous poultry in Egypt. J Mol Genet Med. 2010; 4:43.
54. Pachler K1, Mayr J, Vlasak R (2010) A seven plasmid-based system for the rescue of influenza C virus. See comment in PubMed Commons below J Mol Genet Med 4: 239-246.
55. Liu Q, Wang S, Ma G, Pu J, Forbes NE, et al. (2009) Improved and simplified recombineering approach for influenza virus reverse genetics. See comment in PubMed Commons below J Mol Genet Med 3: 225-231.
56. Liu Q, Wang S, Ma G, Pu J, Forbes NE, et al. (2009) Improved and simplified recombineering approach for influenza virus reverse genetics. See comment in PubMed Commons below J Mol Genet Med 3: 225-231.
57. John S Sullivan, Paul W Selleck, Teena Downton, Ingrid Boehm, et. al. Heterosubtypic anti-avian H5N1 influenza antibodies in intravenous immunoglobulins from globally separate populations protect against H5N1 infection in cell culture. J Mol Genet Med. 2009, 3:38
58. Lynch GW, Selleck P, Sullivan JS. Acquired heterosubtypic antibodies in human immunity for avian H5N1 influenza. See comment in PubMed Commons below J Mol Genet Med. 2009; 3: 205-209.
59. Peyre M, Samaha H, Makonnen YJ, Saad A, Abd-Elnabi A, et al. (2009) Avian influenza vaccination in Egypt: Limitations of the current strategy. See comment in PubMed Commons below J Mol Genet Med 3: 198-204.
60. Kaihatsu K, Mori S, Matsumura H, Daidoji T, Kawakami C, et al. (2009) Broad and potent anti-influenza virus spectrum of epigallocatechin-3-O-gallate-monopalmitate. See comment in PubMed Commons below J Mol Genet Med 3: 195-197.
61. Erkoreka A1 (2009) Origins of the Spanish Influenza pandemic (1918-1920) and its relation to the First World War. See comment in PubMed Commons below J Mol Genet Med 3: 190-194.
62. Ennis Alexander. The changing epidemiology of avian influenza. J Mol Genet Med. 2009; 3: 32.
63. Ma W, Kahn RE, Richt JA. The pig as a mixing vessel for influenza viruses: Human and veterinary implications. See comment in PubMed Commons below J Mol Genet Med. 2008; 3: 158-166.
64. Najmeh Mosleh, Habibollah Dadras and Ali Mohammadi. Molecular quantitation of H9N2 avian influenza virus in various organs of broiler chickens using TaqMan real time PCR. J Mol Genet Med. 2009; 3: 27.
65. Suresh V Kuchipudi, Rahul Nelli, Gavin A White, Maureen Bain, Kin Chow Chang and Stephen Dunham, et. al. Differences in influenza virus receptors in chickens and ducks: Implications for interspecies transmission. J Mol Genet Med. 2009; 3: 26.
66. Toshihiko Sawada, Tomohiro Hashimoto, Hiroaki Tokiwa, Tohru Suzukie, Hirofumi Nakano, et. al. Ab initio base fragment molecular orbital studies of influenza viral hemagglutinin HA1 full-domains in complex with sialoside receptors. J Mol Genet Med. 2009; 3: 25.

67. Zhirnov OP, Syrtzev VV. Influenza virus pathogenicity is determined by caspase cleavage motifs located in the viral proteins. See comment in PubMed Commons below J Mol Genet Med. 2009; 3: 124-132.
68. Iqbal M. Controlling avian influenza infections: The challenge of the backyard poultry. See comment in PubMed Commons below J Mol Genet Med. 2009; 3: 119-120.
69. Sherif B Mossad, Belinda YenLieberman, Nabin K Shrestha, Dalia M Mossad, Steven D Mawhorter, et. al. Characteristics of Transplant Recipients Who Developed Influenza in 2007-08 Despite Influenza Vaccination. J Vaccines Vaccin. 2013; 4: 177.
70. Cassandra M. JamesBerry. Vaccine Control of Avian Influenza H5N1 in Poultry: Need for a Positive Marker. J Vaccines Vaccin. 2013; 4: 168.
71. Toshihisa Ishikawa. Clinical Preparedness for Cytokine Storm Induced By the Highly Pathogenic H5N1 Influenza Virus. J Pharmacogenomics Pharmacoproteomics. 2012; 3: e131.
72. Petar M Mitrasinovic. Design Of Novel Anti-Influenza Drugs That Circumvent Oseltamivir Resistance: A Critical Perspective. Drug Des. 2012; 2: e110.
73. Xavier Abad. Assay of Several Inactivation Steps on West Nile Virus and H7N1 Highly Pathogenic Avian Influenza Virus Suspensions. Biosafety. 2012; 1: 103.
74. Dayyu Chao. A Missing Link for the Global Pandemic Influenza Outbreak. Virol Mycol. 2012; 1: 3.
75. Julia Nogueira Varela, Maacuterio Seacutervulo Izidoro Jr, Luciana Maria de Hollanda and Marcelo Lancellotti. Membrane Protein as Novel Targets for Vaccine Production in Haemophilus influenzae and Neisseria meningitid. J Vaccines Vaccin. 2012.
76. Mansour Mohamadzadeh. Novel Oral Targeted Mini Gene-Vaccine Platform Resists Influenza A Challenge. J Vaccines Vaccin. 2012; 3: e112.
77. Reza Boostani, Mojtaba Rismanchi, Abbas Khosravani, Lida Rashidi, Samaneh Kouchaki, et. al. Presenting a Hybrid Method in Order to Predict the 2009 Pandemic Influenza A (H1N1). J Health Med Inform. 2012; 3: 3.
78. Hiroshi Yokomichi, Shintaro Kurihara, Tetsuji Yokoyama, Eisuke Inoue, Keiko TanakaTaya, et. al. Safety of the Influenza A (H1N1)2009 Vaccine in Chronic Obstructive Pulmonary Disease: A Matched Case-Control Study. J Vaccines Vaccin. 2012; 3: 148.
79. Laura Beaune, David Nicholas and Jodi Hocken. Lessons Learned for Pediatric Pandemic Planning in Palliative Care: A Case Study. J Palliat Care Med. 2012; 2: 120.
80. Laura Beaune, David Nicholas and Jodi Hocken. J Palliat Care Med. 2012; 2: 120.
81. Da Yong Lu, Ting Ren Lu, Hong Ying Wu. Treatment of Influenza Virus Infections with Chinese Medicine. Adv Pharmacoepidem Drug Safety. 2012 .
82. William A Thompson and Joel K Weltmannbsp. Bioinformatic Analyses of 2009-2010 Pandemic H1N1 Influenza A Hemagglutinin Subsets. J Med Microb Diagn. 2012; 1:110.
83. Maria Cano, Paige Lewis, Alan C. Ou, Devindra Sharma, Claudia Vellozzi and Karen R Broder, et. al. Bellâ€™s Palsy Cases Following Administration of Influenza A (H1N1) 2009 Monovalent Vaccine Reported to the Vaccine Adverse Event Reporting System (VAERS). J Vaccines Vaccin. 2012.
84. Yasushi Muraki, Takako Okuwa, Toshiki Himeda and Yoshiro Ohara. Role of the CM2 Protein in Influenza C Virus Replication: Analyses of Recombinant Viruses possessing CM2 Mutants. Metabolomics. 2012; S1-003.
85. Shan Chen, David Roumanes, Maria T. Arevalo, Yanping Chen and Mingtao Zeng. Human CD4+ Memory T-cell Populations Secrete Th1 Cytokines in Response to Influenza Antigen Stimulation. J Vaccines Vaccin. 2012.
86. Matthew P Morrow, Jian Yan, Amir S Khan, Kate E Broderick, Niranjan Y Sardesai, et. al. What the Novel H1N1 Influenza Outbreak Can Teach us about Influenza as a Bioterrorism Weapon. J Bioterror Biodef. 2012; S1: 011.
87. Sanjay Mukherjee and Alok K. Chakrabarti. Impact of Microarray Technology in Influenza Virus Research and Diagnostics. J Proteomics Bioinform. 2012; S6: 002.
88. Ravi Shrivastavax. A Pilot Clinical Trial to Evaluate the Efficacy of a Topical Antiviral Osmotically Active Hypertonic Solution for The Treatment of Influenza Virus Induced Sore Throat. J Clinic Trials. 2011; 1: 102.
89. Maryna C. Eichelberger, Katie H. Rivers, Rebecca Ream, Jin Gao, Arash Hassantoufighi, et. al. Qualitative Differences in T cell responses to Live, Attenuated and Inactivated Influenza Vaccines. J Clin Cell Immunol. 2012; S4: 002.

90. Annavarapu Chandra Sekhara Rao and Durvasula Somayajulu VLN. Influenza Classification from Nucleotide Sequence Database. J Comput Sci Syst Biol. 2011; 4: 077-080.
91. Lina Marcela BarrancoGarduo, Ariadna CervantesNevrez, Adrian MartnezTalavera, Juan Carlos NeriSalvador, Gilberto CastaedaHernndez, et. al. Comparative Bioavailability of Two Oral Oseltamivir Formulations: Commercial Capsules and an Emergency Solution Prepared During the 2009 Influenza a (H1n1) Outbreak in Mexico. JBB. 2011; S1: 008.
92. Sabine Wicker. Influenza Vaccination among Healthcare Workers Deserves a Higher Priority. J Vaccines Vaccin. 2011.
93. Pallavi Somvanshi, Vijai Singh, M.Arshad. Modeling of RNA Secondary Structure of Non Structural Gene and Evolutionary Stability of the Influenza Virus Through In Silico Methods. J Proteomics Bioinform. 2008; 1: 219- 226.
94. Pawan Sharma and Ajay Kumar. Immunoinformatics: Screening of Potential T-Cell Antigenic Determinants in Proteome of H1N1 Swine Influenza Virus for Virus Epitope Vaccine Design. J Proteomics Bioinform. 2010; 3: 275-278.
95. Deepak Kumar Sharma, Anil Kumar Rawat, Shipra Srivastava, Rajeev Srivastava and Ajay Kumar. Comparative Sequence Analysis on Different Strains of Swine Influenza Virus Sub-type H1N1 for Neuraminidase and Hemagglutinin. J Proteomics Bioinform. 2010; 3: 055-060.
96. Marc Z Handler, Viseslav TonkovicCapin, Samuel D Brewster, Thomas J Fritzlen and Daniel J Aires. Granulomatous Reaction Confined to Two Blue-ink Tattoos after H1N1 Influenza Vaccine. J Vaccines Vaccin. 2010; 1:108.
97. Slawomir Tubek, Jozef Bojko, Magdalena Zurek, Krzysztof Kaminski, Marek Szymkowicz, et. al. Immune Complexes-Like Disease in the Course of Enterobacter cloacae sepsis Due to Cholelithic Cholecystitis, Preceded by Influenza Vaccination. J Vaccines Vaccin. 2011; 2: 119.
98. Fengwei Zhang, Jia Wu, Chunqiong Xu, Xiaojing Lin, Honglan Zhao, et. al. Infectivity of Pseudotyped Particles Pairing Hemagglutinin of Highly Pathogenic Avian Influenza a H5N1 Virus with Neuraminidases of The 2009 Pandemic H1N1 and a Seasonal H3N2. J Bioterror Biodef. 2011; 2: 104.
99. Rumschlag-Booms E1, Zhang H, Soejarto DD, Fong HH, Rong L (2011) Development of an Antiviral Screening Protocol: One-Stone-Two-Birds. See comment in PubMed Commons below J Antivir Antiretrovir 3: 8-10.
100. Martha L TenaSuck and Andrea Yosajany Morales de Angel. Craniopharyngioma and Oil Machinery Fluid: Review. J Clin Exp Pathol. 2015; 5: 211.
101. Salah Thabit Al Awaidy, Idris Al Obeidani, Jeffrey V. Singh, Salim Al Mahrouqi, Suleiman Salim Al Busaidy, et. al. Epidemiology of Pandemic H1N1 in Oman and Public Health Response, 2009. J Community Med Health Educ. 2011; 5: 343.
102. Zenebu Begna Bayissa, Ebisa Negara, Geremew Tolesa and Belayneh Kefale. Factors that Influences School Youth Exposure to HIV/AIDS, in Mettu Town, South West Ethiopia. J Community Med Health Educ. 2015; 5: 339.
103. Mette Pedersen MD. Laryngopharyngeal reflux, a randomized controlled trial of voice changes after treatment in Scandinavian adults. J Community Med Health Educ. 2015; 5: 336.
104. Irfan Khan and Saghir Ahmad. Studies on Physicochemical Properties of Cooked Buffalo Meat Sausage as Influenced by Incorporation of Carrot Powder during Refrigerated Storage. J Food Process Technol. 2015; 6: 436.
105. Nicola Pescosolido, Andrea Barbato, Dario Rusciano, Carlo Cavallotti. Neovascularization in Alkali-Burned Rabbit Cornea. J Clin Exp Ophthalmol. 2015; 6: 417.
106. Fei Liao, Yanchun Hu, Yue Huang, Xi Liu, Hui Tan, et. al. The Influence on Livestock Industry and Development Prospect of Eupatorium adenophorum Spreng. J Microb Biochem Technol. 2015; 7: 057-060.
107. Nathan Oesch and RIM Dunbar. Influence of Kin Network on Maternal and Infant Health and Illness. J Preg Child Health. 2015.
108. Dr. P.Sireesha , Dr.B.Sudhakar Rao, Dr.D.Thammi Raju. Factors Influencing Effective Use of Information and Communication Technology (ICT) Tools by various Animal Husbandry (A.H.) Organizations in Andhra Pradesh. IJIRSET. 2014.

109. Sirusa Kritsanapuntu and Nilnaj Chaitanawisuti.Use of Tuna-Cooking Liquid Effluent as a Dietary Protein and Lipid Source Replacing Fishmeal in Formulated Diets for Growing Hatchery-Reared Juvenile Spotted Babylon (Babylonia areolata). J Aquac Res Development. 2015; 6: 323.
110. K. Kaur, ankita and s. Garcha. Bioremediation of dairy effluent using candida intermedia mtcc 1744 and kluyveromyces marxianus mtcc 3772.2013; 51-56.
111. J. Aravind, S.Karthikeyan and Kunthala Jayaraman. Designing a cost effective Air-Lift Reactor for the bioremediation of composite tannery effluents. ICP. 2007.
112. K. Lekshmi and d.s. jaya. Studies on the distillery effluent characteristics and its impact on Vembanad Lake in the industrial area of varanadu in aIAPpUZHA district, kerala. ICP. 2007.
113. J.K. Bahane, S.K.Udaipuire and O.N. choubey. Impact of effluent of Soya Solvent Extraction Plants on Environment. ICP. (2007).
114. B.v. kulkarni , s.v. Ranade and a. I. Wasif. phytoremediation of textile process effluent by using water hyacinth - a polishing treatment. Icp. 2007.
115. Mahapatro Mint and B. K. Mohanty. Effect of sugar mill effluent of germination of green gram (Phaseolus aureus, Roxb.) And growth behaviour of it's seedlings. Icp. 2007.
116. T. Ramesh and V. Nehru Kumar. Performance evaluation of Fixed Bed Fixed Film anaerobic reactor for treating Dairy effluent. ICP. 2007.
117. Akash Pandey, S. Panwar, N.A. Siddiqui AND Nitin Endlay. Release of Adsorbable Organic Halide (AOX) in Bleach Plant Effluent OF Wood and Agro Based Pulp AND Paper Mills. ICP. 2012.
118. G. K. Amte and Trupti V. Mhaskar, Studies on Textile-Dyeing Effluent from Bhiwandi city, Dist: Thane, Maharashtra, India. ICP. 2012.
119. P.O. Fatoba , A.O. Adepoju and Grace A.Okewole. Heavy Metal Accumulation in the Fruits of Tomato and Okra Irrigated with Industrial Waste Effluents. ICP. 2012.
120. Heidi A Davidson, Erin Kennedy, Michael A Jhung, Cherie Drenzek, Ariane Reeves, et. al. Knowledge, Attitudes and Practices Regarding 2009 H1N1 Vaccine Among Patients Hospitalized With Influenza A (H1N1) pdm09. Virol Mycol. 2012; S2: 002.
121. Gregorius J Sips, Andrew Pekosz, Anke Huckriede, Diane E Griffin, Jan C Wilschutbr nbsp, et. al. Interaction of Influenza A/H1N1pdm Virus with Human Neuronal and Ocular Cells. Virol Mycol. 2014; S2: 001.
122. Linhua Shu, Hassan Muhammad, Liying Han, Qin Xiong, Yijing Hu, et. al. The Role of Flexible Bronchoscope in the Diagnosis of the Pulmonary Tracheobronchial Tuberculosis in Children-Report of Four Cases and Review of Literature. J Bacteriol Parasitol. 2015; 6: 223.
123. Ing. Rainer Penzkofer, Barnsteiner K and Dendorfer S. Investigations into the Influence of Age, Shoe Type and Kicking Direction on the Severity of Head Trauma. Journal of Forensic Biomechanics. 2013.
124. Aishwarya Devi R. Active and Reactive Power Regulation of a Grid Connected Wind Energy Conversion System with Doubly Fed Induction Generator. IJAREEIE.2014.
125. Nwipie GN, Erondu ES and Zabbey N. Influence of Stocking Density on Growth and Survival of Post Fry of the African Mud Catfish, Clarias gariepinus. Fish Aquac J. 2015; 6:116.
126. Rui B, Shen T and Wen H. Interpretation and Integration of 13C-Fluxomics Data. Metabolomics. 2015; 5:138.
127. Okuyucu Kursat, Alagoz Engin, Arslan Nuri, Komurcu Seref, Ayan Asl and Ozturk Erkan, et. al. Watch Out for the Unexpected: Sole Gallbladder Metastasis in a Patient with Malignant Melanoma Striked by FDG-PET. J Nucl Med Radiat Ther. 2015; 6: 210.
128. Friederika Fluck, L Menezes Falcatildeo, Raquel Paixatildeo and Isabel Pinheiro. Extraskeletal Ewing Sarcoma in a Young Patient During Pregnancy. J Clin Case Rep. 2015; 5:485.
129. Somrutai Poothong, Cathrine Thomsen, Line Smastuen Haug and Elsa Lundanes. Evaluation of Dried Blood Spots for Determination of Perfluoroalkyl Substances in Blood. J Anal Bioanal Tech. 2015.
130. David Alejandro CabreraGaytaacuten, Aurora Flory AguilarPeacuterez, Alfredo VargasValerio and Concepcioacuten GrajalesMuntildeiz. Estimated Direct Costs of Patients Hospitalized for Severe Acute Respiratory Illness in the Mexican Social Security Institute. Winter Season, 2013-2014. Intern Med. 2015; 5: 180.

131. Renata Balnyte, Daiva Rastenyte, Antanas Vaitkus, Ingrida Uloziene, Astra Vitkauskiene and Erika Skrodeniene, et. al. Associations of HLA DRB1 Alleles with Igg Oligoclonal Bands and Their Influence on Multiple Sclerosis Course and Disability Status. J Neurol Neurophysiol. 2015; 6:273.
132. Wael Talaat. Micellar Liquid Chromatographic Determination of Lamivudine, Indinavir and Ketoconazole in Dosage Forms and Biological Fluids. Pharm Anal Acta. 2015; 6: 327.
133. Filippo de Nicolellis. An Early Report on a Local Project about Primary Health Care to Improve the Communication and the Compliance in the Elderly for Vaccine Campaigns against Influenza. J Vaccines Vaccin. 2015; 6: 267
134. Toshiyuki Yamamoto, Haruhi Inoguchi, Yuko Sano, Akihiko Kandori and Miho Murata. Assessment of A New Magnetic Device to Monitor Swallowing in Parkinson's Disease. J Neurol Neurophysiol. 2015; 6:267.
135. D.Nithya, S.M. Poornima, R.Pazhani murugan, V.Gopikrishnan, M.Radhakrishnan, et. al. influence of biofertilizers and irrigation systems for the growth and yield of mulberry plants. Ijpaes. 2011.
136. Mateja Jovanovic, Varun Jain, Sneha Galiveeti, and Vimala Ramasamy. A Case of Necrotising Pneumonia in the Setting of Influenza Infection. J Pulm Respir Med. 2014; 4: 201.
137. Marc Souris, Daniel Gonzalez, Witthawat Wiriyarat, Kamlang Chumpolbanchorn, Supaluk Khaklang, et. al. Potential Role of Fresh Water Apple Snails on H5N1 Influenza Virus Persistence and Concentration in Nature. Air Water Borne Diseases. 2015.
138. WeiJu Huang. Influences of Gut Hormones on Hepatocellular Carcinoma. Endocrinol Metab Synd. 2015; 4: 155.
139. Hirobumi Asarkua, Takehiko Fukami, Tomoko Inagaki and Naoko Tateyama. Serious Influence of Yersinia Enterocolitis on Pregnancy in a Woman Complicated With Chronic Hypertension and Gestational Diabetes Mellitus: A Case Report. J Preg Child Health. 2015.
140. Maceacute M Schuurmans and Nicolas J Mueller. Prolonged Viral Shedding of Influenza Virus: Which Definition? J Med Microb Diagn. 2014; 3: 171.
141. Tecu C, Mihai ME, Alexandrescu VI and Lupulescu E. Concise Communications: Death of a Patient Aged 2.5 Years after Infection Cause Parainfluenza Virus Type 1. J Med Microb Diagn. 2014; 3: 166.
142. Kahouli I, Malhotra M, TomaroDuchesneau C, Saha S, Marinescu D, et. al. Screening and In-Vitro Analysis of Lactobacillus reuteri Strains for Short Chain Fatty Acids Production, Stability and Therapeutic Potentials in Colorectal Cancer. J Bioequiv Availab. 2015.
143. Lai KY, George WYN and Fanny FC. The 1918 Spanish Influenza Pandemic. J Pulm Respir Med. 2015; 5: 233.
144. Aswathi Kumar, Deborah KennedyBoone, Harris A Weisz, Bridget A Capra, Tatsuo Uchida, et. al. Neuroprotective Effects of Aframomum melegueta Extract after Experimental Traumatic Brain Injury. Nat Prod Chem Res. 2015; 3: 167.
145. Prasanta Nanda. Bioaccumulation of Heavy Metals and Physiological Response in Anabas testudineus on Exposure to Paper Mill Effluent. J Environ Anal Toxicol. 2014; 5:244.
146. Peter P. Khaola. The Influence of Culture Traits and their Imbalance on Employee Job Satisfaction and Turnover Intentions. Arab J Bus Manage Rev. 2014.
147. Maxwell D Eremie. Comparative Analysis of Factors Influencing Career Choices among Senior Secondary School Students in Rivers State, Nigeria. Arab J Bus Manage Rev. 2014.
148. Tejinder Kataria, Kuldeep Sharma, Pranav Chadha, Dhanraj Jangid and Kulbir Ahlawat. A Comparison of Fluro-Deoxy Glucose-Positron Emission Tomography (FDGPET)Versus Magnetic Resonance (MR) Based Target Volume Delineation in Post-operative Glioblastoma. J Nucl Med Radiat Ther. 2015; 6: 205.
149. Penzkofer, Barnsteiner K and Dendorfer S. The Influence of Age, Shoe Type and Kicking Direction on the Severity of Head Trauma. Journal of Forensic Biomechanics. 2014.
150. Terri Rebmann, Amy M Strawn, Zachary Swick and David Reddick. Personal Disaster and Pandemic Preparedness of U.S. Human Resource Professionals. J Biosafety Health Educ. 2013; 1: 102.