CVE – AGMOOCS - TANUVAS

ENDOMETRITIS

DR. S. SATHESH KUMAR,

M.V.Sc., Ph.D., PGDEVP.,

Professor and Head

Department of Veterinary Gynaecology and Obstetrics,

Veterinary College and Research Institute

Tamil Nadu Veterinary and Animal Sciences University

Orathanadu – 614 625, Thanjavur Dt.

Email: drsatheshkumar6@rediffmail.com

LESSON II

- *Aetio-pathogenesis of endometritis*

AETIOLGY

- Endometritis is a multifactorial disease
- Determining its causative risk factors has great potential as a source of information that must be considered for the treatment and prevention of endometritis.
- Causative risk factors
    - > Extrinsic factors
    - > Intrinsic factors

Extrinsic factors

- **Calving season / environment:**

  > Rainy seasons - the general health of cows decreases, making them more vulnerable to uterine infections.

  > endemic infectious agents

- **Nutrition:**

  > Negative energy balance

  > Protein deficiency and excess

  > Vitamin (A, B, C, E) deficiency

  > Minerals especially Selenium deficiency

Intrinsic factors

- **Dystocia and Retention of the placenta (ROP)**

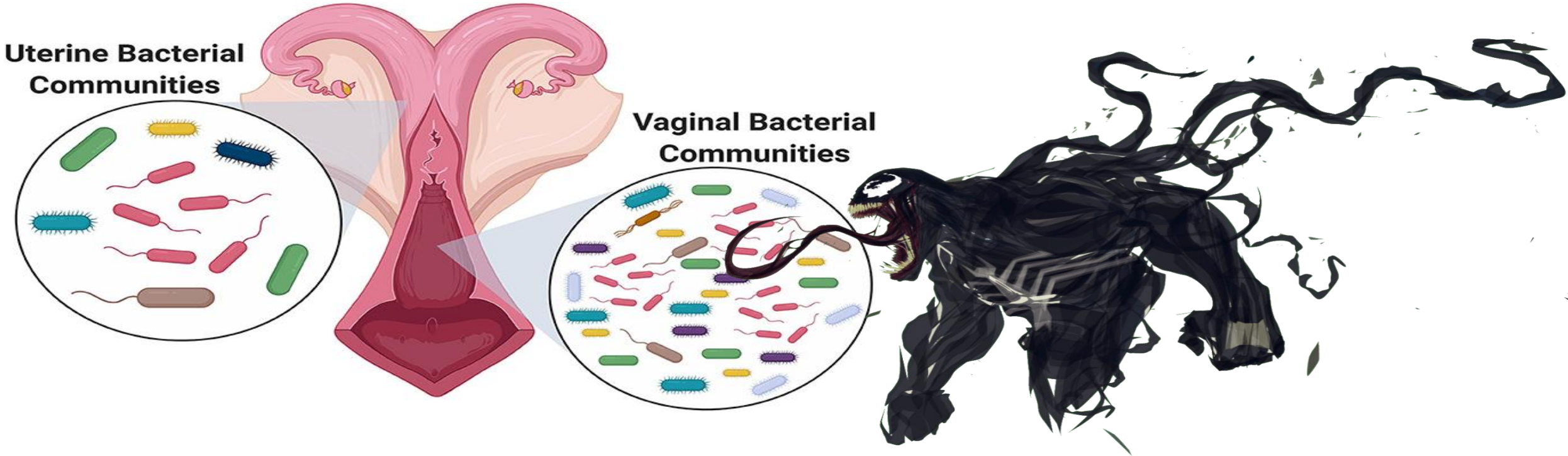
  > Inappropriate and indiscriminate handling of uterine environment during dystocia and manual removal of retained placenta.

- **Incidence of twinning**
- **Metabolic disorders: Hypocalcemia, ketosis etc.,**



AETIOLGY

After parturition the anatomical barriers of the vulva, vagina and cervix are breached, introducing bacteria into the uterus, including pathogens, along with bacteria that constitute the uterine microbiome. **(Sheldon and Owens, 2017)**

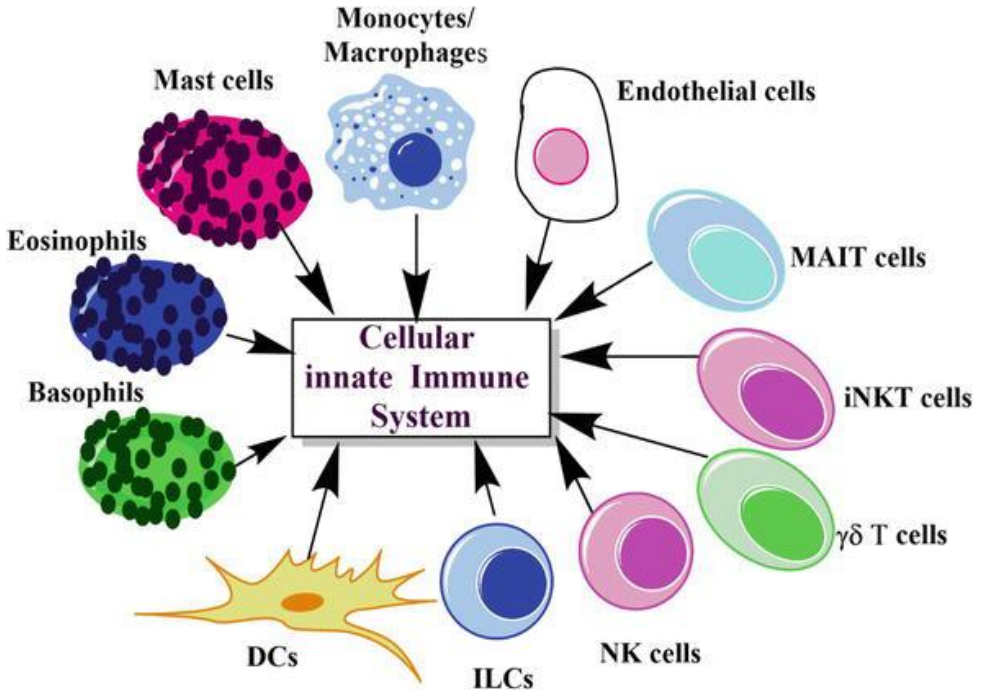


UTERINE PATHOGENS

- **Uterine disease is commonly associated with *Escherichia coli*, *Arcanobacterium pyogenes*, *Fusobacterium necrophorum* and *Prevotella* species.**
- **The most prevalent pathogens are *E. coli* and *A. pyogenes.* (Williams *et al.*, 2005)**
- ***E. coli* infections appear to precede and pave the way for the *A. pyogenes* infection**
- ***A. pyogenes*, *F. necrophorum* and *Prevotella* species act synergistically and increase the risk of clinical endometritis and its severity.**

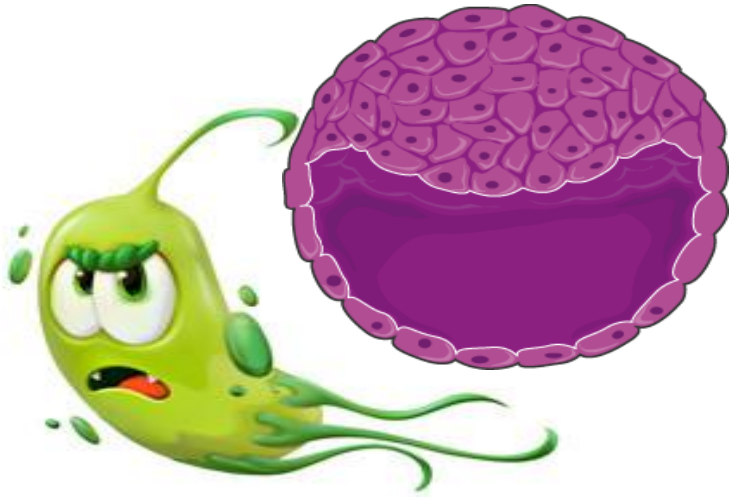
NEUTROPHIL INFILTRATION

- **The uterine immune response to microbes leads to an influx of neutrophils from the peripheral circulation into the endometrium and uterine lumen**

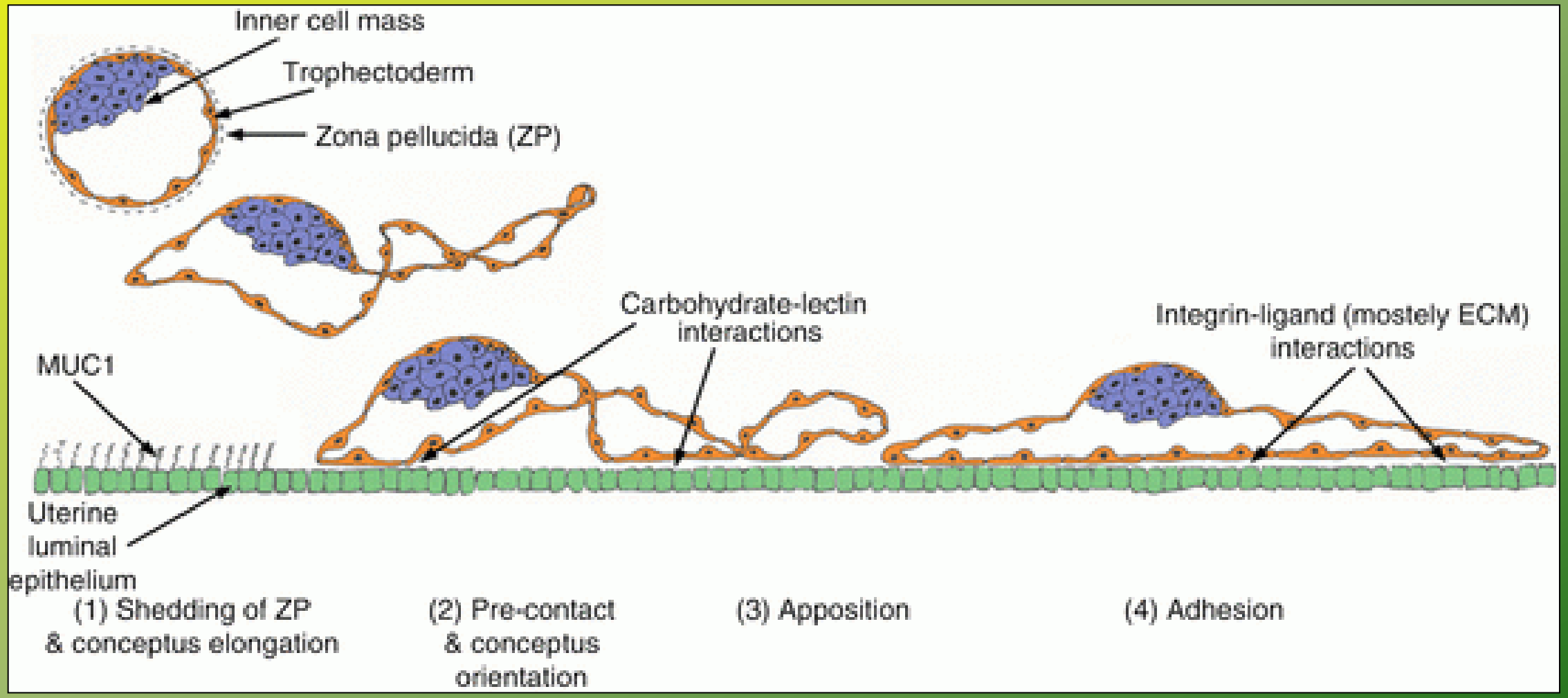


CONEPTION FAILURE
DUE TO ENDOMETRITIS

- **The presence of pathogenic bacteria in the uterine lumen and the associated inflammation of the endometrium preclude successful development and implantation of a viable embryo, so these animals cannot conceive while they are affected.**



NORMAL IMPLANTATION

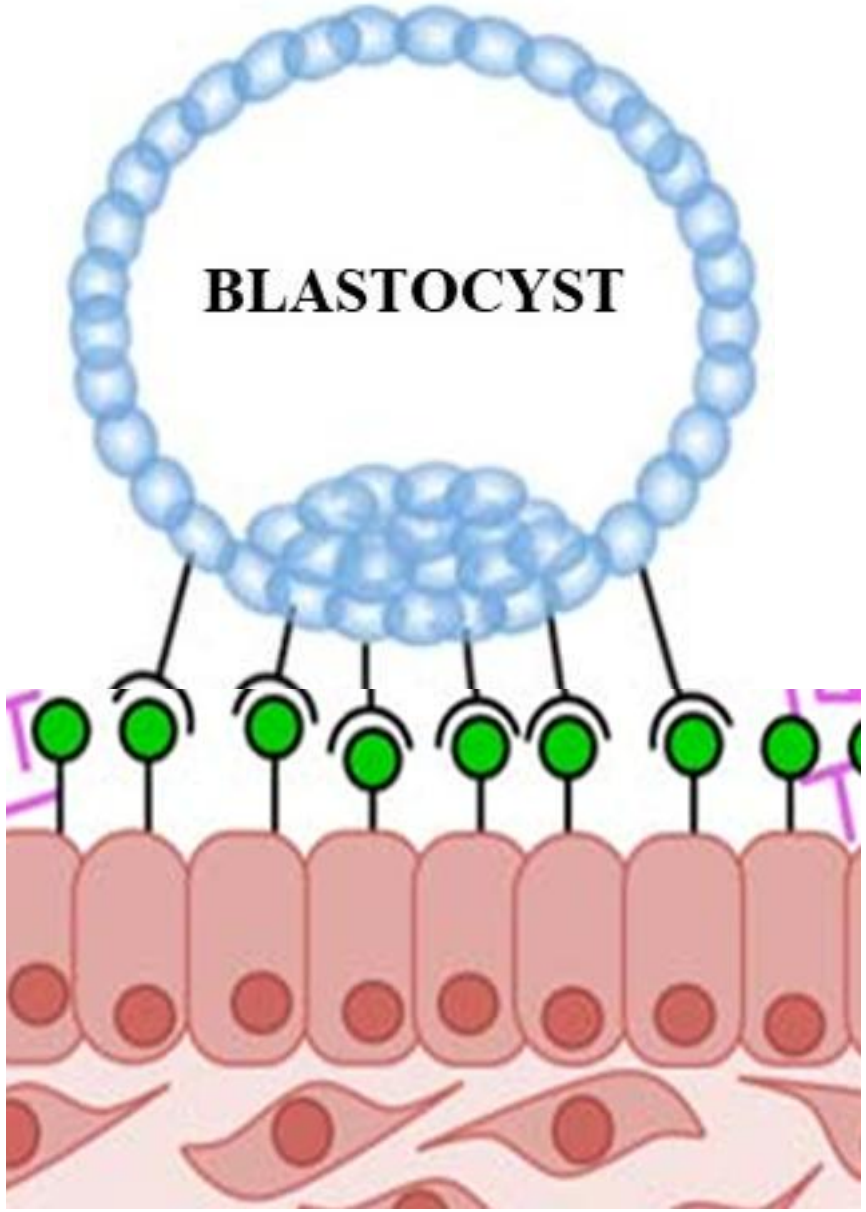


MUC 1

- **Mucin 1 (MUC1) expression is increased in the bovine endometrium in response to subclinical infection.**
- **MUC1 - An epithelial cell glycosylated transmembrane protein, have a role in microbial defence of the endometrium in mammals.**
- **MUC1 is an anti-adhesion factor that prevents the conceptus attachment and implantation**

(Hafez and Hafez, 2000)

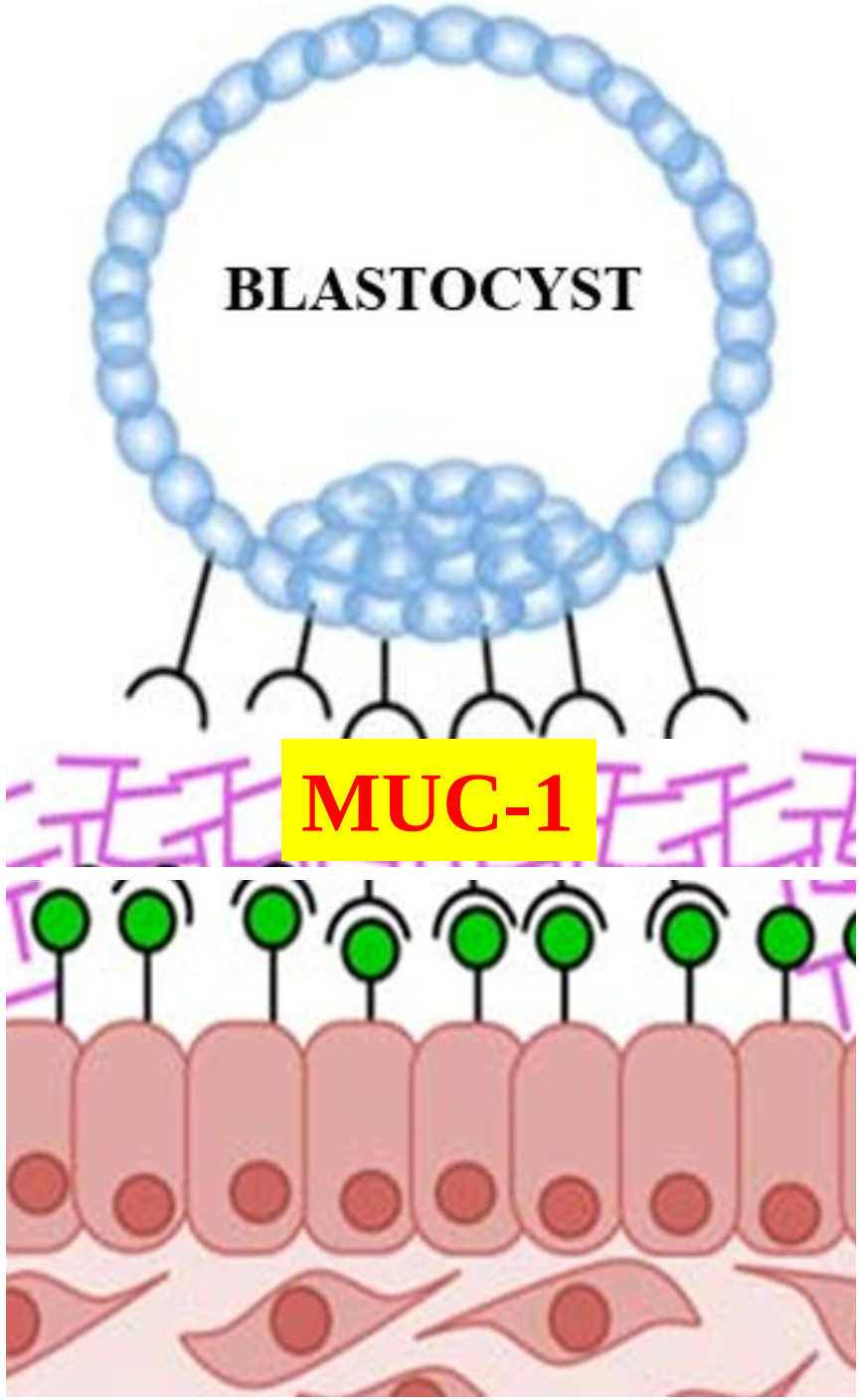
NORMAL IMPLANTATION



RECEPTORS

UTERINE ENDOMETRIUM

SUB-CLINICAL UTERINE INFECTION



IMPAIRED IMPLANTATION

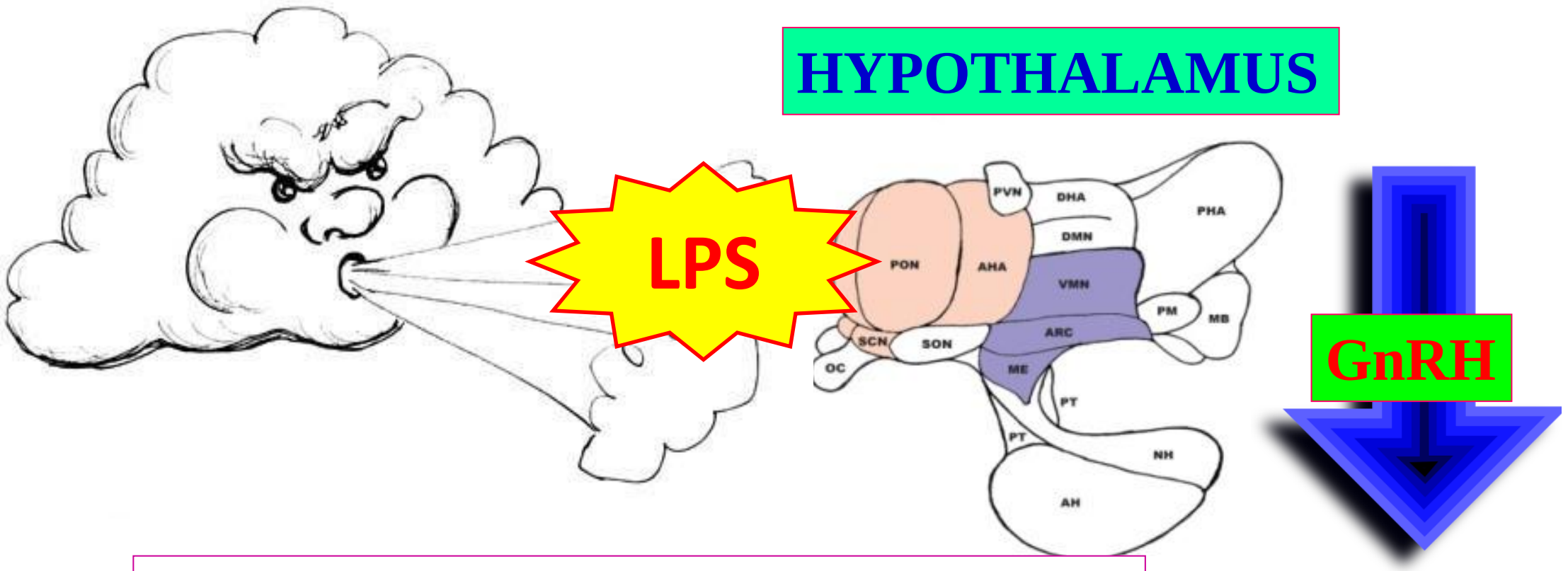
RECEPTORS

UTERINE ENDOMETRIUM

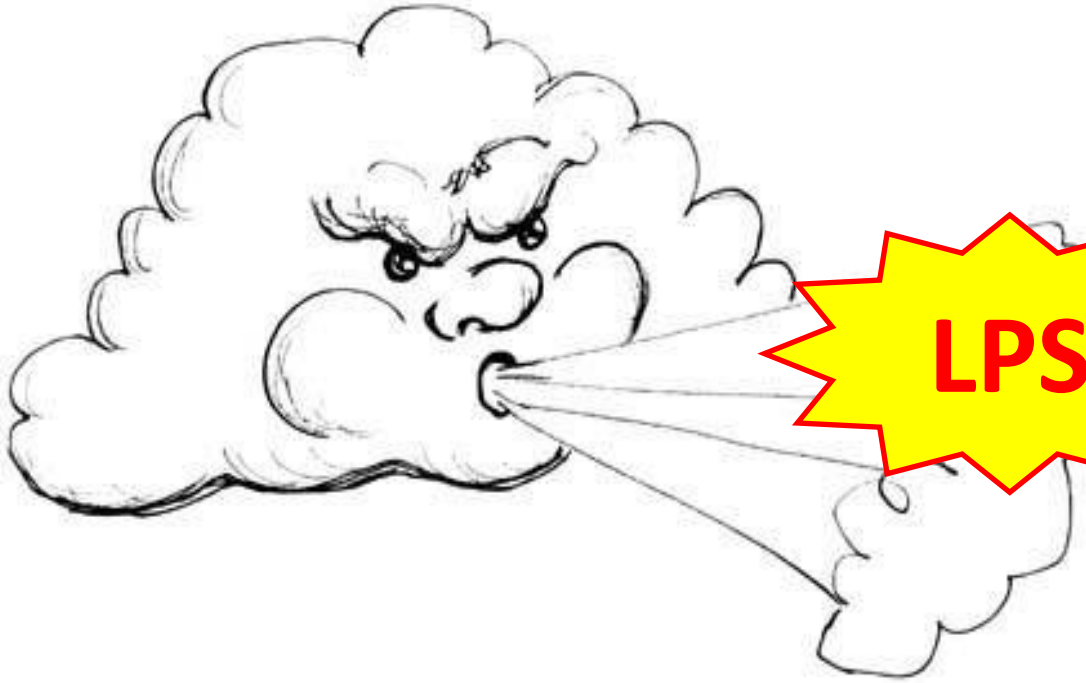
ENDOTOXIN Vs ENDOCRINE

- **The effect of pathogens on uterine cells is not limited to inflammation, but also affects endocrine function.**
- **Bacterial endotoxins – Lipopolysaccharides (LPS) are components of the outer cell wall of gram-negative and gram-positive bacteria that are highly immunostimulatory.**
- **The peripheral plasma of animals with *E. coli* infection of the endometrium have higher concentrations of LPS.**

HYPOTHALAMUS

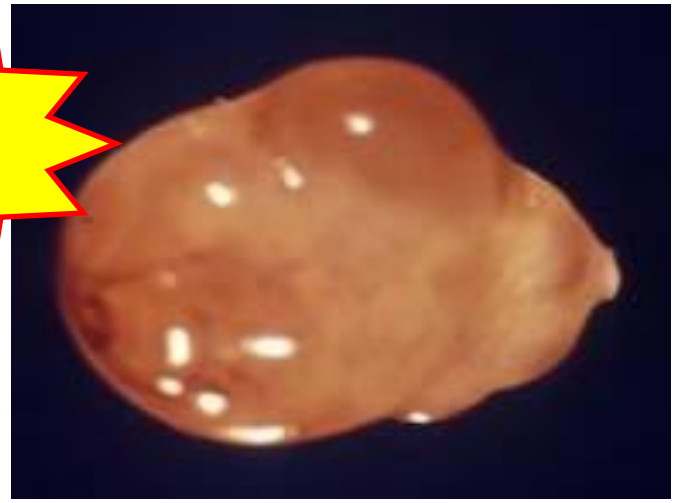


- **LPS interfered with the preovulatory sequence of endocrine events via suppression of GnRH and LH pulsatility**



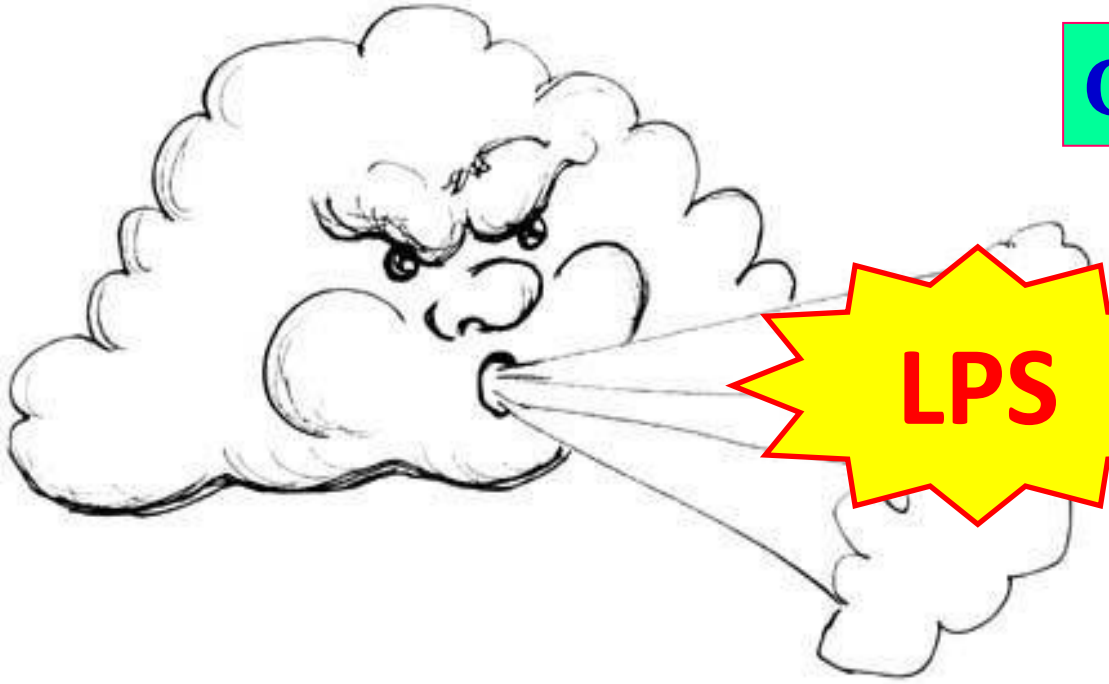
LPS

FOLLICLE



OESTRADIOL

- *E. coli* infection is associated with reduced ovarian follicle growth.
- LPS reduced granulosa cell oestradiol secretion



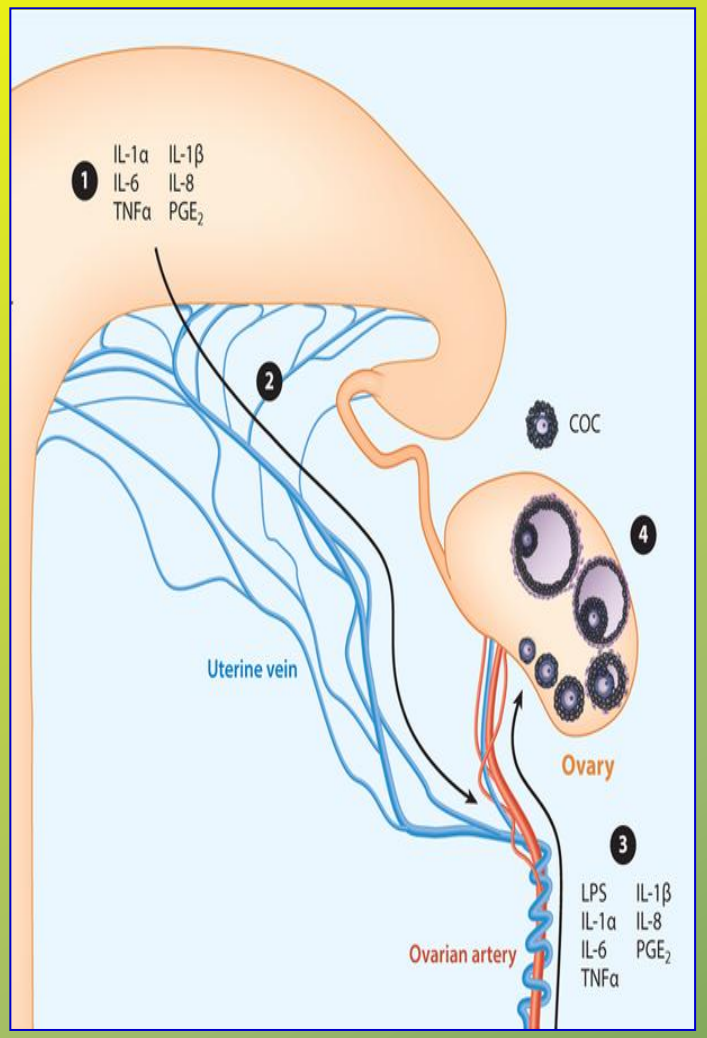
LPS

CORPUS LUTEUM

PGF

- ***E. coli*** **infection is associated with prolonged luteal phases of the ovarian cycle in cattle.**
- **LPS stimulated the accumulation of PGE rather than PGF**

CYTOKINES



- An immune/inflammatory challenge can affect reproduction at the level of the hypothalamus, pituitary gland or gonads.

(Herman and Tomaszewska-Zaremba, 2010)

- Cytokines (Tumour necrosis factor alpha, Interleukins etc.) - affects theca and granulosa cell androstenedione and oestradiol production, respectively

(Williams *et al*., 2008)

CONSEQUENCES OF CHRONIC INFLAMMATION

Chronic inflammation of endometrium may lead to conception failure due to

- **chronic scarring of the endometrium**
- **obstruction of the uterine fallopian tubes and ovario-bursal adhesions (affecting about 2% of cows).**

SUMMARY

- **Inappropriate handling of dystocia and post-parturient placental retention cases are considered to be the major predisposing factors for the uterine infections.**
- **Microbial invasion and subsequent inflammatory response leads to endocrine disturbance and conception failure.**

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Thank you !!