

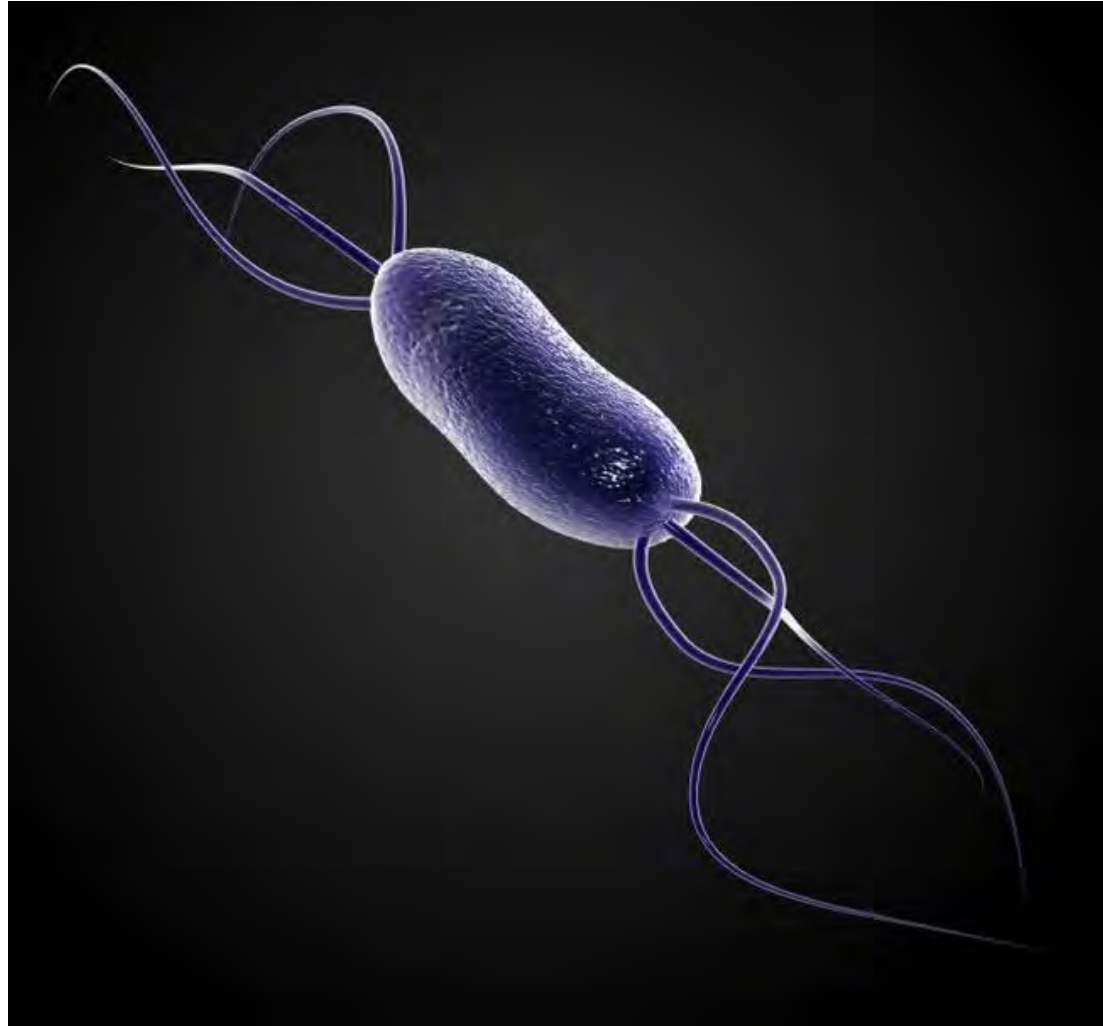


DELTA MUNE

Listeria monocytogenes

A food safety risk to
the dairy industry.

Meet *Listeria monocytogenes*



History

- Described in 1924
- 1940 - Officially renamed after Joseph Lister
- 1920's – First cases of human Listeriosis
- 1952 – Described as human pathogen
- 1981 – first link to foodborne illness
- Today – Regarded as major pathogen

Physical Structure

- Gram positive cell wall
- Facultative anaerobe
- Does not produce spores
- Motile at lower temperatures
- 12 species in genus, 5 new species (2014)
- 2 of 17 species regarded as pathogens, only LM regarded as a human pathogen.
- Only 3 of 12 serovars implicated in foodborne illness. 4b most prevalent.

Listeria species

[L. aquatica](#)

[L. booriae](#)

[L. cornellensis](#)

[L. fleischmannii](#)

[L. floridensis](#)

[L. grandensis](#)

[L. grayi](#)

[L. innocua](#)

[L. ivanovii](#) – Pathogen of sheep

[L. marthii](#)

[L. monocytogenes](#) – Pathogen of Humans and animals

[L. newyorkensis](#)

[L. riparia](#)

[L. rocourtiae](#)

[L. seeligeri](#)

[L. weihenstephanensis](#)

[L. welshimeri](#)



Natural habitat

- Until 1960's – only associated with animals.
- Widely distributed in nature
- Humans, Animals, and birds are carriers
- Sewage, soil, water, vegetation, silage, animals and food processing plants.
- Forms biofilms
- 5-10% of population are asymptomatic carriers.

Physical Properties

- A_w low as 0.92
- 10% NaCl
- Temp low as 0°C
- pH low as 4.2
- Grow in presence of Lactic acid
- Saprophytic



Recent outbreaks! (CDC)

- **2017**
- [Vulto Creamery Soft Raw Milk Cheese – Listeriosis](#)
- **2016**
- [Frozen Vegetables – Listeriosis](#)
- [Raw Milk – Listeriosis](#)
- [Packaged Salads – Listeriosis](#)
- **2015**
- [Soft Cheeses – Listeriosis](#)
- [Ice Cream – Listeriosis](#)
- **2014**
- [Commercially Produced, Prepackaged Caramel Apples – Listeriosis](#)
- [Bean Sprouts – Listeriosis](#)
- [Cheese – Listeriosis](#)
- [Dairy Products – Listeriosis](#)
- **2013**
- [Cheese – Listeriosis](#)
- **2012**
- [Ricotta Salata Cheese – Listeriosis](#)
- **2011**
- [Cantaloupes – Listeriosis](#)

Recent outbreaks! (CDC)


Multistate Outbreak of Listeriosis Linked to Soft Raw Milk Cheese Made by Vulto Creamery (Final Update)



Posted May 3, 2017 1:30 PM ET

This outbreak appears to be over. However, *Listeria* remains an important cause of serious, life-threatening human illness in the United States. For more information about *Listeria* and steps that people can take to reduce their risk of infection, visit [CDC's *Listeria* webpage](#).

Highlights

- **Read the Recall & Advice to Consumers and Retailers>>**
- This outbreak appears to be over. However, CDC recommends that consumers do not eat, restaurants do not serve, and retailers do not sell recalled raw milk cheeses made by Vulto Creamery.
- On March 10, 2017, Vulto Creamery [recalled](#)  all lots of its raw milk cheeses.
 - The raw milk cheeses were distributed nationwide, with most being sold at retail locations in the northeastern and Mid-Atlantic states; California; Chicago; Portland, Oregon; and Washington, D.C.
- CDC, public health and regulatory officials in several states, and the U.S. Food and Drug Administration (FDA) investigated a multistate outbreak of *Listeria monocytogenes* infections (listeriosis).
 - Eight people infected with the outbreak strain of *Listeria* were reported from four states.

At a Glance:

- **Case Count: 8**
- **States: 4**
- **Deaths: 2**
- **Hospitalizations: 8**
- **Recall: Yes**



Recent cases in SA

Parmalat hides bacteria infections

2017-03-26 06:00

Herman Scholtz - **City Press**



Dairy giant Parmalat had repeated and serious infections with the dangerous bacteria types Salmonella and Listeria, but hid this information from their biggest supermarket clients and later made a single employee the scapegoat instead.

This is what the Commission for Conciliation, Mediation and Arbitration (CCMA) found at the end of 2016, when it ruled that Parmalat had unfairly dismissed Tertius Carstens, quality manager of the Bonnievale plant in the Western Cape, one of the biggest dairy plants in Africa.

While Carstens was eventually fired, the plant manager at Bonnievale, Hansie Wolfaardt, was promoted to head of Parmalat's Ladismith plant.



Listeriosis in SA



Listeriosis in SA

A Counter Argument: Listeria Hysteria?

One source states that the incidence of *Listeriosis* in pregnancy is 12 per 100,000. Available statistics for 2007 shows that of **800 cases in the United States in 2007, about 200 cases** occurred during pregnancy. The same source indicates that the incidence of *Listeriosis* in the newborn is estimated at a rate of **8.6 per 100,000 live births**. More recent statistics have been difficult to obtain.

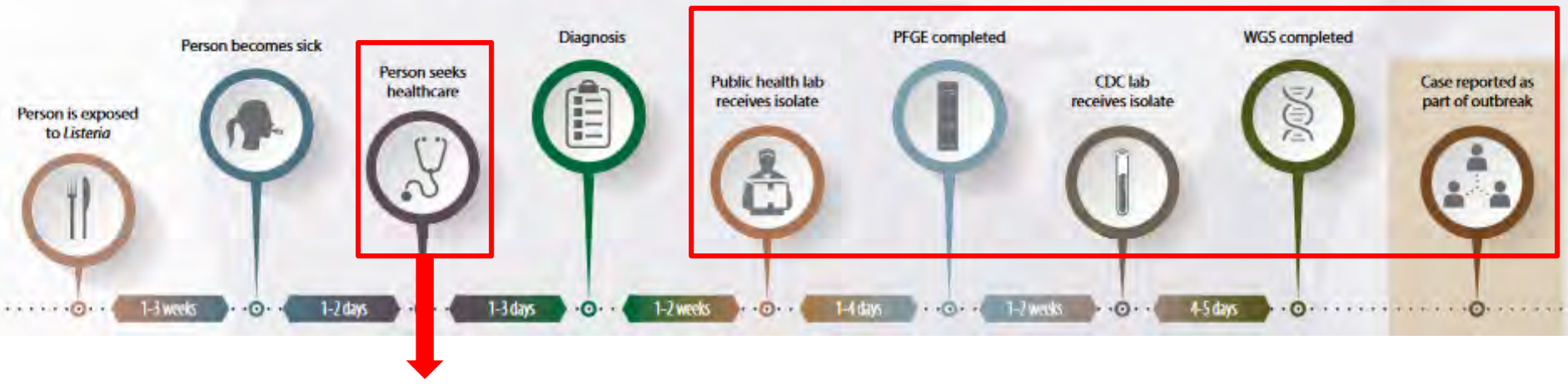
It is such information (statistics that suggest a low risk of pregnant women becoming infected with *Listeria*) that leads certain professionals to feel that pregnant women are scared half to death by the improbable. Doctor George Du Toit, Stellenbosch Obstetrician and Gynecologist, says that there are **no reported *Listeria* cases in pregnant women in South Africa**. According to him, **only imported food may present a danger**.

Challenges in SA

- Medical aid not covering investigations
- Rural cases not reported
- Infant deaths attributed to “Natural causes”
- Allocation of state funds insufficient.

Outbreak investigation

Timeline for Linking a Case of *Listeria* Infection to an Outbreak



Treatment with broad spectrum antibiotics

Pathology

- Causes Listeriosis
- 2 Forms of disease
- 1: Flu like symptoms , Vomiting & Diarrhea.
- 2: Septic disease: invades GIT Epithelial cells
 - Enters host monocytes, macrophages and polymorphonuclear leucocytes = intracellular parasite.
 - Becomes blood borne

Pathology

- Once intracellular = gains access to the brain and able to infect fetus through trans placental migration.
- Host immunity normally eliminates infection through T-lymphocyte response.
- Systemic disease may develop in immunosuppressed patients.
- Systemic disease manifests as Septicemia, meningitis, encephalitis and pneumonia.

Infectivity?

- Mostly strain dependent
- 1000cfu/g in healthy people
- Outbreak in 1998 in USA
- Product contained $<0.3\text{cfu/g}$
- In USA; 0.2% cases $<100\text{cfu/g}$
- $>80\%$ cases $>1\text{milj cfu/serving}$ or $10,000\text{cfu/g}$

Significance

- Stops at self-limiting diarrhea, skin rash in healthy people.
- Serious cases almost exclusively associated with Elderly, pregnant woman, newborns and immune-suppressed individuals.
- In US 2500 cases with 500 of them fatal.

Recent outbreaks! (CDC)

- **2016**
- [Multistate Outbreak of Listeriosis Linked to Frozen Vegetables](#) (8 cases; 2 deaths; 25%)
- [Multistate Outbreak of Listeriosis Linked to Raw Milk](#) (2 cases; 1 Death; 50%)
- [Multistate Outbreak of Listeriosis Linked to Packaged Salads Produced at Springfield, Ohio Dole Processing Facility \(Final Update\)](#) (19 Cases; 1 Death; 5%)

Significance

- **Multistate Outbreak of Listeriosis Linked to Whole Cantaloupes from Jensen Farms, Colorado (2011)**
- **147 cases ; 33 Deaths ; 22% Mortality**
- Eric and Ryan Jensen, former owners of Colorado-based Jensen Farms, people pleaded guilty on Tuesday 22 October to federal criminal charges.

Significance

- Both men pleaded guilty in US District Court in Denver to six counts of adulteration of a food and aiding and abetting. Each faces not more than one year in federal prison and a fine of up to \$250,000 per count.
- The Jensens filed for bankruptcy in 2012 and suspended farming operations amid a raft of lawsuits by people who were sickened or whose family members died from listeria infections connected to the tainted cantaloupes.

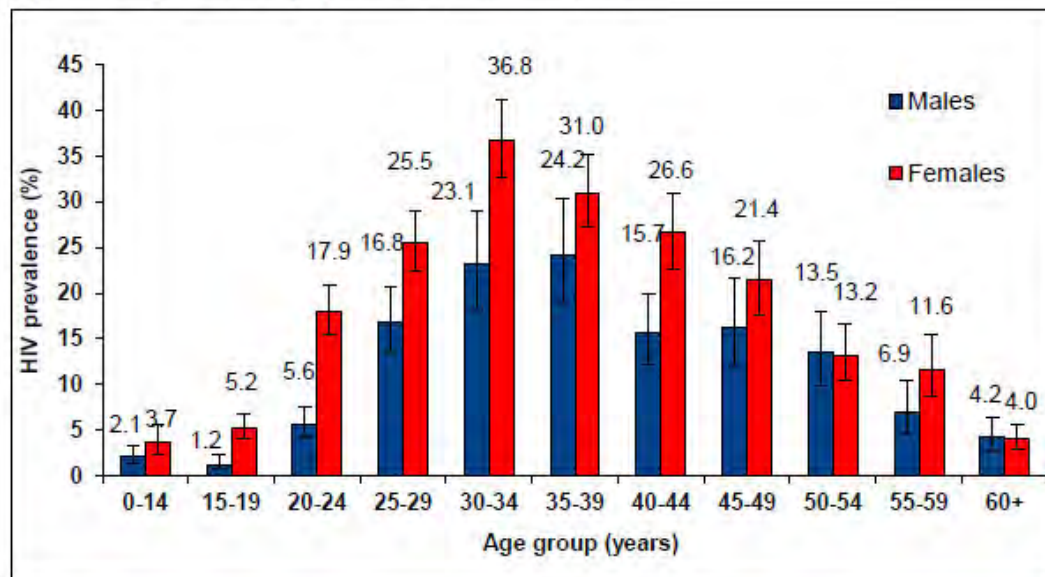
In Perspective

Agent	No of cases	% Hospitalized	% Deaths
Campylobacter spp.	845,024	1%	0.009%
Clostridium perfringens	965 958	0.04%	0%
E.Coli O157	63,153	3.38%	0.03%
Salmonella enterica	1,029,382	1.89%	0.04%
Shigella spp	131,254	1.1%	0.007%
Clostridium botulinum	55	76%	16%
Listeria monocytogenes	1591	91.45%	16%

Risk groups (2015 stats)

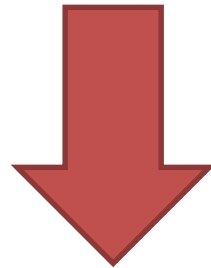
- 7milj people with HIV in SA 12.7%
- 2.3Milj adults with Diabetes (20-79years) 4%
- 16% of men and 14% of woman will develop cancer during their life. (CANSA)

Figure 1: HIV prevalence by age and sex, South Africa, 2012



Sources of L.monocytogenes.

- Raw products (unpasteurized milk, Brine mixes, herbs& Spices)
- Environment (Dust, Drains, Water etc.)
- Staff (Hands & Clothing)



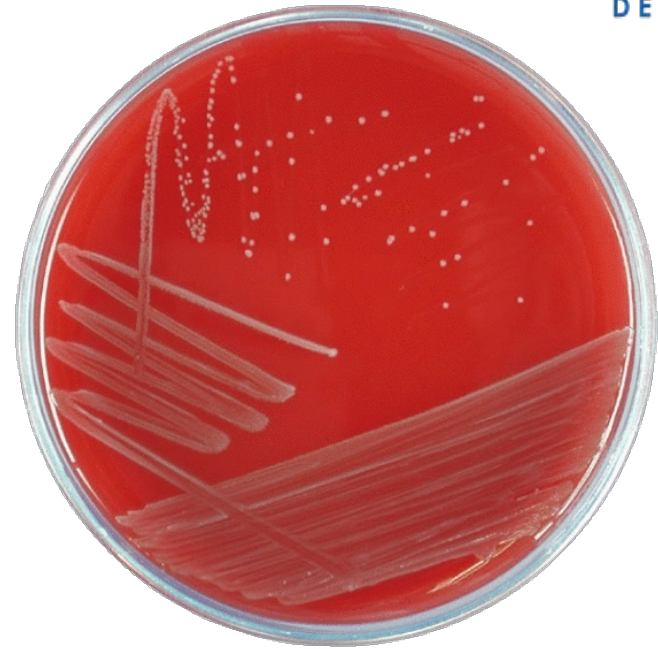
- Contamination during processing = contaminated final product.

L. monocytogenes in Dairy

- Post pasteurization contamination is the biggest risk.
- Products most implicated:
 - Raw milk
 - Soft cheese (Feta, Brie, Camembert, Blue cheese)

Monitoring

- Drains
- Tile floors with grout
- Equipment
- Routine testing of processed products



A microscopic view of a Gram stain. The background is a light pinkish-purple color. Numerous small, purple-stained cocci are scattered throughout the field. Some of these cocci are arranged in pairs or small groups. There are also several larger, pink-stained structures, which appear to be elongated and possibly contain internal structures, likely representing Gram-negative bacteria or other organisms that have taken up the counterstain. The overall appearance is that of a mixed culture or a sample with a high proportion of Gram-positive bacteria.

Thank you