VESICULAR EXANTHEMA OF SWINE

ANIMAL GROUP AFFECTED	TRANS-MISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Domestic pigs; related viruses occur in marine mammals, fish and other mammals	Direct contact, oronasal, lachrymal secretions, urine, faeces, insemination, blood transfer, feeding of raw or insufficiently cooked meat	Fever, lameness and vesicles followed by erosions in the mouth and on the snout, feet, and teats; all indistinguishable from FMD, lesions in VES seem to be deeper, and granulation tissue commonly forms especially on the feet	Morbidity can reach almost 100%, but mortality is low	Strict eradication	*In houses* *in zoos* Serological monitoring system, strict importation restrictions, no garbage/meat feeding

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Susceptible animal groups
Domestic pigs, related viruses occur in marine mammals, fish and other mammals. Low levels of antibodies to VESVs and SMSv have been found in terrestrial mammals (wild boars, foxes, buffaloes, donkeys, and cattle) along the West coast of the US. The relationship between the detection of antibodies and natural disease in these species is unknown.

Causative organism
Vesicular exanthema of swine (VES) is caused by a calicivirus. There are 13 serotypes of VESV and the virus is closely related to at least 14 other serotypes of caliciviruses found in the San Miquel sea lion virus (SMSV) group. Many SMSVs have been shown to cause vesicular disease in experimentally infected pigs.

Zoonotic potential
The infection of humans VESV is inferred, but has not been proven.

Distribution
Occurred only in the USA (1932) and has been eradicated (last recorded case in 1956).

Transmission
Rapid transmission occurred in the original outbreak through contact of infected pigs and fomites. Spread of VES also by feeding raw or insufficiently cooked infected pork meat. Marine animals (fish, sea lions, fur seals, elephant seals etc.) along the Pacific coast are most likely the host of various serotypes of VESVs and SMSVs. Oral infection with VESV requires 100-1000 times the amount of virus needed to produce lesions by intradermal inoculation into the snout.

Incubation period
The incubation period after natural exposure is 1 to 5 days.

Clinical symptoms
Fever; vesicles with subsequent erosions in the mouth, on the snout, feet and teats, and lameness have been reported. Clinical signs are indistinguishable from those of foot-and-mouth disease and other vesicular diseases. Lesions in VES seem to be deeper, and granulation tissue commonly forms especially on the feet. Morbidity can be as high as 100 %. There is essentially no mortality in VES.

Post mortem findings
Vesicles are indistinguishable from those of foot-and-mouth disease, vesicular stomatitis, and swine vesicular disease. Primary viral replication takes place in the stratum germinativum of the snout, lips, gums, tongue, and coronary band. Following hydropic degeneration and oedema, keratinocytes in affected areas become spherical (ballooning degeneration) and float into the vesicular fluid. In contrast to other vesicular diseases, the stratum basale may be disrupted. Local lymph nodes may become involved, characterized by lymphocyte depletion and congestion.

Diagnosis
Differential diagnosis for VES should include foot-and-mouth disease, vesicular stomatitis, swine vesicular disease, and chemical and thermal burns. The range of affected species may help in the diagnosis of vesicular diseases. If only swine are affected other differentials include swine pox, pseudorabies, and classical swine fever. Vesicular fluid samples are tested by electron microscopy and PCR. Virus isolation should be performed to confirm the diagnosis. Serum samples should be tested for neutralizing antibodies against VESV.

Material required for laboratory analysis
The following should be collected from each of two or three animals:
1. Vesicular fluid (as much as possible).
2. Epithelium covering a vesicle.
3. Flaps of epithelial tissue still attached. Don't collect old necrotic or fibrinous material that is difficult to remove, because it is often highly contaminated with bacteria.
4. Heparinized blood (viremia ends about 5 days after the onset of disease).
5. Serum (10 ml of serum).
6. Full set of tissues in formalin.

Collect material from vesicles in sterile glycerol phosphate buffer solution. The virus persists for at least a week in tissues of the snout, tongue, coronary band, tonsil, and lymph nodes.

Relevant diagnostic laboratories

Treatment
There is no treatment for VESV infected pigs. There is essentially no mortality. Long term carriers have not been demonstrated. However, infected pigs that harbour the virus are a threat for other animals. A clinical appearance similar to foot-and-mouth disease causes significant diagnostic problems and is the main reason for strict eradication programs.

Prevention and control in zoos
- Control measures will be assisted by avoiding feeding of VESV infected meat (no cadavers of marine mammals should be fed to pigs).
- Having an effective swine identification system.
- Using serological surveys targeted primarily to breeding sows to detect infections.
- Garbage feeding must be stopped or carefully regulated to insure proper cooking. Temperatures of 70°C for a minimum of 60 min inactivate the virus.

Suggested disinfectant for housing facilities
VESVs are inactivated by cresol, sodium hydroxide (2%), formalin (1%), sodium carbonate (4% anhydrous or 10% crystalline, with 0.1% detergent), ionic and non-ionic detergents, strong iodophors (1%) in phosphoric acid, lipid solvents such as chloroform. Examples of effective disinfectants: potassium peroxymonosulfate (Antec Virkon S at a dilution rate of 1:100); hypochlorites (bleach, Chlorox (The Chlorox Company) at a dilution rate of 1:32 (only in the absence of organic material, disinfectant properties of sodium hypochlorite are inactivated by organic material and diminished by alkaline materials (lime) and moisture, contact with skin is irritating); phenols and related compounds, e.g. cresols, 1 Stroke Environ® (Calgon Vestal), Tek-Trol (Bio-Tek Industries, Inc.) at 1-2% concentrations, not inactivated by organic debris, disinfectant properties are enhanced by warm temperatures, and diminished by cold temperatures and moisture, contact with skin is corrosive and the use of goggles and rubber gloves is recommended.

Notification
Yes.

Guarantees required under EU Legislation
Guarantees required by EAZA Zoos
Measures required under the Animal Disease Surveillance Plan
Measures required for introducing animals from non-approved sources
Measures to be taken in case of disease outbreak or positive laboratory findings
Conditions for restoring disease-free status after an outbreak
Contacts for further information

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