

## Influenza A virus infraspecies Influenza A virus LPAIV (H1-16, N1-9) (low pathogenic avian influenza virus)

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### GENERAL INFORMATION

#### Influenza A virus infraspecies Influenza A virus LPAIV (H1-16, N1-9) (low pathogenic avian influenza virus)

FLUAV LPAIV (H1-16, N1-9)

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**Category:** Virus

**Genus:** Influenzavirus A

**Risk group:**

2

Biological agents that can cause human disease and might be a hazard to employees; they are unlikely to spread to the community; there is usually effective prophylaxis or treatment available.

**Notes:**

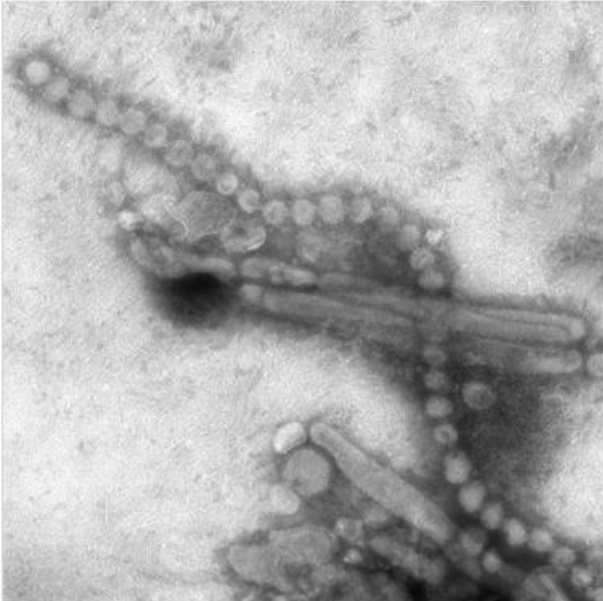
Footnote j:

Influenza A viruses are characterised by high diversity, which is defined by 16 haemagglutinin and 9 neuraminidase subtypes. The natural host species for these viruses are the waterfowl. Influenza A viruses can be transferred to other animal species and have formed new lines for humans, pigs, horses, dogs and seals. The sporadic transmission of avian influenza A virus without the formation of new lines has been observed in anteater, muskrat, ferret, camel, cat, leopard, humans, mink, pila, stone marten, tiger, whale, racoon, racoon dog and civet cat.

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Transmission electron micrograph of Influenza A virions. CDC, Cynthia S. Goldsmith and Thomas Rowe, 2013.

### Medical significance

Seasonal influenza is an annually occurring disease, which may result in serious complications with a fatal outcome, particularly in elderly persons and chronically ill individuals. The annually adapted vaccine offers a certain degree of protection against the disease, and can prevent complications, particularly in elderly persons.

Reference: [04034](#)

## OCCUPATIONAL SAFETY AND HEALTH

[Sector](#) | [Activity](#) | [Protective measures](#) | [Inactivation/Decontamination](#) | [Immediate measures/First aid](#) | [Occupational health care](#)

### SECTORS

- Health services
- Care services
- Laboratories
- Veterinary medicine
- Hunting
- Agriculture
- Animal care

Reference: [04038 10025](#)

### ACTIVITIES

- Close contact with other individuals
- Contact with materials potentially contaminated by pathogens
- Close contact with poultry/waterfowl (avian influenza)
- Care of the elderly

Reference: [04038 10025](#)

### PROTECTIVE MEASURES

The following protective measures apply to specific activities in laboratories, the husbandry of laboratory animals and biotechnological activities. For further information see [TRBA 100](#), [TRBA 120](#), [TRBA 500](#).



### Technical measures

Where tasks intentionally involve biomaterials, their identity must be verified and documented routinely.

Areas in which the biomaterial is processed must be isolated from other areas and labelled with the 'Biohazard' warning symbol and protection level 2.

The doors of the area within which the protection level applies must open in the direction of the escape route and be equipped with an inspection window.

Where a health hazard posed by bioaerosols cannot be eliminated, the relevant activities must be performed in a microbiological safety cabinet (MSC). For detailed information on activities in MSCs, see leaflet B 011 of the BG RCI (German Social Accident Insurance Institution for the raw materials and chemical industry).

Wash basins, disinfectant dispensers, disposable towels and hand detergents must be available.

Water faucets and disinfectant dispensers must be operable without the use of the hands.

Laboratories must offer suitable eyewash facilities.

All surfaces and areas that could come into contact with biological agents must be easy to clean, liquid-tight and resistant to detergents and disinfectants. A seamless wall-floor joint must be effected.

Windows and doors must be kept closed while work is in progress.

Work areas are to be maintained in a clean and tidy state. Only tools and devices that are actually needed may remain on the benches.

Pipettors must be provided and used. Mouth pipetting is not permitted.

If the use of pointed or sharp instruments cannot be avoided, they must be disposed of in suitable containers after use.

The release of biological agents must be minimised during the opening of technical equipment.

Catch basins must be in place to ensure that open sample containers are prevented from turning over during work operations.

Clearly labelled, closed, rigid, liquid-tight and unbreakable vessels that can be disinfected from the outside must be provided and used for the in-house transport of biological agents.

Transport of biological agents outside the plant is subject to the regulations governing hazardous goods (class 6.2).

Suitable containers must be available for the collection of waste that constitutes biological agents.

### Organisational measures

The number of staff must be limited to the actual requirements, and access to the area in which the protection level applies must be restricted to authorized persons.

An instruction manual must be prepared. Prior to beginning their activity and subsequently at least once a year, verbal and work-related instruction must be provided to staff members to familiarise them with the hazards and protective measures as laid down in the instruction manual. DGUV Informative Publication 213-016 (BGI/GUV-I 853) contains a prototype instruction manual on 'activities involving biological agents of Risk Group 2' in accordance with the German Ordinance on Biological Substances.

The instruction process must also include advice in occupational medicine and safety.

Restrictions of employment for expectant and nursing mothers must be observed in accordance with the German Maternity Protection Act.

Injuries must be reported immediately to the person in charge.

### Personal protection - body protection

Suitable protective clothing must be worn (at least lab coats).

During the processing of infectious tissues, the protective clothing must be complemented by disposable aprons.

Remove protective clothing when leaving the area in which the protection level applies.

Keep protective clothing separate from normal clothing.

### Personal protection - hand protection

Depending on the results of the risk assessment, the use of protective gloves may be mandatory for certain activities.

The skin protection plan must be observed.

### **Personal protection – eye and face protection**

Depending on the results of the risk assessment, protective goggles or face protection may be necessary.

### **Personal protection - respiratory protection**

Depending on the results of the risk assessment, a respiratory protection device may be necessary. Respiratory protection equipment must be worn for only a limited period of time. This period must be defined in the risk assessment.

### **Occupational hygiene**

The consumption and storage of food and alcohol/tobacco in the protection level area is forbidden. The wearing of jewellery, watches and rings on the hands and the forearms is not permitted.

Fingernails are to be kept short.

Following completion of work and prior to leaving the work area, hands are to be disinfected, washed and remoisturised according to the skin protection plan.

Skin protection and skin care agents must be made available in contamination-proof containers.

Contaminated protective clothing and shoes are to be collected safely and decontaminated, cleaned and disposed of centrally.

Work clothing must not be cleaned at home.

The cleaning regulations for employees, equipment and workplaces must be defined in a hygiene plan.

Insects and pests in the working area must be regularly controlled.

### **Vaccination**

Available against seasonal flu.

Reference: [00001 99999](#)

## **INACTIVATION / DECONTAMINATION**

Disinfection measures must be carried out by proven means and procedures. For detailed information see the following lists: DVG - Animal Husbandry (German Association for Veterinary Medicine, Accommodation and Husbandry of Animals), DVG - Food Area, [VAH](#) and RKI. Officially ordered disinfection measures (decontamination) required by the authorities may be carried out only with disinfection agents included in the [RKI list](#).

Furthermore, the Industrie Association Hygiene and Surface Protection ([HO](#)) supplies lists of statements of companies on the efficacy of different products. The information in this register is based on statements of the respective companies.

Surface disinfection: e.g. with Terralin PAA (8% solution, 60 min exposure time). Hand disinfection: e.g. with Sterillium Virugard (2 min exposure time).

A suitable autoclave must be available in the same building.

Externally contaminated test vessels must be disinfected before opening.

Work areas and working equipment must be decontaminated before the performance of maintenance measures. For further information see [TRBA 100](#) ('Technical Rules for Biological Agents').

Contaminated solid wastes, liquid cultures and suspensions containing pathogens are to be collected in appropriate containers and deactivated.

Reference: [00001 04025](#)

## **IMMEDIATE MEASURES / FIRST AID / POST-EXPOSURE PROPHYLAXIS**

### **Information for physicians**

Detection of influenza virus as an acute pathogen must be reported to the responsible health authority, stating the name of the affected individual.

Reference: [99999](#)

## **OCCUPATIONAL HEALTH CARE according to [ArbMedVV](#)**

### Optional health care:

In the case of tasks specifically involving contact and tasks involving incidental contact with biological agents classed as Risk Group 2 under the Biological Agents Ordinance (Biosstoffverordnung, [BioStoffV](#)) or which involve a comparable risk, the employer must offer an optional health care. This does not apply when on account of the risk assessment and on account of the protective measures taken it can be assumed that there is no risk of infection. An optional health care must also be offered if as a result of the exposure to biological agents

- a serious infectious illness is to be expected and post-exposure prophylactic measures are possible, or
- an infection has resulted.

## MORPHOLOGY AND PHYSIOLOGY

### MORPHOLOGY

There are influenza A, B and C viruses. Influenza A viruses are the causative agents of "seasonal flu". Influenza A viruses have spike-like surface molecules on their viral membranes: they consist of the glycoproteins haemagglutinin (HA) or neuraminidase (NA). So far, 16 different HA types and 9 different NA types are known. Influenza A viruses are named according to their surface molecules, e.g. Influenza A (H3N7).

Reference: [04034](#)

### INFORMATION ON MOLECULAR BIOLOGY

#### Genome

Influenza viruses have a segmented, negative-sense RNA genome.  
EMBL-ID: PRJNA183620

Reference: [04034](#)

## OCCURRENCE / NATURAL HABITAT

### FREE-LIVING / HOST BOUND

This biological agent is host-dependent parasitical.

Reference: [04034](#)

### HOSTS

Humans, pigs, horses and other animal species.  
Human (infecting humans) and avian (infecting birds) influenza viruses have different receptors. Pigs have receptors for both types of influenza.

Reference: [04034](#)

### GEOGRAPHIC DISTRIBUTION

Worldwide.

Reference: [04034](#)

## PATHOGENICITY / PATHOGENIC PROPERTIES

### CHARACTERISTIC OF PATHOGENICITY

Human-pathogenic (causes diseases in humans).

Reference: [04034](#)

## ALLERGENICITY / SENSITISING EFFECT

An allergic / sensitising potential is not known.

Reference: 04034

## DISEASE

### DESCRIPTION

Flu, influenza.

Reference: 04034

### ZOONOSIS

Zoonosis (transmission between animals and humans): Yes

Reference: 04034

### INCUBATION PERIOD

1 - 2 days. (Avian influenza 2 - 5 days).

Reference: 04034

### SYMPTOMS AND COURSE OF DISEASE

Approx. one- third of influenza infections take a feverish course; another third present in the form of milder illness; and another third are asymptomatic. Symptoms may include: longer periods of fever, dry cough, shortness of breath ranging to respiratory distress, sore throat, chest pain and headache, cold, bloody sputum, drowsiness, weakness, confusion, dehydration (deep yellow urine, reduced urinary excretion).

In severe courses, which mainly appear in very young, elderly or chronically ill patients, but also in women during late pregnancy, the illness worsens 2 - 5 days after onset of symptoms.

Complications may include myocarditis (inflammation of the heart muscle), encephalopathy (brain damage) and respiratory failure requiring artificial ventilation.

Children commonly develop middle ear infections.

Unlike seasonal flu, the pandemic influenza virus H1N1 from the year 2009 ("swine flu") triggered disease requiring hospitalisation, particularly in young adults.

The administration of salicylates (e.g. aspirin, ASA) to children with feverish diseases, such as influenza, is contraindicated, since this may cause them to develop the life-threatening Reye's syndrome accompanied by vomiting, liver swelling and brain damage.

Reference: 04034

### LETHALITY

Fatal outcome, particularly due to complications such as respiratory failure, and in severe secondary infections.

The administration of salicylates (e.g. aspirin, ASA) to children with feverish diseases such as influenza is contraindicated, since this may cause them to develop the life-threatening Reye's syndrome accompanied by vomiting, liver swelling and brain damage.

Reference: 04034

### THERAPY

In case of illness in patients from risk groups (young, old, chronically ill, immunosuppressed and pregnant persons) and in severe courses, antiviral treatment should be initiated as quickly as possible. However, such treatment may also have a positive impact on the prognosis, even if it is instituted at a later time in the course of the illness.

Patients with mild courses should receive only symptomatic treatment.

Oseltamivir-resistant H1N1 viruses have circulated since the 2007/08 season. However, they were still treatable with zanamivir.

The administration of salicylates (e.g. aspirin, ASA) to children with feverish diseases such as influenza is contraindicated, since this may cause them to develop the life-threatening.

Reye's syndrome accompanied by vomiting, liver swelling and brain damage.

Reference: [04034](#)

## PROPHYLAXIS

Annual vaccination in October or November, or when there is a flu outbreak. The vaccine takes effect after approx. two weeks; an infection may develop earlier.

The vaccine is recommended for high-risk groups; that is, persons aged over 60, chronically ill persons, pregnant women from the second trimester or with underlying illness from the first trimester, and persons working in the healthcare sector who are at increased risk of becoming infected or infecting persons in need of care themselves, as well as persons working in areas with high levels of public contact. Vaccination is also recommended in persons who are in close contact with poultry and wild birds; even if the vaccine does not act against avian influenza, it can prevent double infections.

Reference: [04034](#)

## EPIDEMIOLOGY

### TRANSMISSION ROUTES / PORTALS OF ENTRY

Transmission takes place via inhalation (by breathe).

Transmission takes place orally (by ingestion).

Reference: [04034](#)

## LEGAL PRINCIPLES / REGULATIONS

### LAWS AND ORDINANCES

Ordinance on Safety and Health Protection at Workplaces Involving Biological Agents (Biological Agents Ordinance - [BioStoffV](#))

Law for the regulation of genetic engineering (Genetic Engineering Act - [GenTG](#)) and associated regulations (only in German).

Public notice of the list risk-rated donor organisms and recipient organisms for genetic engineering of 5. July 2013

Law on the prevention and control of infectious diseases in humans (Infection Protection Act - [IfSG](#)) (only in German)

Ordinance on Occupational Health Care ([ArbMedVV](#))

Law for the protection of working mothers ([MuSchG](#)) (only in German)

Rules for [transportation of dangerous goods](#):

- European Convention on the carriage of dangerous goods by road ([ADR](#))
- Order concerning the International Carriage of Dangerous Goods by Rail (RID)
- International Air Transport Association ([IATA](#)), dangerous goods regulation, 54th edition 2013
- the law on the transport of dangerous goods ("Gefahrgutbeförderungsgesetz". -[GGBefG](#))
- Regulation on the national and international transport of dangerous goods by road, rail and inland waterway services (Dangerous Goods Regulations, road, rail and inland waterways - [GGVSEB](#))
- Regulation on the International Maritime Dangerous Goods (Dangerous Goods Regulations lake - [GGVSee](#))
- Regulation on the order of advisor and the training of the persons in businesses and enterprises (Dangerous Goods Advisor Ordinance - GBV) (only in German)

## TECHNICAL RULES AND OTHER REGULATIONS

### [TRBA 100](#)

Protective measures for activities involving biological agents in laboratories

### [TRBA 230](#)

Protective measures for activities involving biological agents in agriculture and forestry and comparable activities

### [TRBA 240](#)

Protective measures for activities involving microbially contaminated archival materials

### [TRBA 250](#)

Biological agents in health care and welfare facilities

### [TRBA 400](#)

Guideline for risk assessment and for the instruction of employees in relation to activities with biological agents

### [TRBA 405](#)

Application of measurement methods and technical control values for airborne biological agents (only in German)

### [TRBA 450](#)

Criteria for the classification of biological agents

### [TRBA 462](#)

Classification of viruses into risk groups (only in German)

### [TRBA 500](#)

Basic measures to be taken for activities involving biological agents

## LINKS

### **World Organisation for Animal Health (OIE)**

[Information provided by the World Organisation for Animal Health](#)

### **German Federal Institute for Occupational Safety and Health (BAuA)**

[Epidemiology of work-related infectious diseases \(only in German\)](#)



## Further Links:

[Information provided by the Bundeszentrale für gesundheitliche Aufklärung - BZgA \(Federal Center for Health Clarification\) for influenza virus \(only in German\)](#)  
[National Research Platform for Zoonoses - Pathogen profile influenza viruses](#)

## REFERENCES

[General information](#) | [Occupational and health protection](#) | [Morphology and physiology](#) | [Occurrence/natural habitat](#) | [Pathogenicity/pathogenic properties](#) | [Disease](#) | [Epidemiology](#) | [Legal basics](#) | [Links](#) | [References](#)

Quelle: 00001

Informationen aus den Technischen Regeln für Biologische Arbeitsstoffe, insbesondere aus:  
Information from the technical rules for biological substances, in particular from:

- [TRBA 100](#)

Schutzmaßnahmen für Tätigkeiten mit biologischen Arbeitsstoffen in Laboratorien; Ausgabe:  
Oktober 2013, geändert 2014

Protective measures for activities involving biological agents in laboratories; Edition: October 2013,  
amended 2014

- [TRBA 120](#)

Versuchstierhaltung; Ausgabe: Juli 2012, geändert 2017

Experimental animal husbandry; Edition July 2012, amended 2017

- [TRBA 500](#)

Grundlegende Maßnahmen bei Tätigkeiten mit biologischen Arbeitsstoffen; Ausgabe: April 2012  
Basic measures to be taken for activities involving biological agents; Edition April 2012

Quelle: 01462

[TRBA 462](#)

Einstufung von Viren in Risikogruppen; Ausgabe: April 2012

Classification of viruses in risk groups; Edition April 2012

Quelle: 02014

Verordnung zur arbeitsmedizinischen Vorsorge ([ArbMedVV](#))

Ordinance on Occupational Health Care ([ArbMedVV](#))

Quelle: 04025

Bekanntmachung des Robert Koch-Institutes: „Liste der vom Robert Koch-Institut geprüften und  
anerkannten Desinfektionsmittel und -verfahren“, Stand: 31. August 2013

Bundesgesundheitsbl. 2013 • 56:1706–1728

Quelle: 04034

Robert-Koch-Institut: „Ratgeber für Ärzte - Influenza (Saisonale Influenza, Influenza A(H1N1) 2009,  
Aviäre Influenza)“, 2013

Quelle: 04038

Deutsche Gesetzliche Unfallversicherung, Bundesverband: „Information: Handlungsanleitung für die  
arbeitsmedizinische Vorsorge nach dem Berufsgenossenschaftlichen Grundsatz G 42 „Tätigkeiten  
mit Infektionsgefährdung“, 2010

Quelle: 10025

Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (Hrsg.): Forschung Projekt F 5198/A91 (I.  
Fischer, St. Schurer, R. Jäckel, M. A. Rieger) Epidemiologie arbeitsbedingter Infektions-krankheiten  
(2013). [www.baua.de/de/Publikationen/Fachbeitraege/F5198.html](http://www.baua.de/de/Publikationen/Fachbeitraege/F5198.html)

Quelle: 99999

Angabe des Bearbeiters

Indication of the author

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