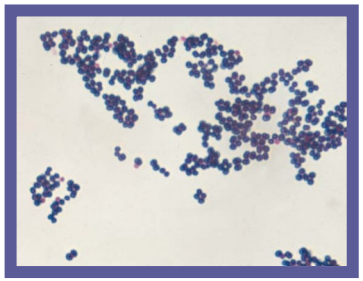
9.- Cocos Gram positivos

Staphylococcus

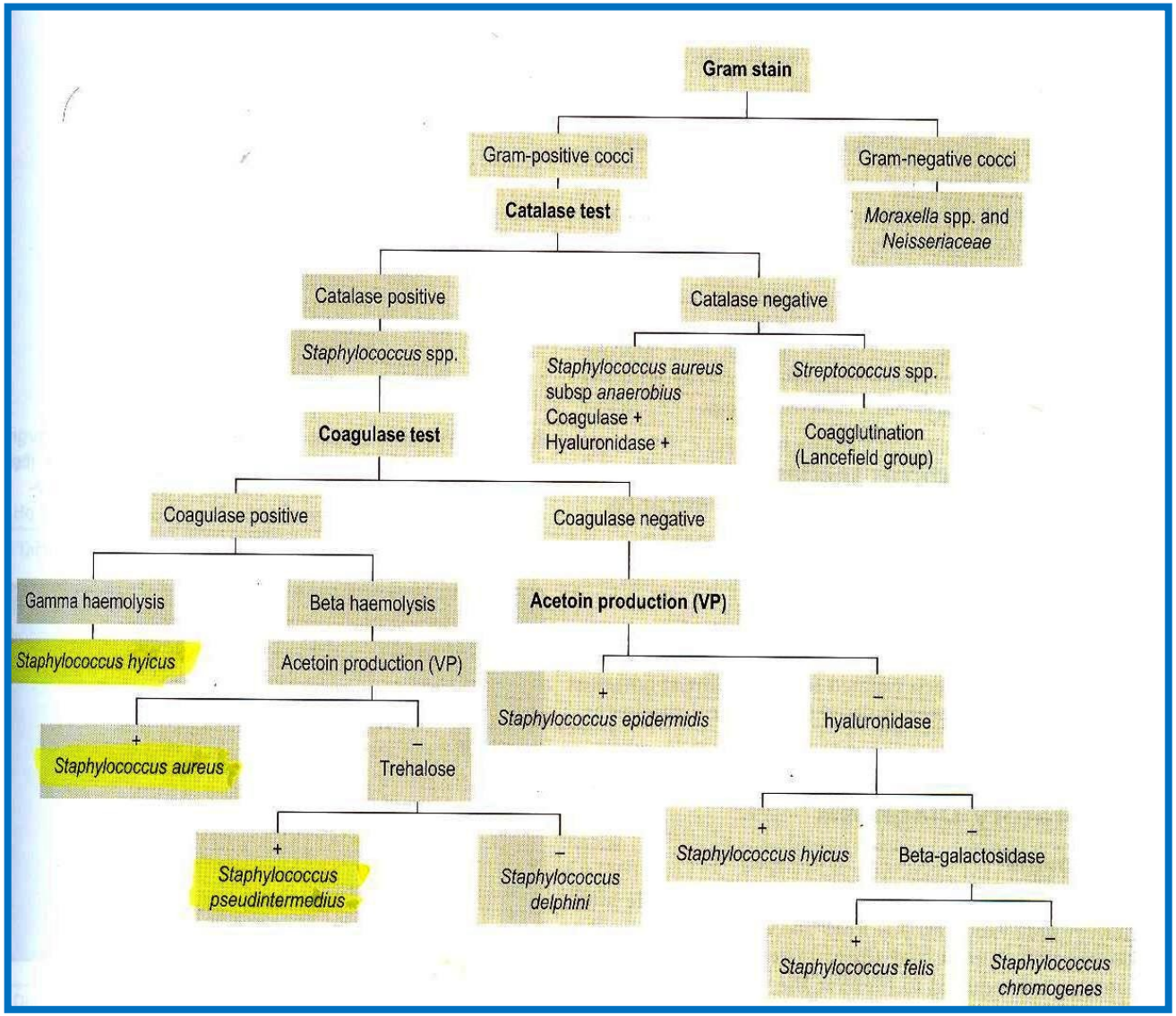
- Dominio: *Bacteria*
- Phylum: *Firmicutes*
- Clase: *Bacilli*
- Orden: *Bacillales*
- Familia: *Staphylococcaceae*
- Género: *Staphylococcus*

Staphylococcus



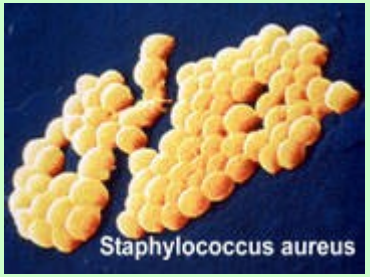
- Bacterias esféricas de 0.5 a 1.5 μ de diámetro, que se dividen formando racimos.
- Anaerobios facultativos, catalasa positivos, oxidasa negativos, inmóviles.
- Comensales de la piel y mucosas del hombre y los animales.
- La producción de coagulasa se asocia con patogenicidad
- Causantes de infecciones purulentas (piogénicas)

Identificación de *Staphylococcus*



S. aureus: Factores de virulencia

I. **Asociados a la célula bacteriana:**
a) Proteína A
b) Polisacáridos capsulares (efecto antifagocítico)
c) Acidos teicoicos (adherencia-fibronectina)
II. **Exoenzimas:**
a) Coagulasa
b) Hialuronidasa
c) Lipasas
d) Nucleasas (ADN)
III. **Exotoxinas:**
a) Hemolisinas
b) Leucocidinas (destrucción de fagocitos)
c) Toxinas exfoliativas (proteasas que lesionan la piel)
d) Toxinas con actividad de super-Ag (humanos)



Proteína A de *S. aureus*

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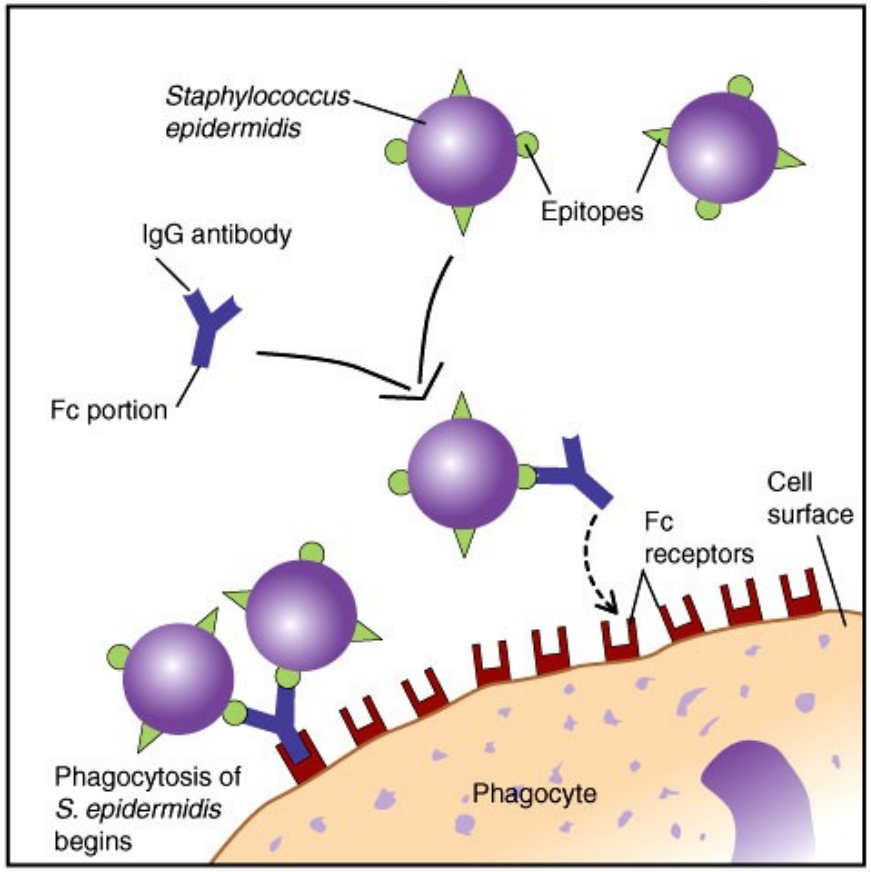

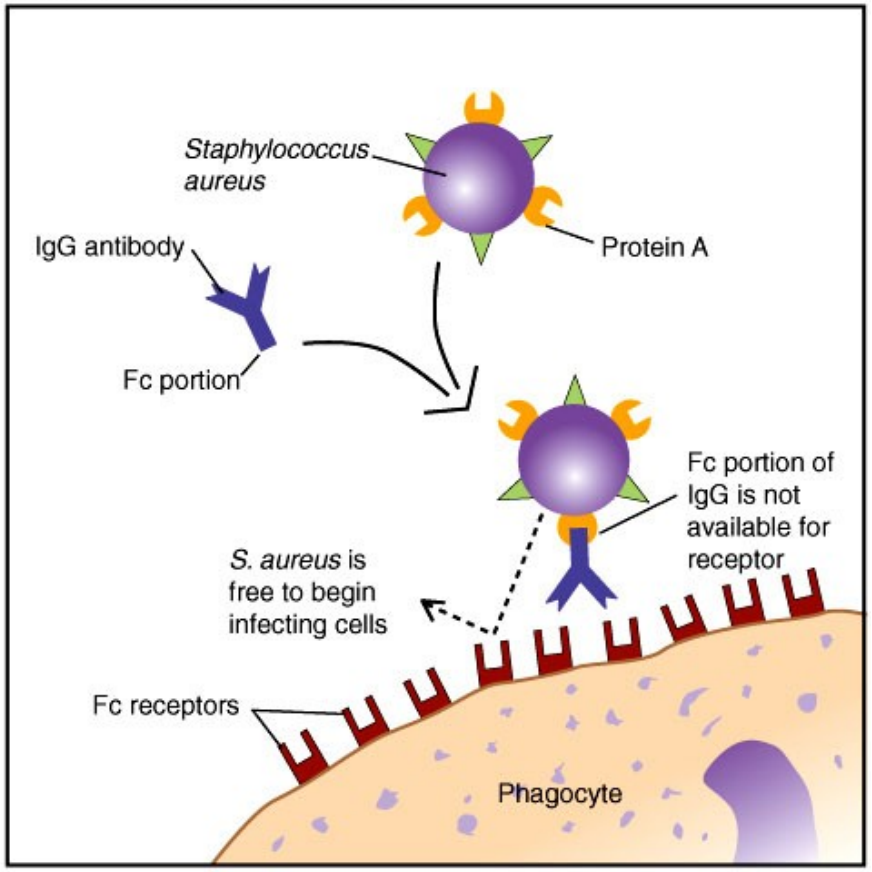

Cuadros clínicos asociados con *Staphylococcus* coagulasa-positivos:

1.- *S. aureus:*

- Bovinos: Mastititis
- Ovinos: Mastitis; foliculitis; dermatitis
- Caprinos: Mastitis; dermatitis
- Cerdos: Botriomicosis (lesiones granulomatosas) de la ubre
- Equinos: Botriomicosis de cordones espermáticos; mastitis
- Perro y gato: Infecciones supurativas (similares a las causadas por *S. pseudintermedius*)
- Aves: Artritis y septicemia en pavos; onfalitis en pollitos; pododermatitis ("bumblefoot")

2.- *S. pseudintermedius*:

- Perros: Pioderma; endometritis; cistitis; otitis externa
- Gatos: Diferentes infecciones piogénicas

3.- *S. hyicus:*

- Cerdos: Epidermitis exudativa; artritis

Definitions

Mastitis — inflammation of the mammary gland caused by microorganisms, usually bacteria, that invade the udder, multiply and produce toxins that are harmful to the mammary gland.

Clinical Mastitis — visible signs of mastitis, which include:

Mild signs — flakes or clots in the milk, may have slight swelling of infected quarter.

Severe signs — secretion abnormal; hot, swollen quarter or udder; cow may have a fever, rapid pulse, loss of appetite, dehydration and depression; death may occur.

Subclinical Mastitis — no visible signs of the disease:

The somatic cell count (SCC) of the milk will be elevated.

Bacteriological culturing of milk will detect bacteria in the milk.

Clinical mastitis causes the greatest financial loss to dairy farmers through lowered milk production

For every clinical case of mastitis, 15 to 40 subclinical cases will occur.

Somatic Cell Count (SCC) — the number of leukocytes or white blood cells per milliliter of milk.

Normal milk will have less than 200,000 cells per milliliter.

An elevated SCC is an indication of inflammation in the udder.

The bulk tank SCC gives an indication of the level of subclinical mastitis and the loss of milk production in a herd due to mastitis.

INFECTIOUS DISEASE

From Pigs to People: The Emergence of a New Superbug

The discovery of a novel strain of MRSA able to jump from livestock to humans has sparked a multicountry effort to see how dangerous it might be

The first infection was puzzling, almost inexplicable. In July 2004, Andreas Voss of Radboud University Nijmegen Medical Center in the Netherlands admitted a 6-month-old girl for surgery to repair a congenital heart defect.

Because an infection with the common bacterium *Staphylococcus aureus* would pose a grave risk following heart surgery, Voss and his colleagues screened the baby girl for the microbe. They found not just *S. aureus* but also a menacing drug-resistant form known as methicillin-resistant *S. aureus* (MRSA). The physicians were flummoxed. Although MRSA has reached epidemic proportions in much of the developed world, MRSA infections are rare in the Netherlands, thanks to an aggressive "search and destroy" policy the

or other livestock harbored MRSA, and no MRSA strain had ever been known to jump from livestock to humans. If the Dutch doctors' fears were correct, a novel strain had just gained that ability, opening up a new route for a potentially dangerous superbug to spread among humans. "Initially, we were very much afraid that this would be a major problem that could spread to the entire population," says Jan Kluytmans, a microbiologist at VU University Medical Center in Amsterdam whom Voss recruited early on to help investigate.

In recent months, the dangers

Index case. MRSA from pigs on Eric and Ine van den Heuvel's farm was detected in their daughter, Eveline, when she was an infant.

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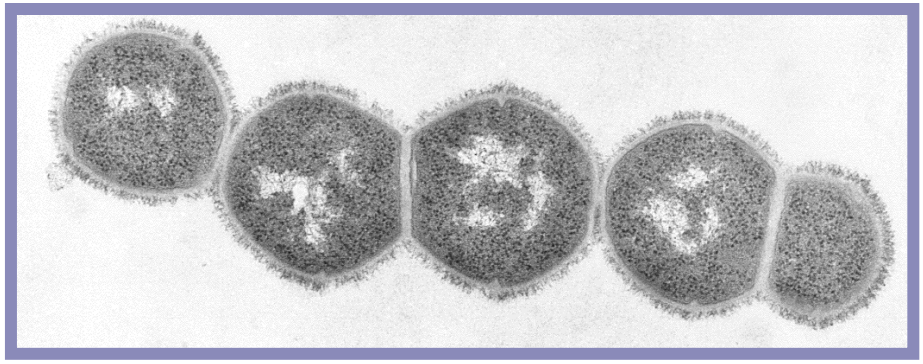
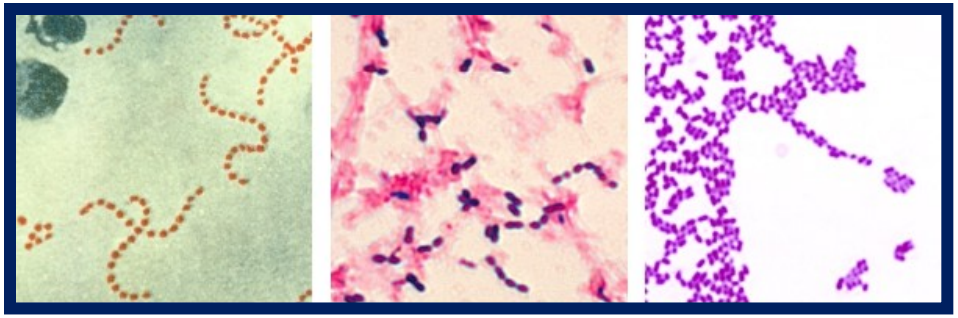
Streptococcus



- Dominio: *Bacteria*
- Phylum: *Firmicutes*
- Clase: *Bacilli*
- Orden: *Lactobacillales*
- Familia: *Streptococcaceae*
- Género: *Streptococcus*

Streptococcus



- Son bacterias redondas (~1 μ de diámetro), que se pueden encontrar solas, en pares o en cadenas.
- Anaerobios facultativos, catalasa y oxidasa negativos, inmóviles.
- Comensales de piel y mucosas.
- Producen infecciones purulentas.

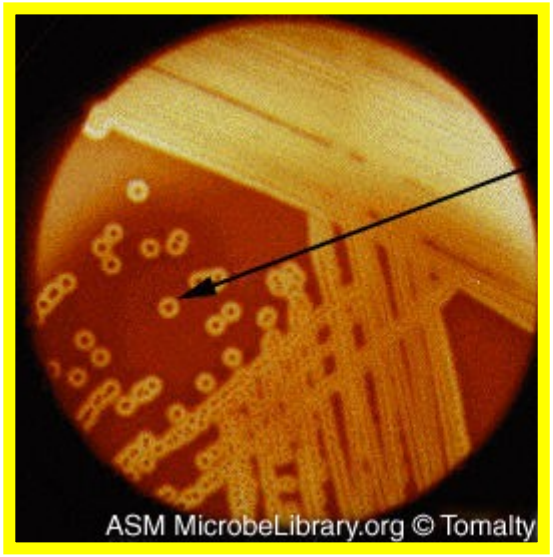
Criterios para la diferenciación de *Streptococcus*

1. **Tipo de Hemolisis** (eritrocitos de ovino o bovino)

a) Hemolisis α: Hemolisis parcial indicada por una zona verdosa alrededor de las colonias.

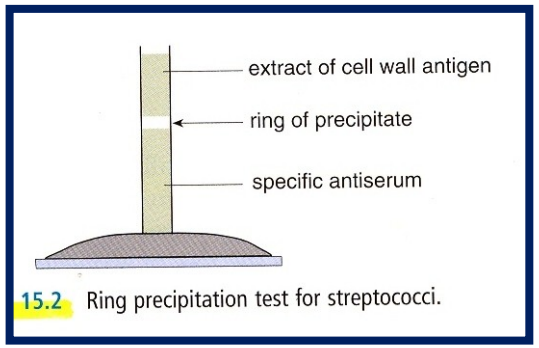
b) Hemolisis β: Hemolisis completa, indicada por una zona clara alrededor de la colonia.

c) Hemolisis γ: Ausencia de hemolisis.

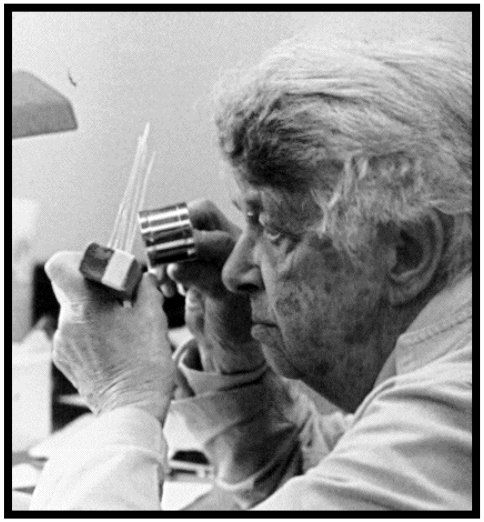


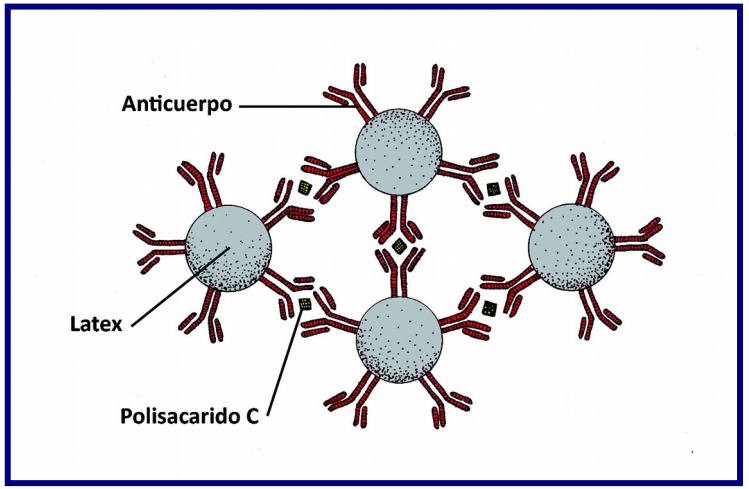
2. **Grupos de Lancefield**:

- ✓ Esta clasificación se basa en diferencias serológicas de un polisacrárido (C) de la pared celular de estas bacterias.
- ✓ Se designan con las letras mayúsculas de la A a la U.
- ✓ Se realizan pruebas de precipitación o aglutinación (latex) con antisueros preparados en conejos.
- ✓ Algunos de los grupos de Lancefield pueden subdividirse mediante pruebas de aglutinación que identifican diferencias en la proteína M.



15.2 Ring precipitation test for streptococci.



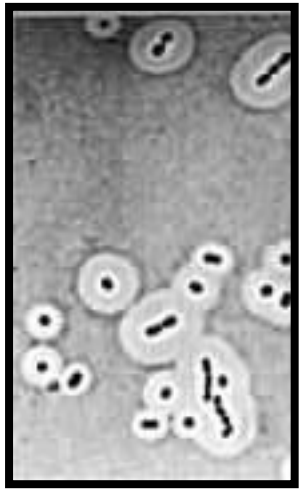


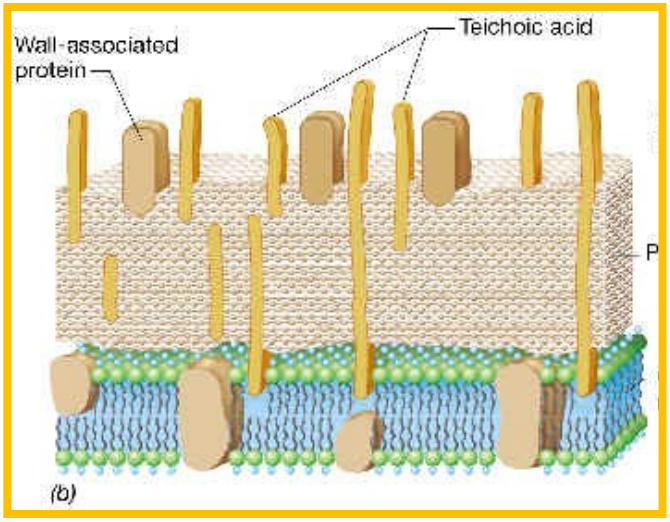
3. **Pruebas bioquímicas**:

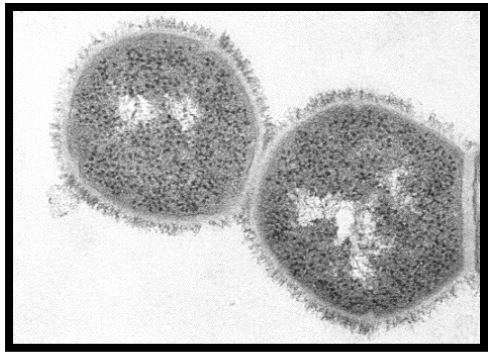
- ✓ Por ejemplo la reacción de CAMP (Christie-Atkins-Munch-Petersen); el factor de CAMP es responsable del efecto hemolítico sinérgico de *Streptococcus* grupo B y *Staphylococcus aureus*.

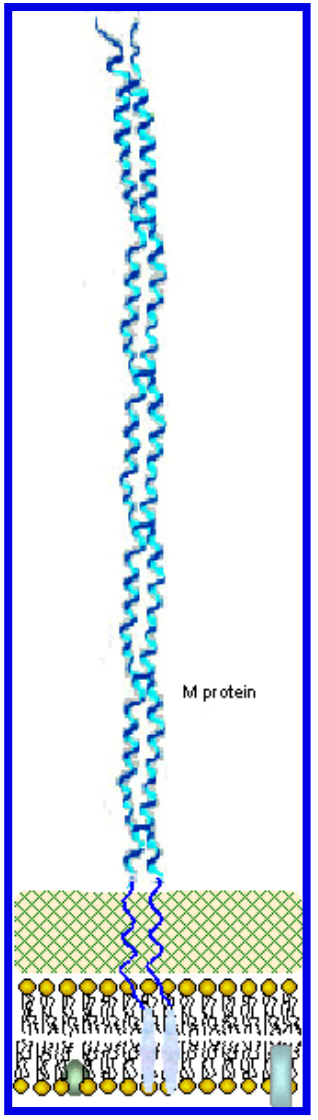
Streptococcus: Factores de Virulencia

- Aislados recientes de los gpos A (*S. pyogenes*) C (*S. dysgalactiae, S. equi, S. zooepidemicus*) y D (*S. suis*) poseen una **cápsula** de ácido hialurónico
- En la pared celular (*S. pyogenes* y *S. equi*)) se encuentra la **proteína M** (antifagocítica) su extremo amino hipervariable da lugar a diferentes serotipos.
- Las **fimbrias** y los **ácidos teicoícos (**adherencia a células epiteliales)
- Streptolisinas (hemolisinas), hialuronidasa, streptocinasa (induce plasmina que lisa coágulos sanguíneos), DNAsas, proteasas.









Streptococcus de interés veterinario

Especie	Gpo L	Hem	Huésped	Cuadro Clínico
S. agalactiae	B	β	Bov, Ov, Capr	Mastitis
S. dysgalactiae***	C	α	Bovinos Corderos	Mastitis Poliartritis
S. equi *	C	β	Equinos	Papera (strangles)
S. zooepidemicus*	C	β	Equinos Bov, Cerdos Perro	Mastitis, Neum Endometritis Septicemia, Infs supur, Neumonía
S. suis	D	α	Cerdos	Sept, Mening, Neum, Artrit
S. canis	G	β	Carnivoros	Sept neonatal, mastitis, metritis
S. uberis	-	α	Bovinos	Mastitis

* *S. equi*, subsp *equi;* ** *S. equi* sbsp *zooepidemicus,* ***S. *dysgalactiae* sbsp *dysgalactiae*

S. equi sbp *equi*

- Patógeno huésped-específico
- Evolucionó a partir de *S. equi* sbp *zooepidemicus* con quien comparte 97% de homología a nivel de ADN. No fermenta ribosa, sorbitol y lactosa lo que se usa para diferenciar a estas dos especies.
- Algunos factores de virulencia:
  - Cápsula de ácido hialurónico que imita a esta molécula en los vertebrados lo que lo protege de la RI.
  - Endopeptidasas que rompen la IgG
  - Hasta 4 superatígenos
- El cultivo ya no es considerado estándar de oro; ahora es PCR cuantitativa (qPCR)
- En Europa se usa una vacuna atenuada administrada en el labio superior; en EUA se usa otra administrada nasalmente.

Papera Equina: Patogenia

1. • *S. equi* en agua contaminada y/o fomites
   • Fosas nasales y/o cavidad bucal
2. • En unas 3h se traslada a ganglios linfáticos de cabeza y cuello
   • Severa reacción inflamatoria con masiva infiltración de PMN.
   • Fiebre
3. • Abscesos en g linfáticos con ruptura hacia el exterior y/o descarga hacia bolsa gutural
4. • Descarga nasal purulenta
5. • El exudado en la bolsa gutural se consolida y permite la sobrevivencia de *Se* por años con eliminación intermitente al exterior

theHORSE.com
YOUR GUIDE TO EQUINE HEALTH CARE

Equine Strangles

Strangles is an important disease because it can spread quickly through horse populations

Swollen lymph nodes, a common clinical sign of strangles, usually burst and drain infectious thick, yellow pus.

Many strangles cases do not require specific treatment, and the use of antibiotics is controversial. Thus, it is critical to in-

FAST FACTS

- ***Strangles*** is caused by the bacterium *Streptococcus equi* subspecies *equi* and is an important, highly contagious respiratory tract infection of horses.
- ***Classic signs*** of disease include a nasal discharge, swelling/abscessation of the lymph nodes of the head and neck, fever, coughing, difficulty eating, and lethargy.
- ***Metastatic or "bastard" strangles*** occur when the bacterium infects areas elsewhere in the horse's body, such as the chest, abdomen, or brain.
- ***Recovery*** for most horses occurs uneventfully within six to eight weeks with appropriate nursing care.
- ***To minimize*** the spread of infection, all infected horses should be immediately quarantined and strict hygiene measures should be instituted.
- ***Carriers or chronic shedders*** can occur following recovery in a small percentage of horses with *S. equi*; these are an important source of infection for susceptible horses.
- ***Vaccination*** against *S. equi* might be ben-

n risk factors for the
orse's experience and
l with your veterinarian.

Two strangles vaccines are available: a subunit M-protein-based vaccine for intramuscular use and a modified live bacterial vaccine for intranasal administration.

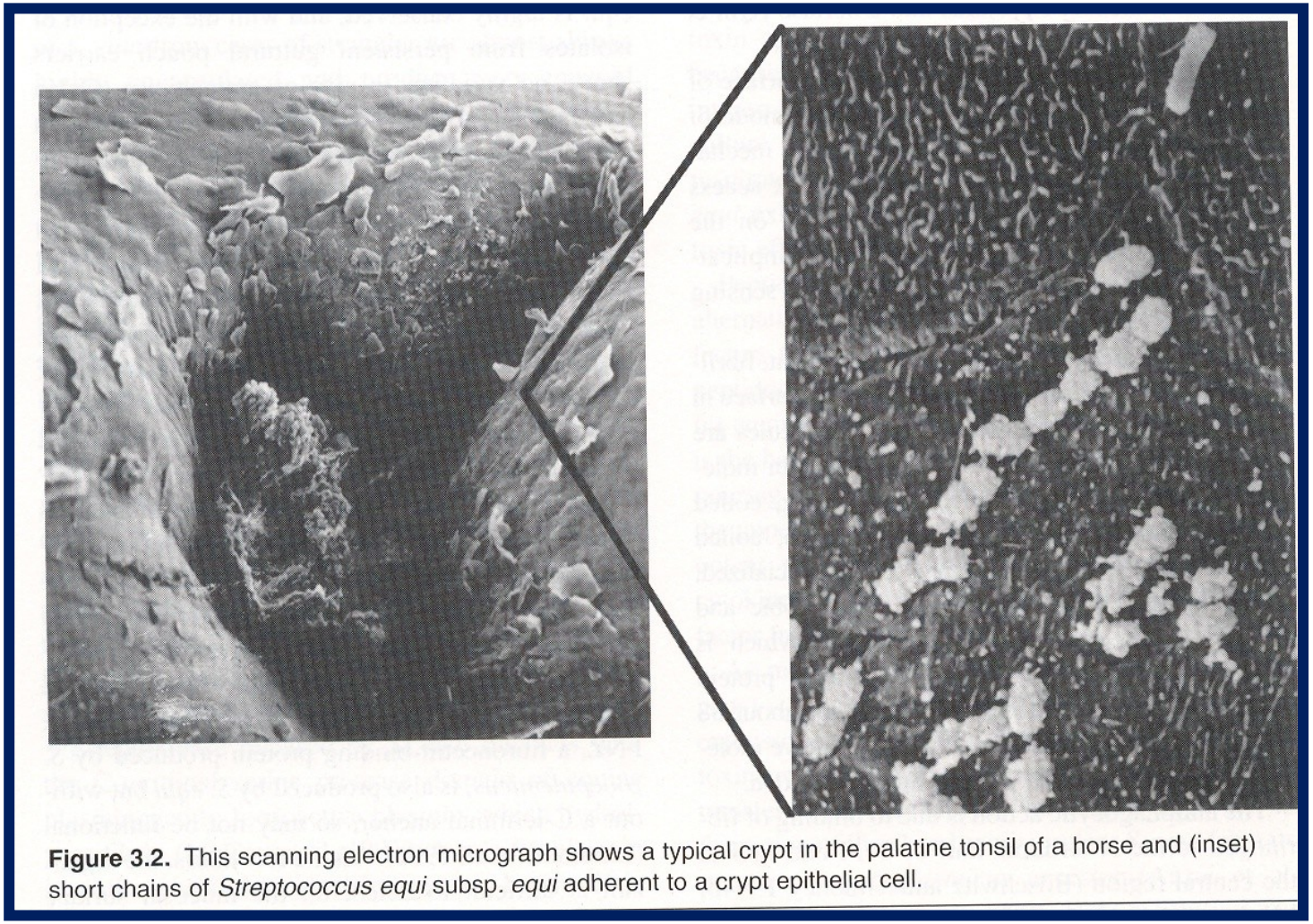


Figure 3.2. This scanning electron micrograph shows a typical crypt in the palatine tonsil of a horse and (inset) short chains of *Streptococcus equi* subsp. *equi* adherent to a crypt epithelial cell.

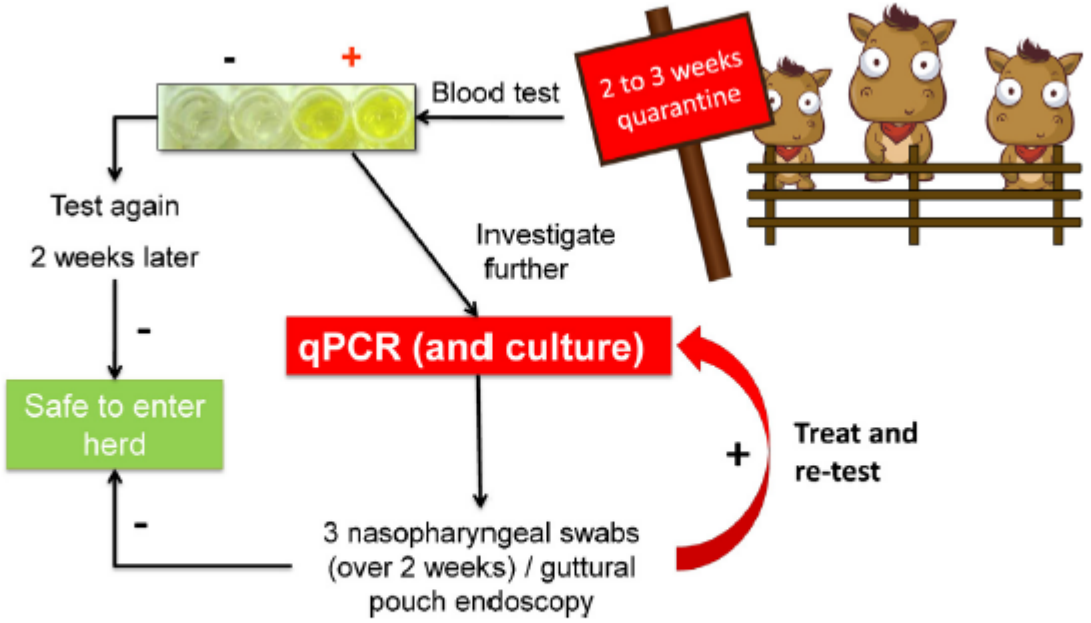


Fig. 2. An effective quarantine procedure. Horses are isolated upon arrival and tested by serology to identify any recently exposed or persistently infected horses. If negative, horses are re-tested 2 weeks later to identify potential seroconversion. If negative, then horses are safe to mix with existing population. If positive, then the guttural pouches or nasopharynx (three swabs over consecutive weeks) should be tested by qPCR (and culture) to identify persistently infected animals.

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Evaluation of a commercially available modified-live *Streptococcus equi* subsp *equi* vaccine in ponies

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Supported by Fort Dodge Animal Health.

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Objective—To evaluate a commercially available modified-live *Streptococcus equi* subsp *equi* vaccine for safety and persistence in vaccinated ponies and to detect recombination or reversion events in the vaccine strain.

Animals—5 ponies that were 1.5 to 8 years old (group 1) and 4 ponies that were 6 months old (group 2).

Procedures—Ponies were vaccinated, with a subsequent booster vaccination 2 to 3 weeks later, and monitored for 50 days. At booster vaccination, an equal amount of a tetracycline-resistant wild-type strain of *S equiwas* administered. Recovery of all strains was performed by use of bacteriologic culture and PCR assays.

Results—Ponies in group 1 had background antibody titers against *S equi* antigen before vaccination despite the lack of known exposure to *S equi*. Ponies in group 2 were immunologically naïve. Increases in anti-*S equi* antibody titers were detected in both groups. Ponies in group 1 did not have clinical signs of disease caused by *S equi*. In group 2, all ponies developed abscesses in retropharyngeal lymph nodes; 1 pony developed severe clinical disease and was euthanized. The vaccine strain was recovered from ponies in group 2 for up to 24 days after vaccination.

Conclusions and Clinical Significance—Although the vaccine was successful in inducing IgG antibodies against *S equi* in all ponies, findings suggested that the vaccine may have caused substantial morbidity and some deaths in the young ponies. In young ponies, the vaccine strain persisted in tissues for weeks; however, no evidence of recombination was detected.

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Characterization of Pneumonia Due to *Streptococcus equi* subsp. *zooepidemicus* in Dogs▽

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***Streptococcus equi* subsp. *zooepidemicus* has been linked to cases of acute fatal pneumonia in dogs in several countries. Outbreaks can occur in kenneled dog populations and result in significant levels of morbidity and mortality. This highly contagious disease is characterized by the sudden onset of clinical signs, including pyrexia, dyspnea, and hemorrhagic nasal discharge. The pathogenesis of *S. equi* subsp. *zooepidemicus* infection in dogs is poorly understood. This study systematically characterized the histopathological changes in the lungs of 39 dogs from a large rehoming shelter in London, United Kingdom; the dogs were infected with *S. equi* subsp. *zooepidemicus*. An objective scoring system demonstrated that *S. equi* subsp. *zooepidemicus* caused pneumonia in 26/39 (66.7%) dogs, and most of these dogs (17/26 [65.4%]) were classified as severe fibrino-suppurative, necrotizing, and hemorrhagic. Three recently described superantigen genes (*szeF*, *szeN*, and *szeP*) were detected by PCR in 17/47 (36.2%) of the *S. equi* subsp. *zooepidemicus* isolates; however, there was no association between the presence of these genes and the histopathological score. The lungs of *S. equi* subsp. *zooepidemicus*-infected dogs with severe respiratory signs and lung pathology did however have significantly higher mRNA levels of the proinflammatory cytokines tumor necrosis factor alpha (TNF-α), interleukin 6 (IL-6), and interleukin 8 (IL-8) than in uninfected controls, suggesting a role for an exuberant host immune response in the pathogenesis of this disease.**

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Isolation and characterization of β-haemolytic-Streptococci from endometritis in mares

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Superantigens

ABSTRACT

The objective of this manuscript was to validate published PCR-based methods for detection of β-haemolytic Streptococci by comparison with established bacteriological techniques using 85 clinical isolates recovered from uterine swabs of mares with clinical signs of endometritis and to determine the distribution of SeeL/SeeM and SzeL/SzeM superantigens in isolates of *Streptococcus equi* subsp. *equi* (*S. equi*) and *S. equi* subsp. *zooepidemicus* (*S. zooepidemicus*). The conventional bacteriological techniques showed the vast majority of these isolates (78) were *S. zooepidemicus* with just 5 *Streptococcus dysgalactiae* subsp. *equisimilis* (*S. equisimilis*) and 2 *S. equi* strains detected. The PCR analyses confirmed the bacteriological results demonstrating the reliability of the 16S rRNA PCR assay for detecting *Streptococci*, the multiplex PCR for differentiating between *S. zooepidemicus*, and *S. equi*, and PCR assays based on streptokinase genes for identification of *S. equisimilis*. PCRs for genes encoding superantigens revealed *seeL* and *seeM* specific amplicons with size of approximately 800 and 810 bp respectively for the *S. equi* strains and for 2 *S. zooepidemicus* strains. To our knowledge, this is the first report of *szeL* and *szeM* possession by *S. zooepidemicus* isolates derived from endometritis in mares.

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Enterococcus

- Dominio: *Bacteria*
- Phylum: *Firmicutes*
- Clase: *Bacilli*
- Orden: *Lactobacillales*
- Familia: *Enterococcaceae*
- Género: *Enterococcus*

- Catalasa negativos, producen hemolisis parcial (α) o no son hemolíticos.
- Pueden crecer en presencia de 6.5% NaCl, en McConkey y fermentar el sorbitol (lo que los diferencia de *Streptococcus*)
- *E. fecalis* es comensal de los intestinos delgado y grueso y pueden llegar a verse involucrado en cuadros de enteritis, mastitis e infecciones del tracto urinario.

Streptococcus y *Enterococcus* causantes de mastitis bovina

	Hem	**CAMP**	**H. Escul**	**Lancf**	**McConk**
S. agalactiae	β	+	-	B	-
S. dysgalactiae	α	-	-	C	-
S. uberis	α	-	+	-	-
E. faecalis	α	-	+	D	+

Glucosido=any of an extensive group of compounds that yield glucose and someother substance or substances when treated with a dilute acid ordecomposed by a ferment or enzyme.

“Los veterinarios lo tienen más fácil. Por lo menos, no son desorientados por las opiniones de sus pacientes”. L. Pasteur