

Pre-ejaculate fluid in the context of sexual assault

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Review article

Pre-ejaculate fluid in the context of sexual assault: A review of the literature from a clinical forensic medicine perspective

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ABSTRACT

Much has been written about the presence or absence of spermatozoa in pre-ejaculate fluid (PEF). Published studies only have a small number of participants; their results are conflicting, may be inaccurate and findings have not reached statistical significance. There are potential methodical issues. However, upon review, the possibility exists that PEF may sometimes contain viable spermatozoa. Additional forensic science differentiation may be required to determine whether or not any spermatozoa found on a swab/stain originate from PEF or ejaculate. This may have implications for sexual assault cases.

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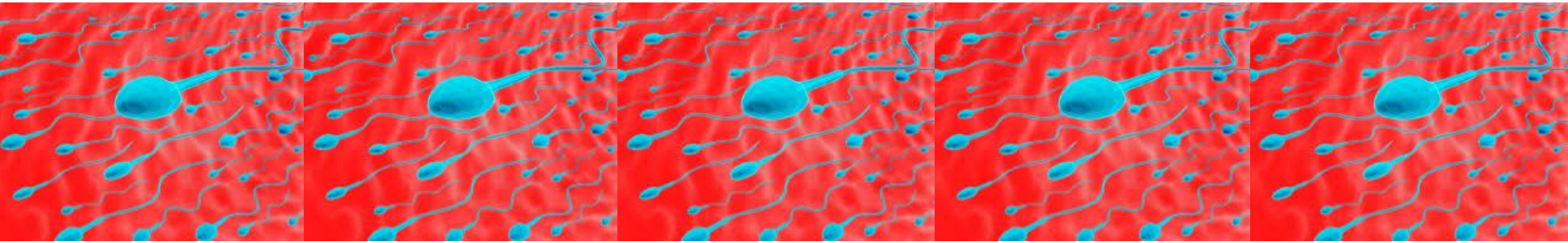
Why look into this?



Reasons



- A SARC doctor investigated this for a court case in 2008
- I was later asked to discuss PEF in 2019 for a court case
- Given articles to read in preparation including another presentation by a WA prosecution lawyer in which she quoted a WA District Court Judge who said: *“Well, who do you believe on this subject; Masters & Johnson or some GP from Perth”?*
- As I looked into the subject more, I realised that this was an opportunity to write a “cupcake” paper
- Also I was coming to Oslo for my overseas professional development leave and hoped to have some time to learn more
- Much of the writing was done here!



Why is PEF relevant in sexual assault

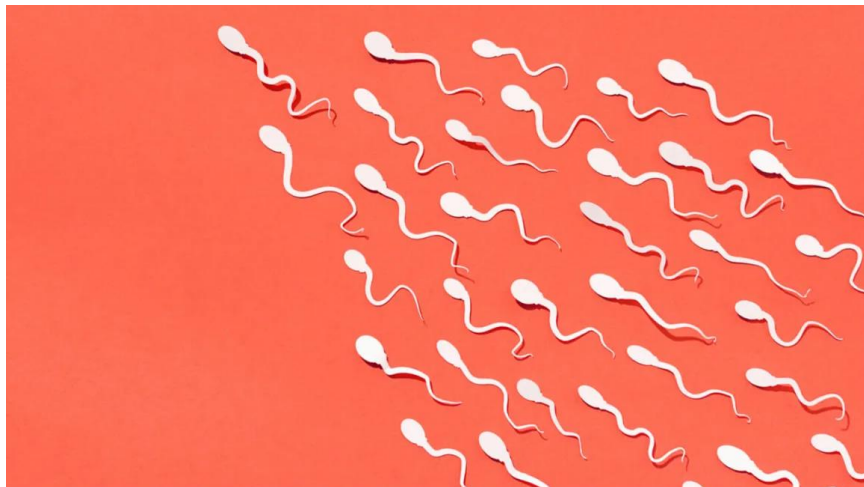
Case 1: Spermatozoa found on HVS evidentiary swabs collected from a woman alleging sexual assault

Prosecution:

- *Alleged* non-consensual penile-vaginal penetration
- Continued until intra-vaginal ejaculation
- No condom

Defence:

- *Admitted* consensual penile-vaginal penetration but *stopped* and withdrew penis when complainant withdrew consent to sex
- *Denied* intra-vaginal ejaculation
- *Proposed* that the spermatozoa found came from pre-ejaculate fluid transferred from the erect penis to the vagina during the short period of consensual penetration



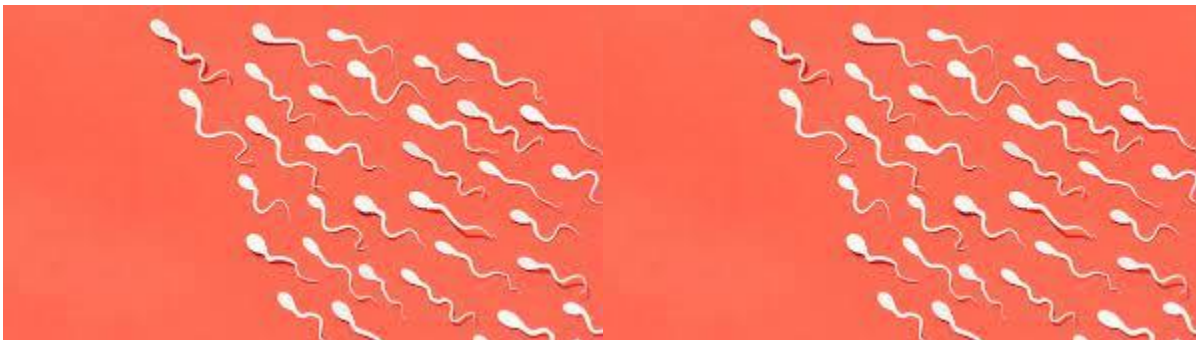
Case 2: Spermatozoa found on vulval swabs collected from a woman alleging sexual assault

Prosecution:

- *Alleged* non-consensual penile-vaginal penetration
- Extra-vaginal (vulval) ejaculation
- No condom

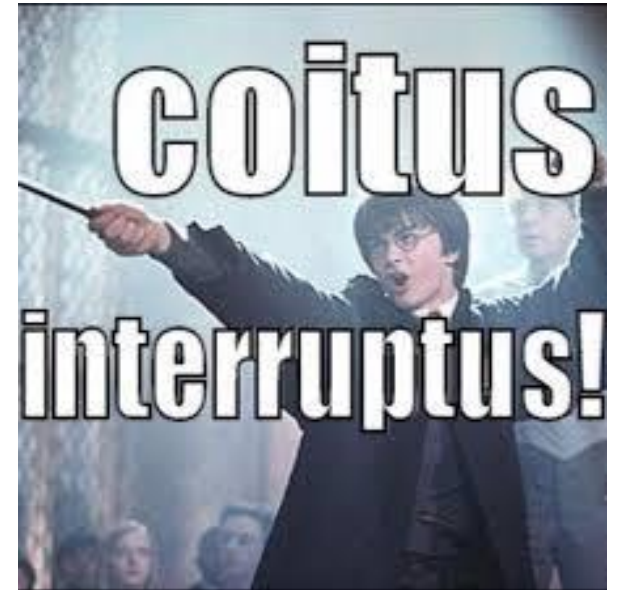
Defence:

- *Denied* that penile-vaginal penetration
- *Admitted* sexual activity in which his unclothed erect penis was in contact with bedsheets
- *Proposed* that secondary transfer of spermatozoa from pre-ejaculate fluid occurred from the bedsheets to the complainant's vulva



Coitus interruptus

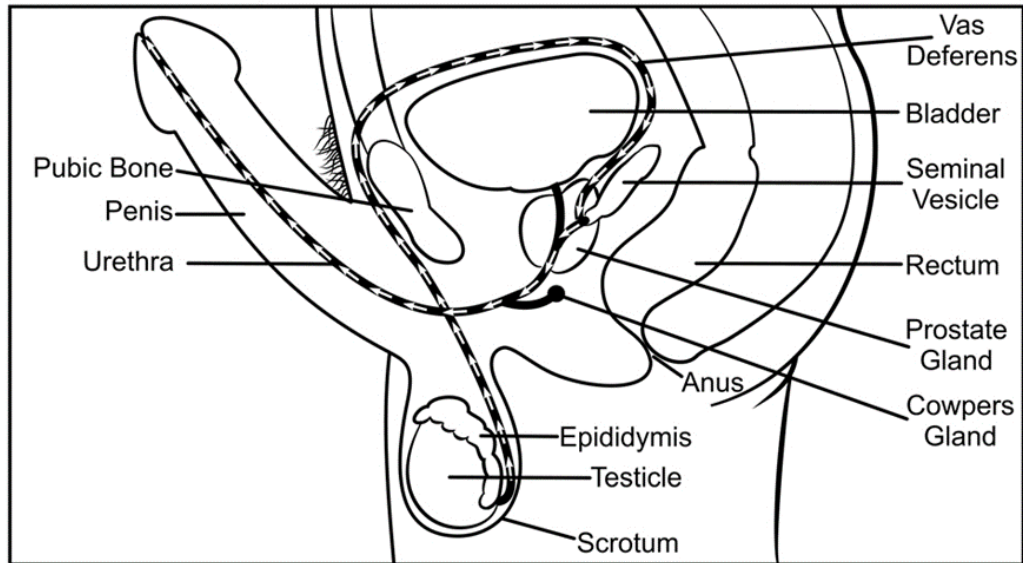
- Withdrawal of erect penis during sex from vagina prior to ejaculation
- Used by many couples (free)
- Perfect use 96% effective
- Typical use 78% effective
- User dependent!!!!
- Taught in family planning clinics that PEF may be responsible for some resulting pregnancies
- (more often it is user failure)



What is pre-ejaculate fluid?



Production and functions of PEF

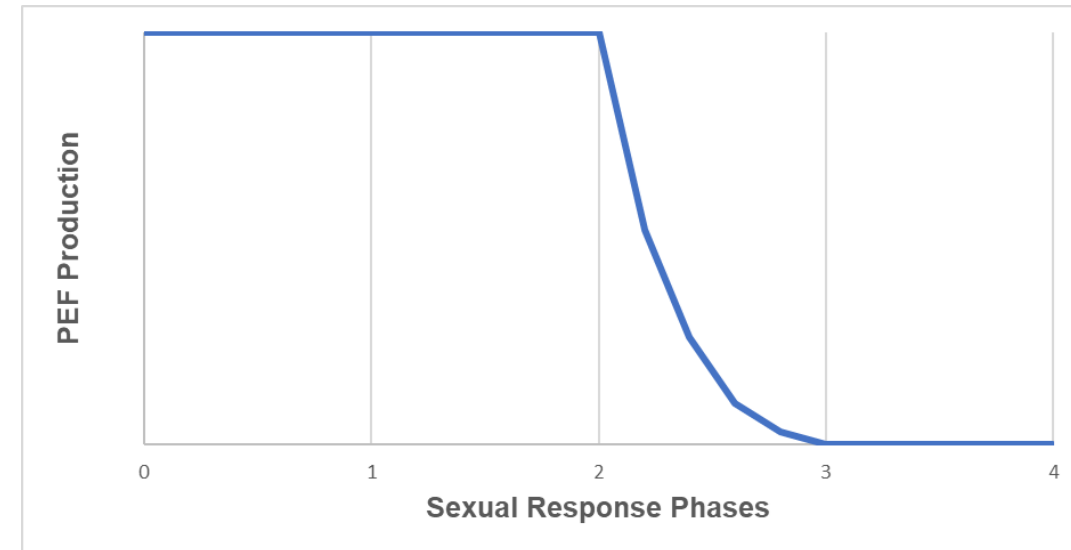


- Pre-ejaculate fluid is produced by Cowper's glands (bulbo-urethral glands)
- This fluid is alkaline and is thought to have numerous functions:
 - To provide lubrication for the semen which is to follow,
 - To neutralise possible urine residue in the male urethra,
 - To neutralise acidic vaginal fluid after ejaculation,
 - To lubricate the penis during intercourse,
 - To aid semen coagulation when external to the penis.



Male sexual excitement cycle

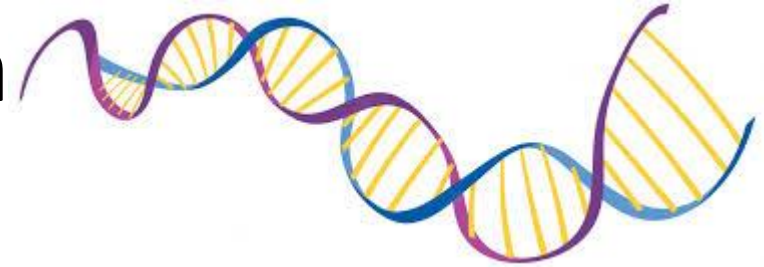
1. Excitement phase – penis erect and start of production of pre-ejaculate fluid
2. Plateau phase – Penis erect. PEF still produced (may be seen at the urethral meatus)
3. Orgasmic phase - Emission of ejaculatory fluid.
 - Stage 1 of orgasmic process (may overlap end of the plateau phase):
 - Closure of the bladder neck
 - Prostatic secretions (10%) enter the prostatic urethra
 - Sperm from vas deferens (10%) enters prostatic urethra,
 - Fluid from seminal vesicles is added (75-80%)
 - PEF (very small amount) is already in the urethra and may be continued to be produced
 - Stage 2 of orgasmic process:
 - Opening of external urethral meatus.
 - Expulsion of seminal fluid



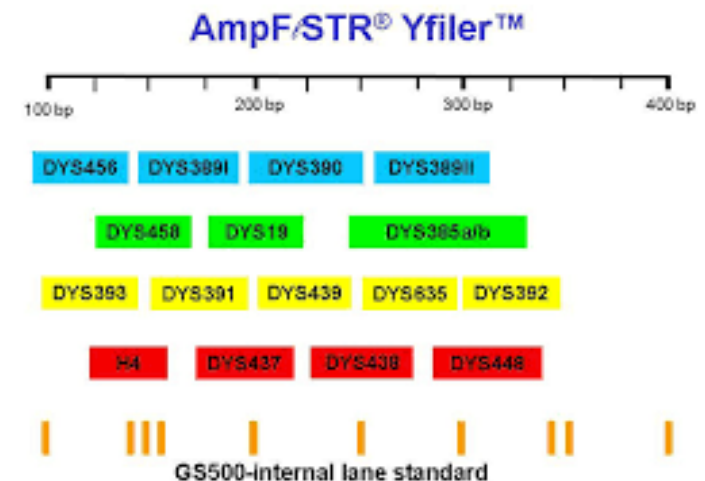


Forensic relevance of PEF

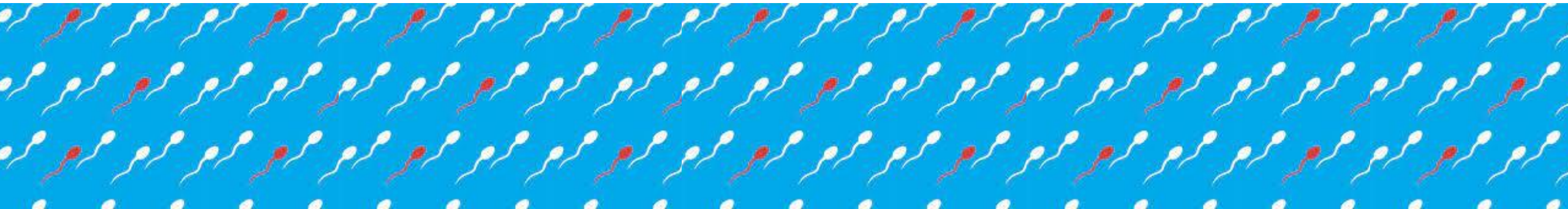
DNA identification + confirmation of penetration



- *Spermatozoa in the vagina is highly suggestive/indicative of recent vaginal penetration*
- Masters and Johnson stated (1966) in “Human Sexual Response” that males frequently produce a fluid in the (pre-ejaculate) plateau phase and “**frequently actively motile spermatozoa** have been demonstrated in microscopic examinations of the pre-ejaculatory fluid emission”
- Additional DNA-yielding cells found in PEF:
 - Nucleated white blood cells
 - Exfoliated cells from glandular tissue and ducts
- ALL can yield a DNA profile for identifying purposes



Can PEF be differentiated from ejaculate?



Forensic tests to differentiate

Substrate	PEF	Ejaculate	False +ves / False -ves
Acid phosphatase (AP reagent) presumptive	??	Yes	Faeces, vagina, fungi bacteria contraceptive cream
PSA (ABAp30 – presumptive)	+	Yes	Ejaculate mixed with breast milk,
Spermatozoa	?	Yes	Animal sperm, azospermia
Semenogelin	No	Yes	No

Published studies investigating whether PEF contains spermatozoa

- No reference(s) provided by Masters & Johnson
- All studies pertain to a particular field of study: fertility, contraception, HIV or clinical forensic medicine
- Low numbers of men (12 – 42 participants)
- No studies met statistical significance
- Some men had oligospermia to begin with
- Only 2 studies confirmed how PEF was differentiated from ejaculate and those two differed in the finding of spermatozoa in PEF!!



Authors	No of men	Sperm?	Extra
Zukerman et al (2003) [14]	12	No	Ferning of fluid. All had sperm, 1 x oligospermia Masturbation not to ejaculation. Fertility study
Kovavisarach et al (2016) [15]	42	16.7% all mobile	Ferning of fluid, actively motile sperm. one sample/man. Normal sperm count, 1x oligospermia. Masturbation to ejaculation. Fertility study.
Killick et al (2011) [9]	27 – 40 samples	40%, 37% motile	Sperm in either every or no PEF samples/ male. Oligospermic men had sperm in PEF. Sperm conc in PEF and ejaculation v similar but fluid looked different. No confirmatory test for PEF. Masturbated until ejaculation in each instance. Fertility study
Ilaria et al (1992) [8]	16	No	Unsure if confirmatory test for PEF. Unsure if masturbated to ejaculation. HIV study
Pudney et al (1992) [7]	15 – 23 samples	Yes	HIV-ve, no sperm 5/9 HIV +ve had clumps of sperm. Unknown how PEF confirmed or if masturbated to ejaculation. Period of abstinence not stated. HIV study
Astrup et al (2012) [16]	14 couples – no ejaculation	3/14	Study to look for sperm after consensual sex. Self-reported no ejaculation. All 3 had sperm present on external genitalia, post fornix and endocervical canal (unsure date of last sex). Forensic study



Problems with study methodology

Study methodology problems

- No participants were witnessed masturbating and collecting the PEF fluid!
- Known issues with study participants following instructions
- Complex actions to be done in sequential order:
 - Maintain an erect penis
 - Masturbate
 - Collect what they assume is PEF by touching end of penis to glass slide before ejaculation
 - +/- continue to ejaculation



Interesting point

- In **all** studies in which spermatozoa were found, the participants masturbated to the point of ejaculation
- The remaining study where spermatozoa were found did not specify if ejaculation occurred (but likely)
- All sperm were found to be motile
- Does ejaculatory inevitability affect the collection process
- Important as the first part of the ejaculate has the most spermatozoa

- May be that late collection of PEF combined with early ejaculatory leakage results in spermatozoa being found

Why it is unlikely to be proven categorically

1. The point of ejaculatory inevitability is subjective

- Study participants may be reluctant to be observed and critiqued;

2. Possible best method (least likely)

- Interrupt the male sexual response cycle at different points along the plateau and early orgasmic phase,
- Obtain the male genitalia, fix, stain and examine histologically to determine at what stage spermatozoa are released from the vas deferens into the prostatic urethra and beyond.
- May be individual and age-related variation
- Would be unable to generalise to a specific person at a specific time
- Unethical

3. Possible to be done on animals

- No medical reason to do so
- No pharmacological impetus or financial gain.

Conclusion



Conclusion

- PEF is produced by Cowper's glands and a very small amount will be present in ejaculate
- Not all pre ejaculate fluid's functions are known
- PEF contains cells and may yield a male DNA profile
- It may stain positive for PSA and acid phosphatase but not semenogelin
- The presence of spermatozoa in PEF is likely to vary between individuals and when in the male sexual excitement cycle it is collected

Forensic relevance

- If a swab/stain contains spermatozoa and tests +ve for semenogelin, the fluid producing this stain is more likely to be ejaculate fluid (as seminal vesicle fluid is produced part way through Stage 1 of the Orgasmic Phase)
- If a swab/stain tests +ve for acid phosphatase and PSA but -ve for sperm or semenogelin, there may be a variety of causes including PEF. (No male DNA if this was a false +ve result)
- If a swab/stain contains spermatozoa and does not test +ve for semenogelin, then depending on the location of the stain, secondary transfer (postural drainage) or PEF may need to be considered as a cause.
- So in conclusion does PEF contain spermatozoa? – **a definite maybe!!**



Questions?

Thank you