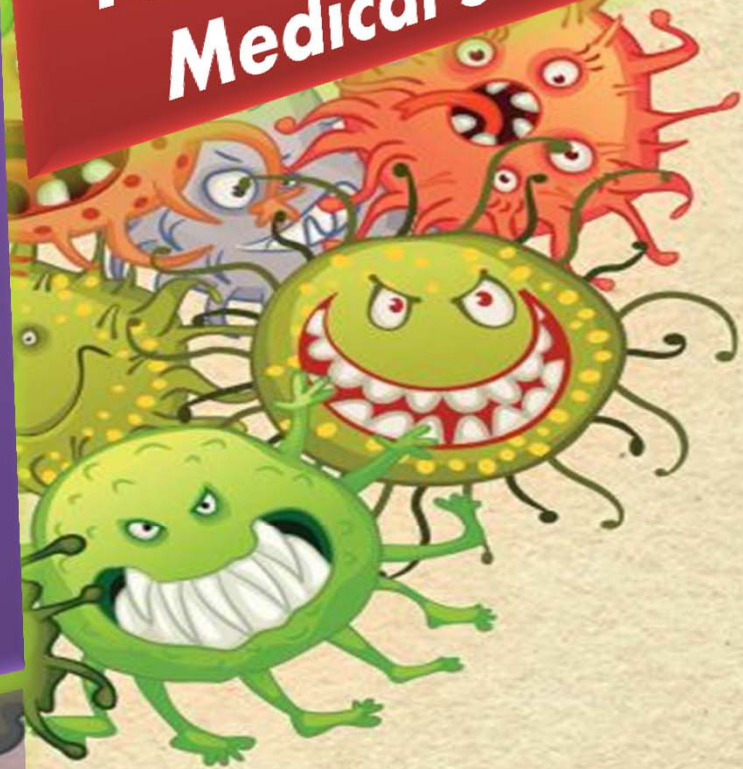


**Application of
Multiplexing For
Infectious
Diseases
Diagnostics;
what is it good
for?**

**Dr. S.M. Jazayeri
MD, PhD,
Clinical Virologist
Tehran University of
Medical Sciences**



Introduction

- Culture, antigen detection, hybridization tests have been used over the years to detect pathogens.
- However, these tests are less sensitive than currently available nucleic acid amplification techniques such as real-time PCR.
- More recently, multiplex real-time PCRs combining the high sensitivity and specificity of the method with the capability to test for multiple targets simultaneously proved to be a suitable and cost-effective method in the diagnosis of pathogens.

Nucleic Acid Amplification Technology/Testing (NAT)

- In the research and diagnostics NAT has been divided into:

1. Target amplification
2. Signal amplification

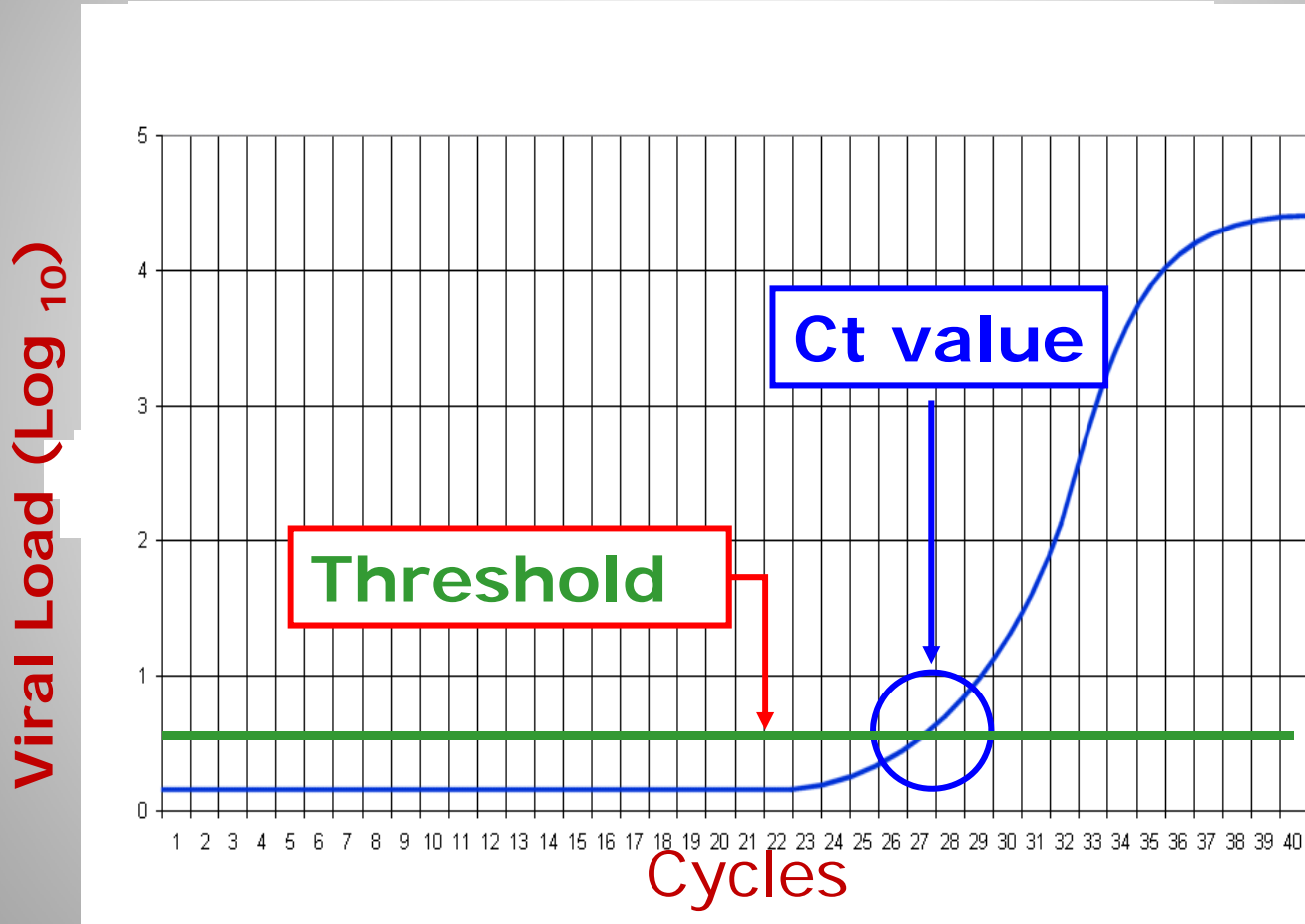
Target amplification Techniques

- PCR
- Real Time PCR
- Quantitative PCR
- COBAS Amplicor[®] (ROCHE)
- Superquant[®] (National Genetics Ins)
- Target Capture[®] (ABI)
- Transcription-mediated amplification (TMA)
- Nucleic Acid Sequence-Based Amplification (NASBA)
- NucliSens[®] (BioMerieux)

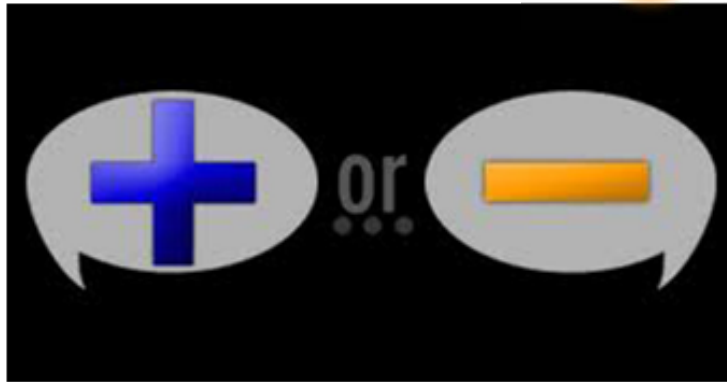
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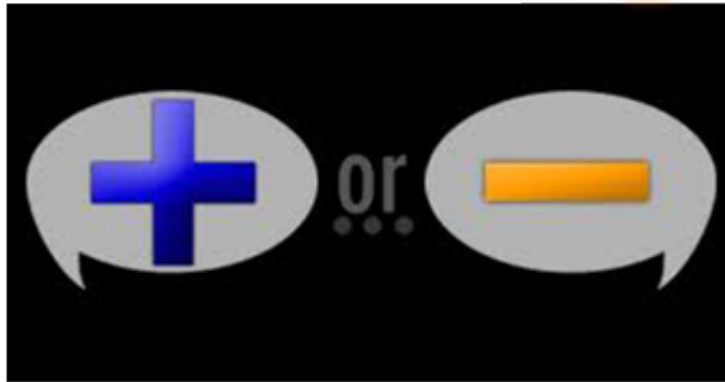
Concept of Threshold and Ct Value



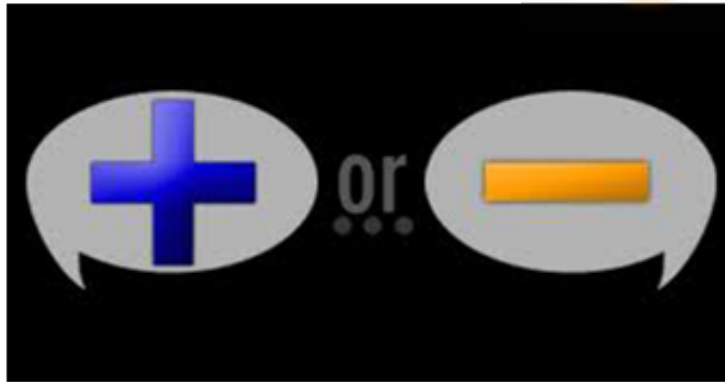
Bias- based Diagnosis



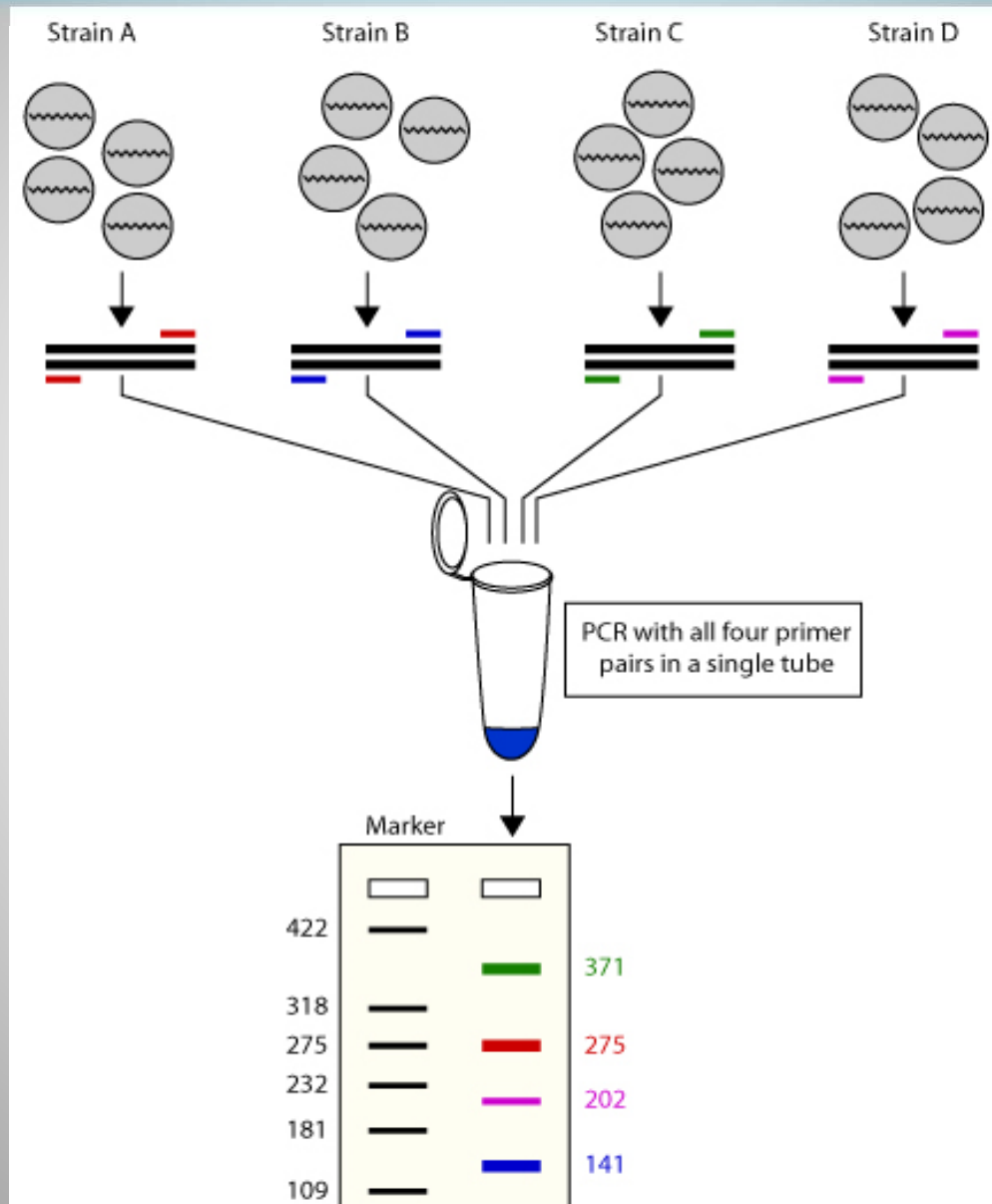
Non-Bias-based Diagnosis



Syndromic Diagnosis

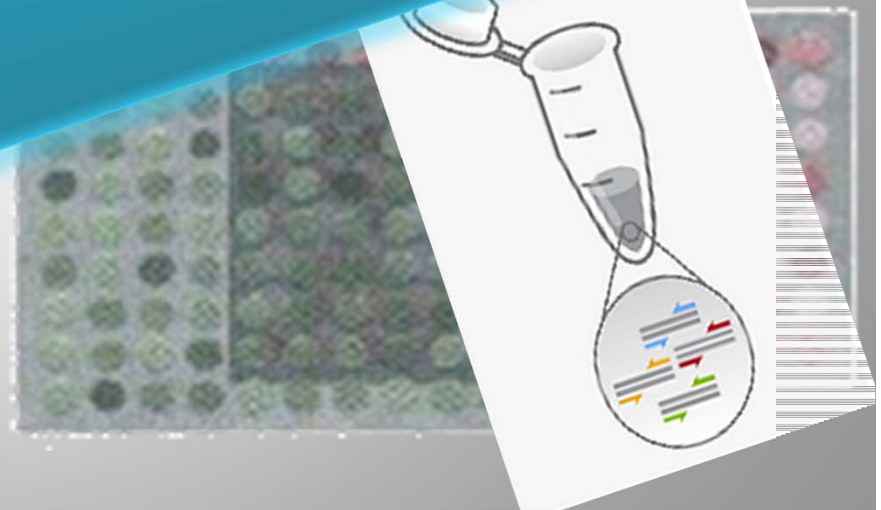
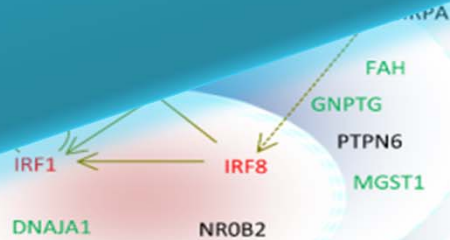


Multiplex Real Time PCR

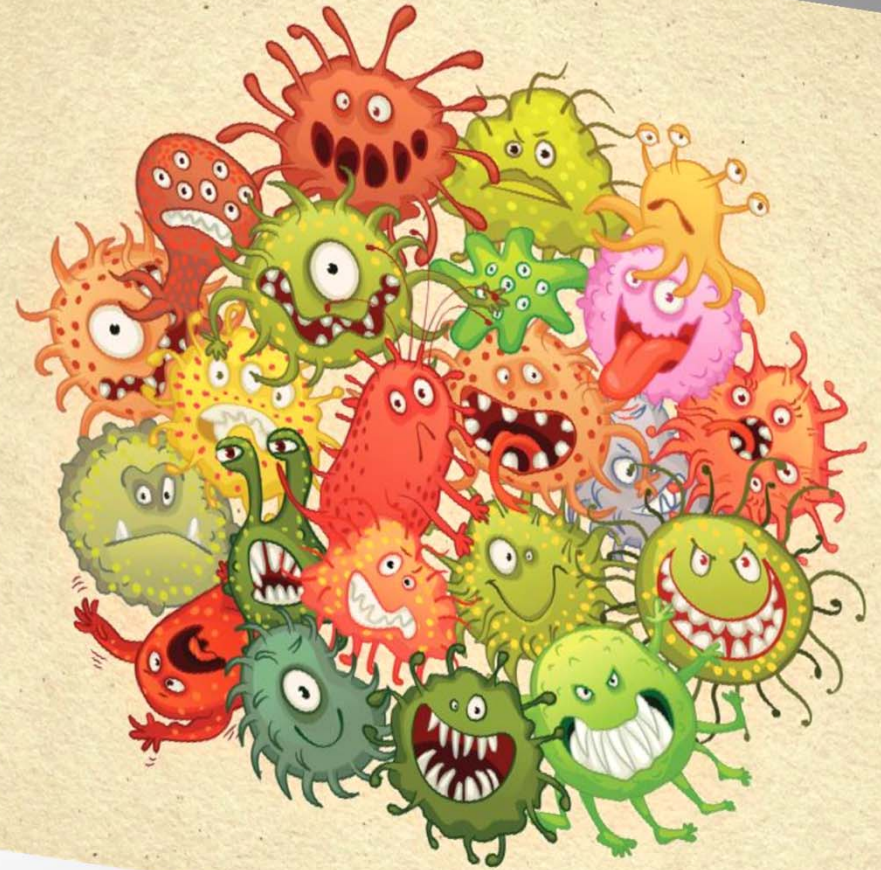


Multiplex Report

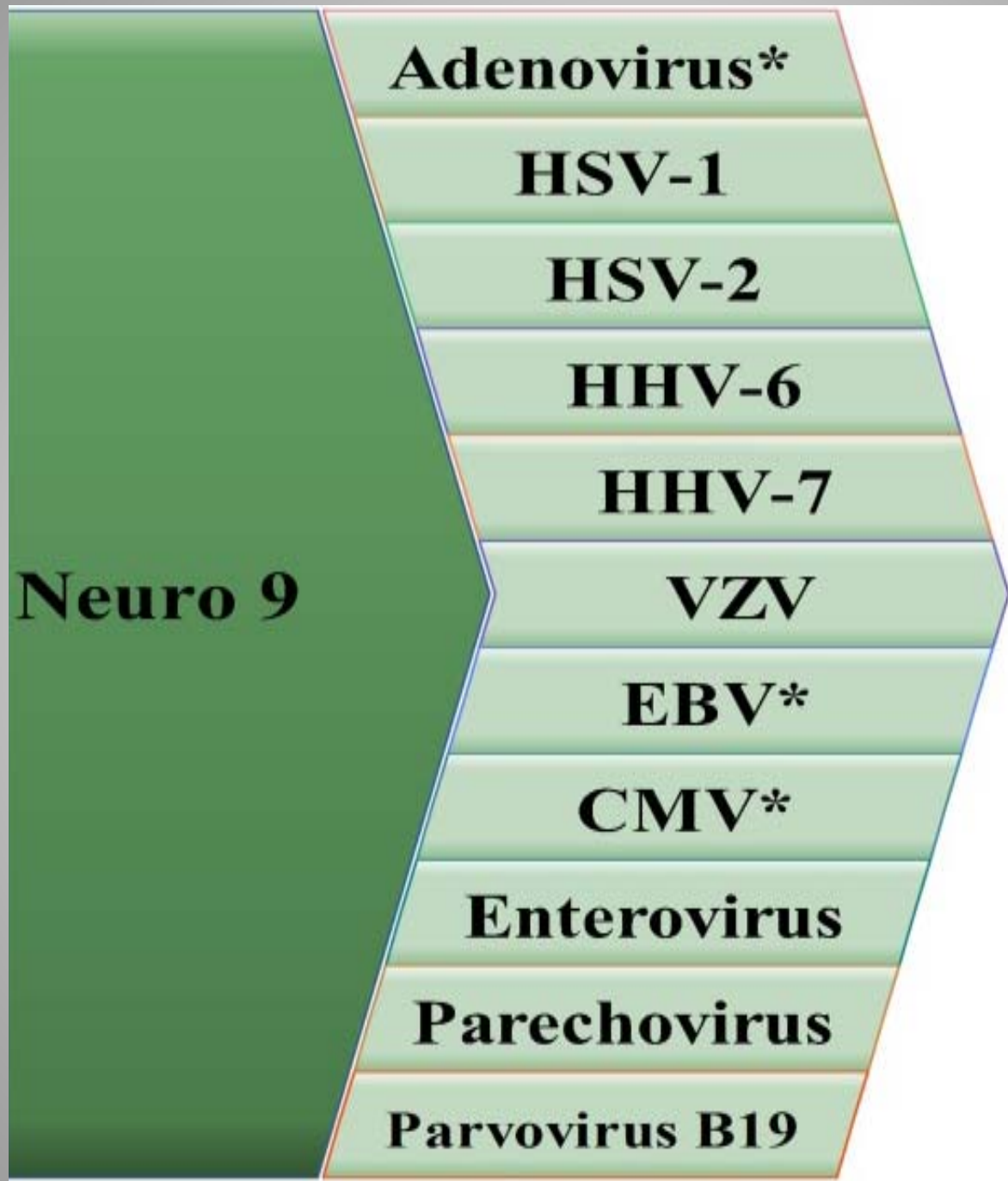
Reports Using Multiplex Tests



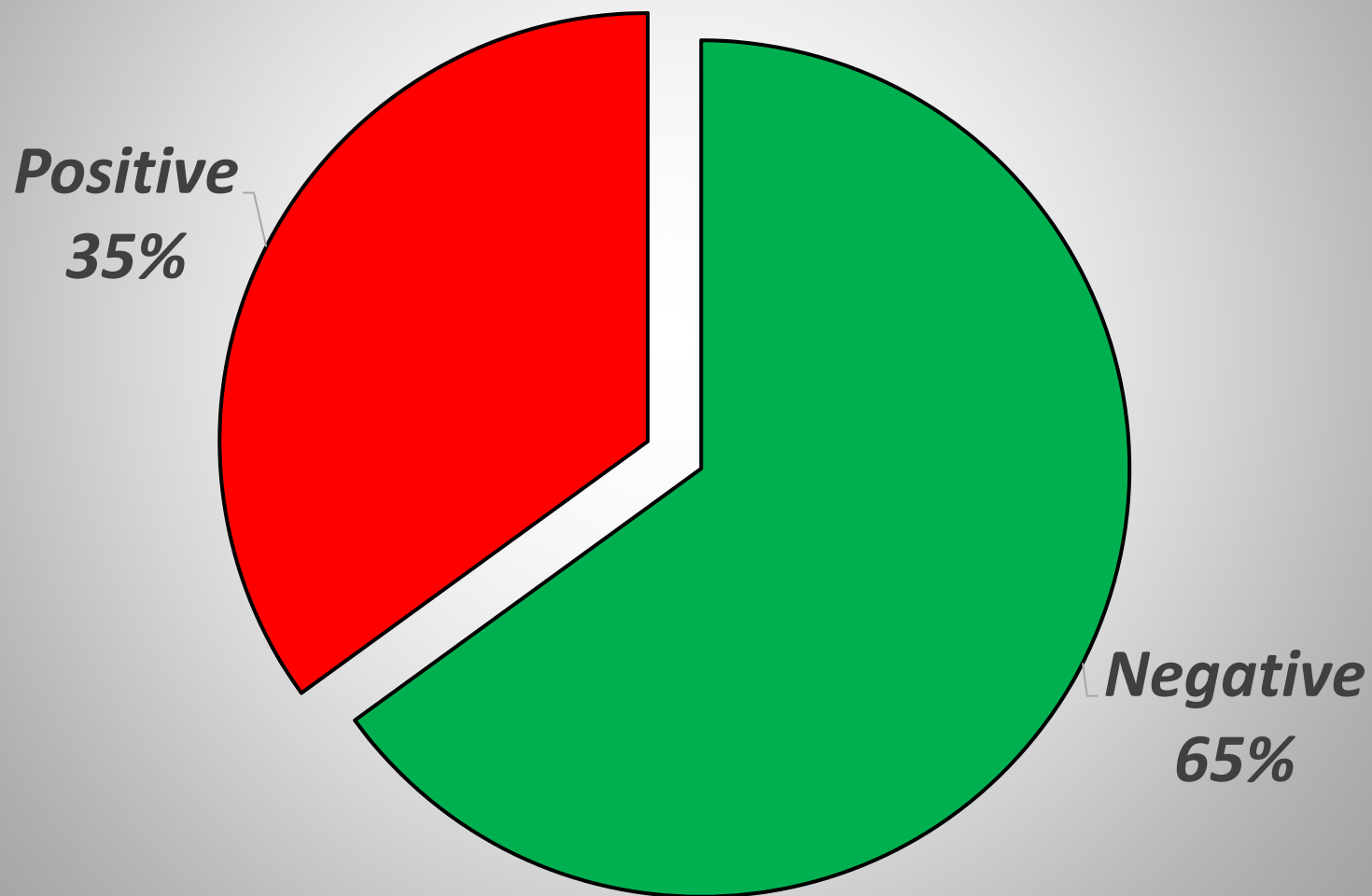
CNS Multiplex



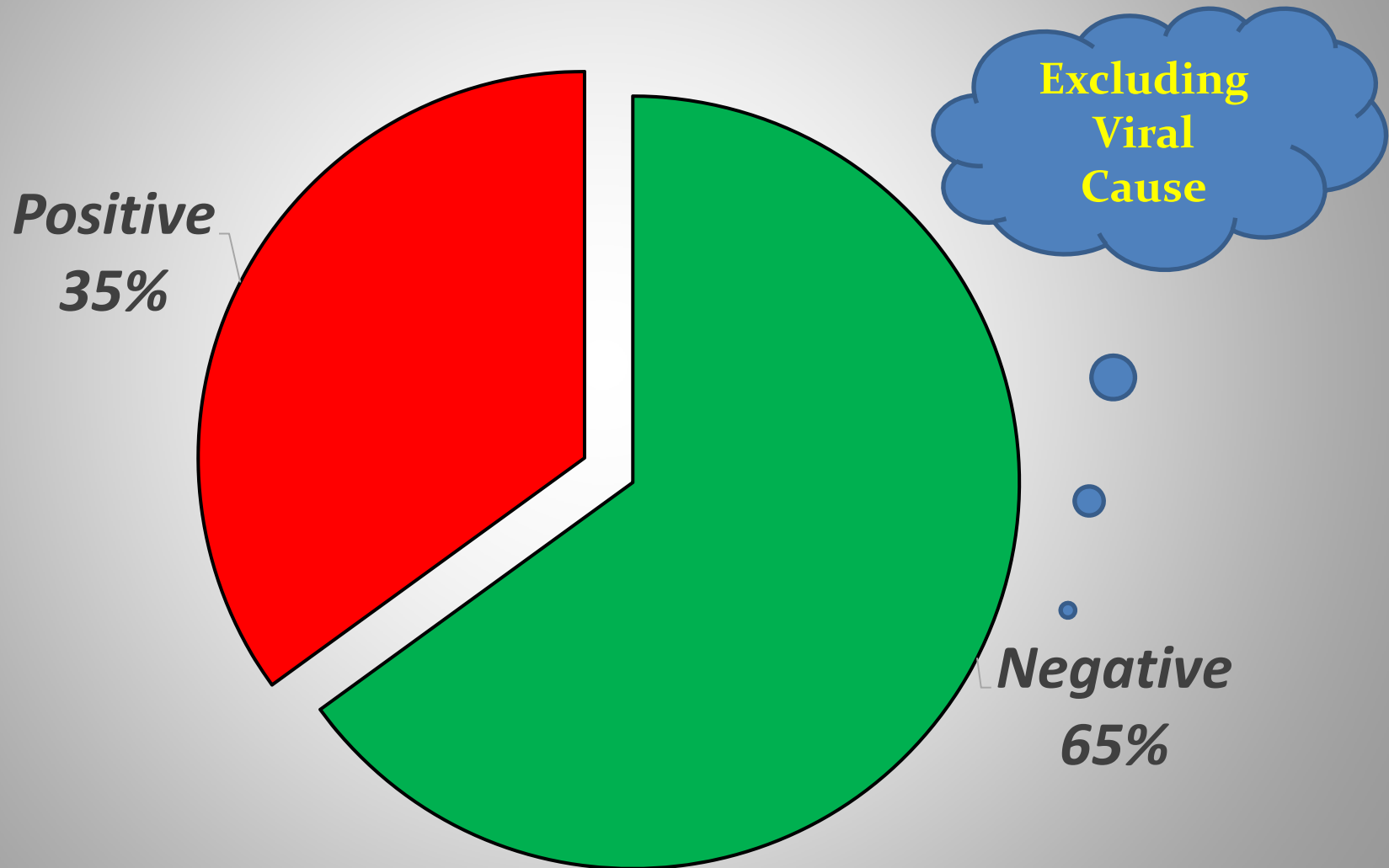
N= 1117



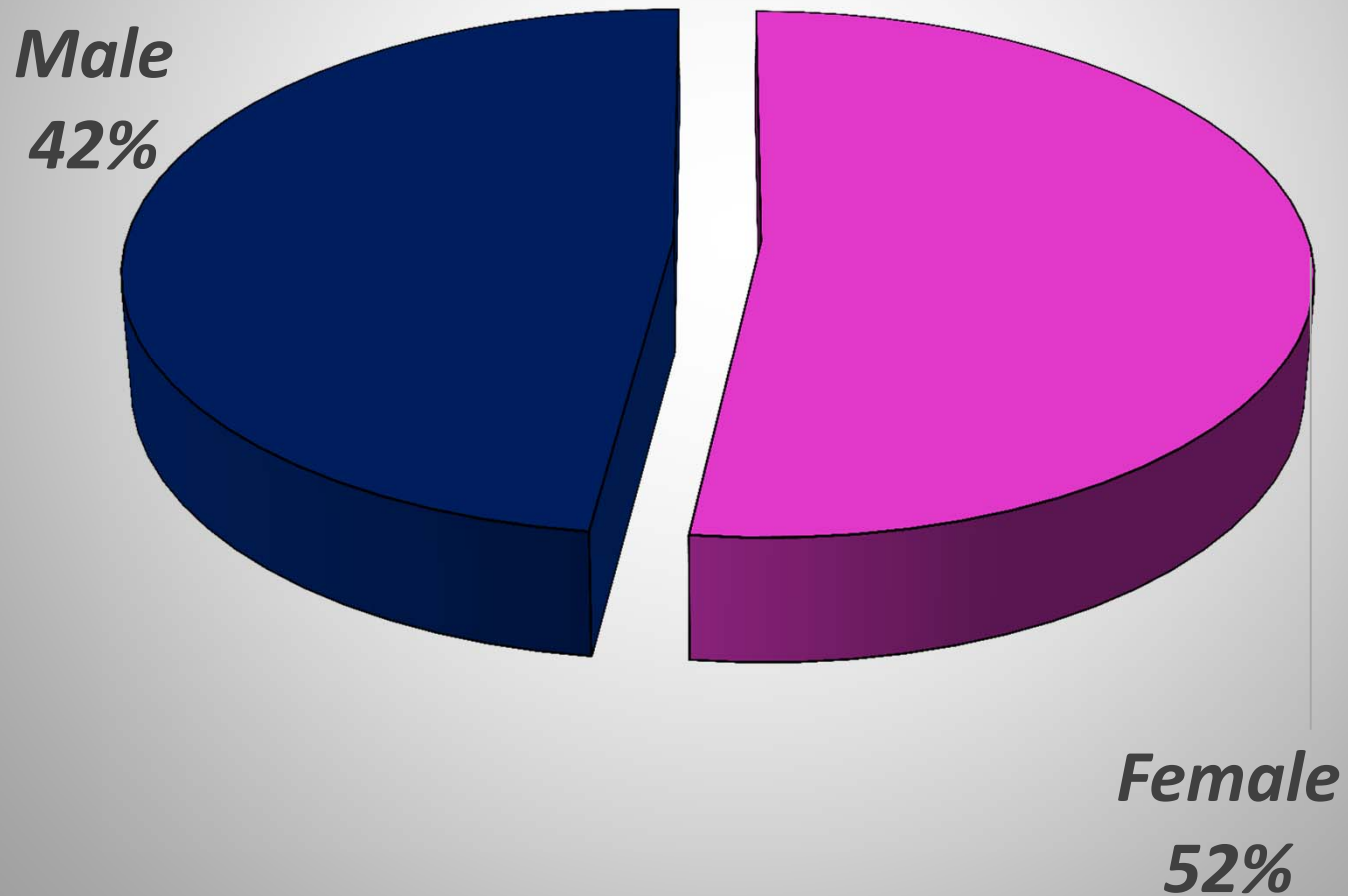
Neurology Results; Positive vs Negative



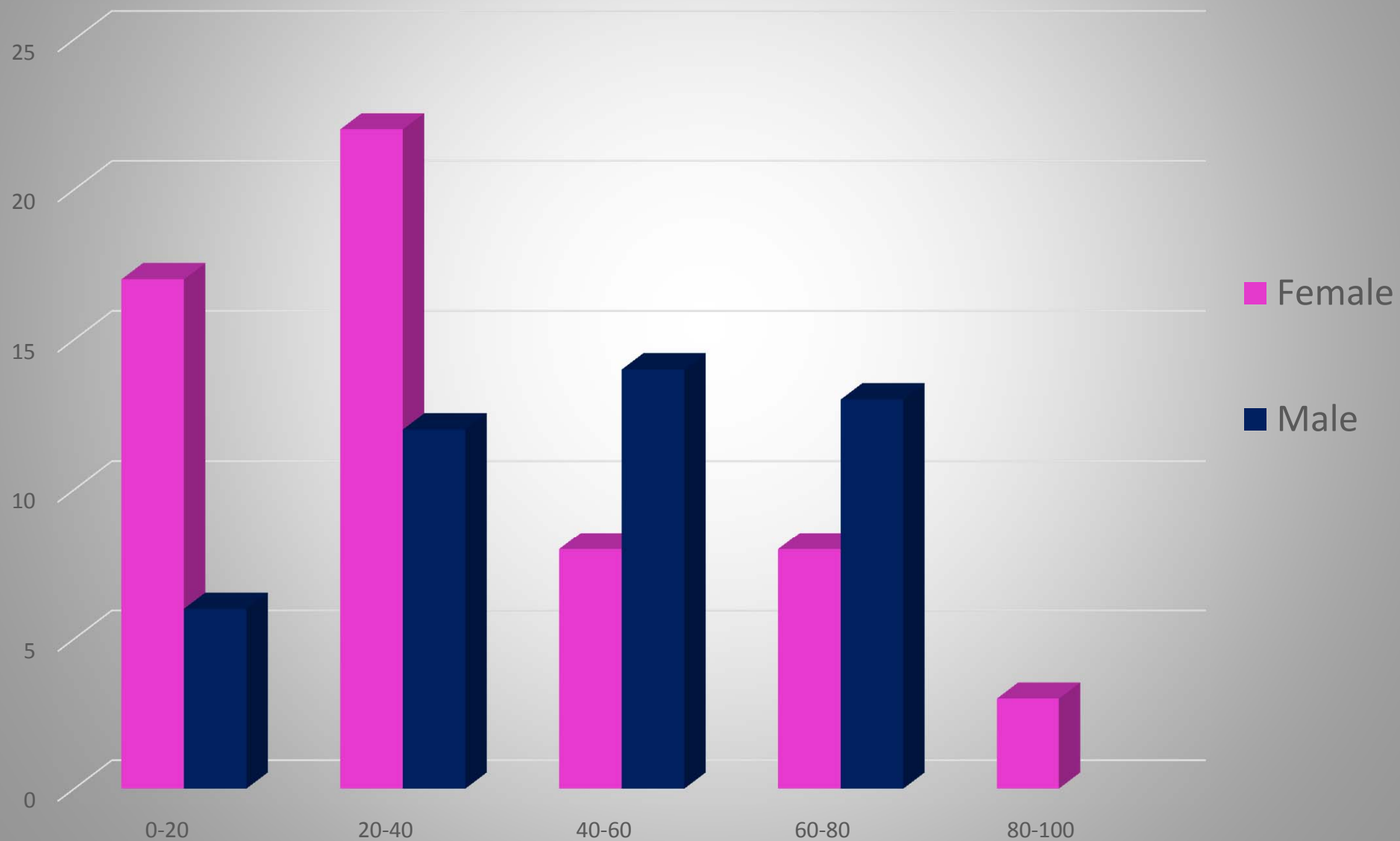
Neurology Results; Positive vs Negative



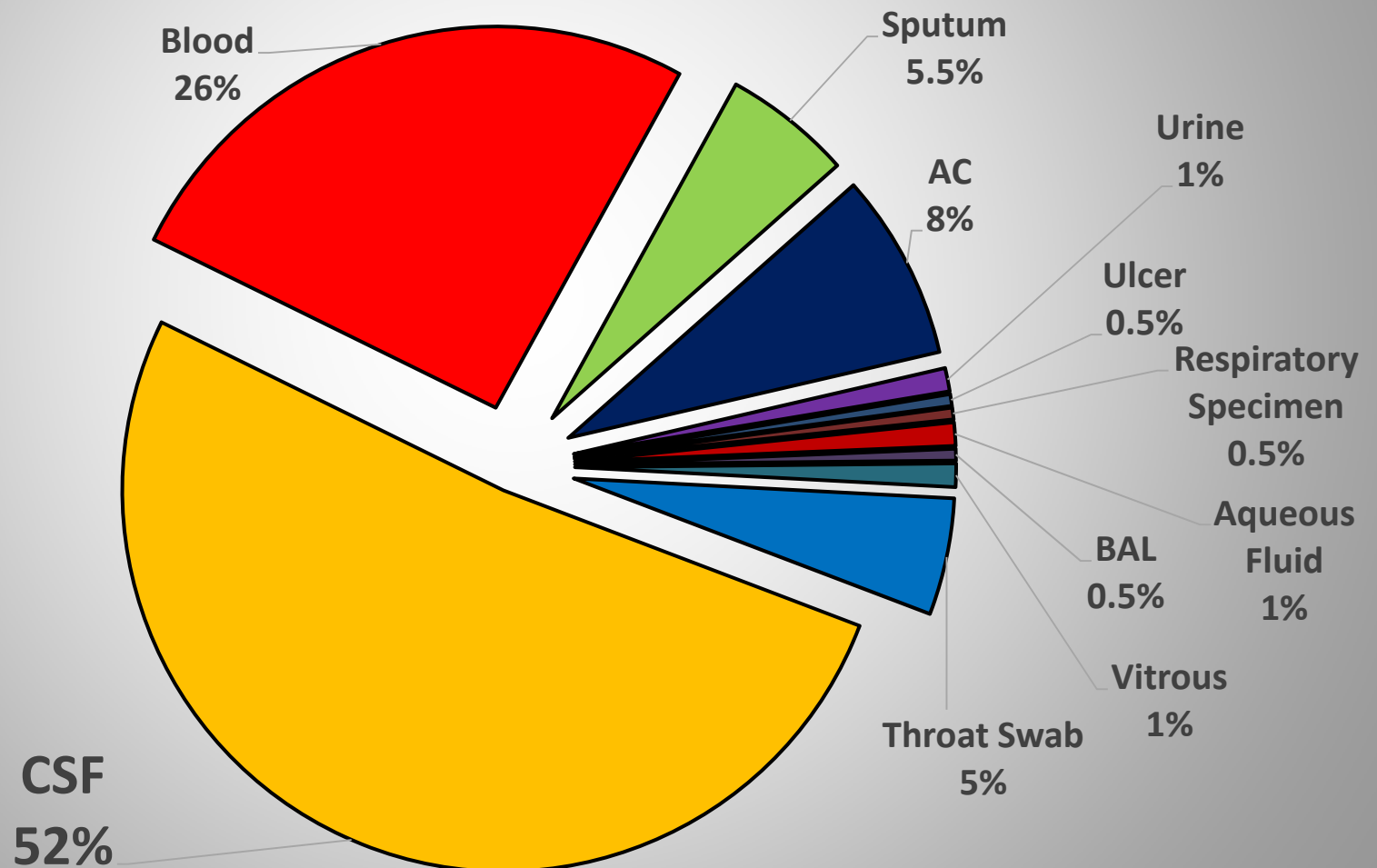
Neurology Positive Results; Genders



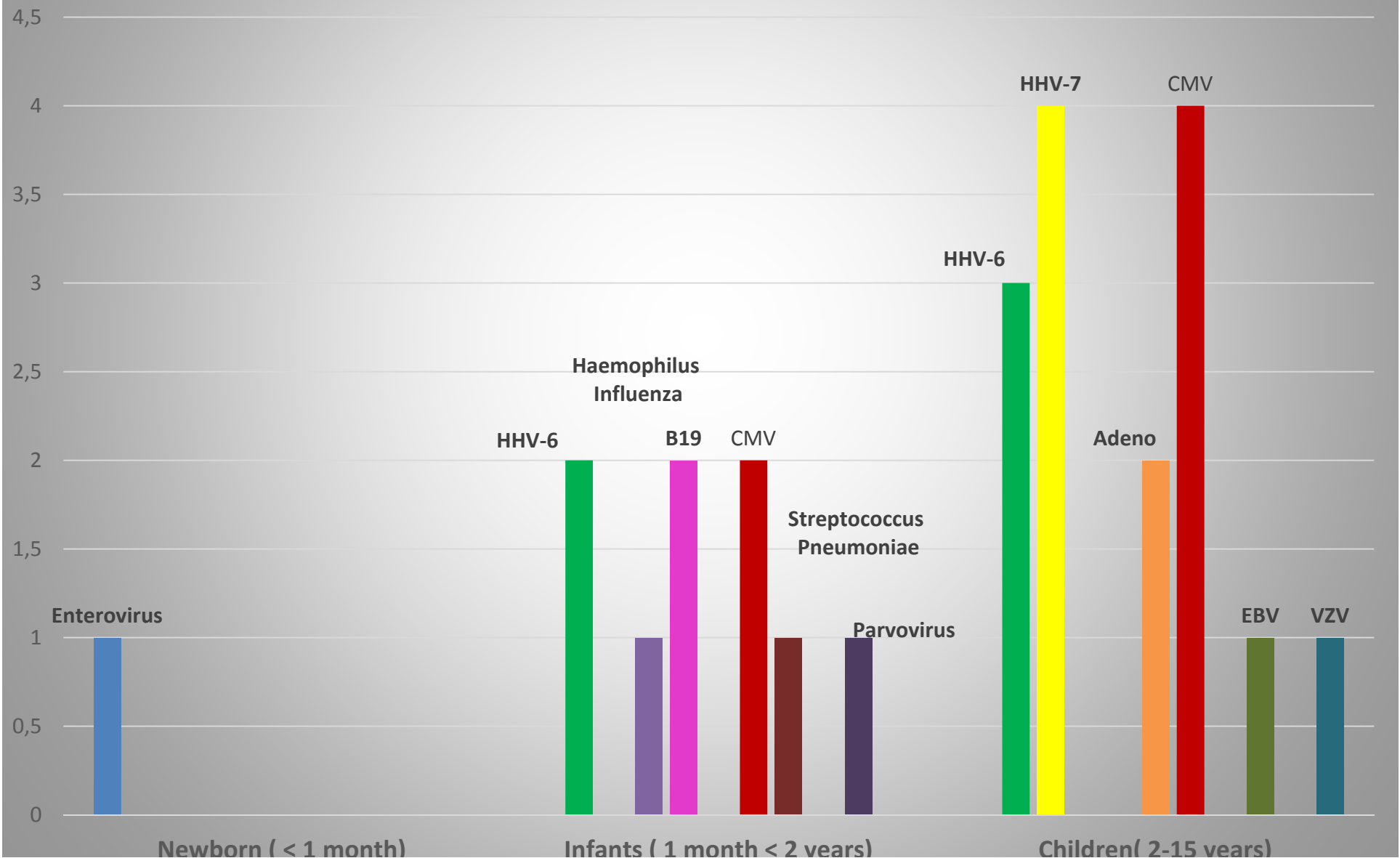
Neurology Positive Results; Age Groups



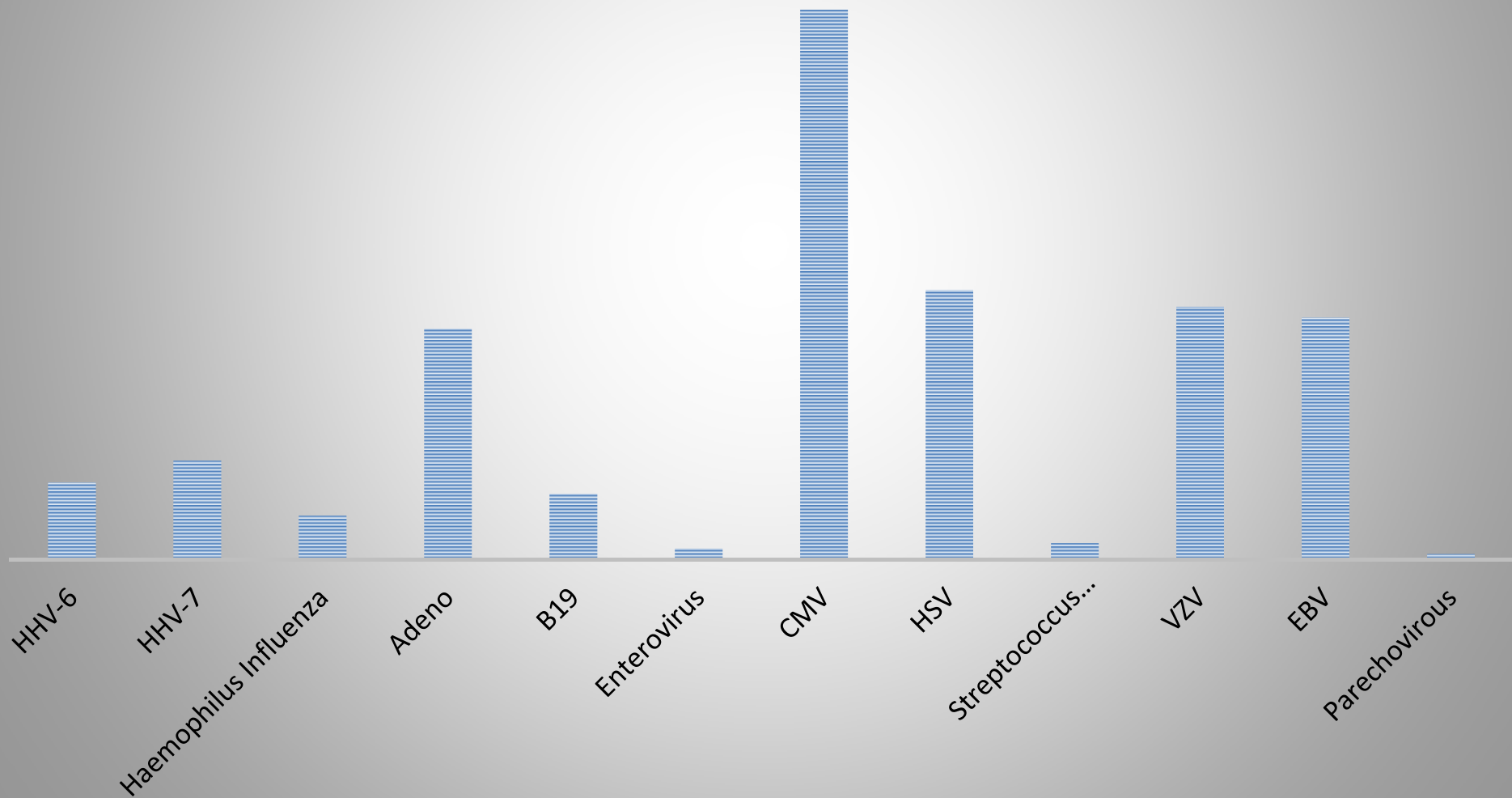
Neurology Positive Results; Type of Specimen



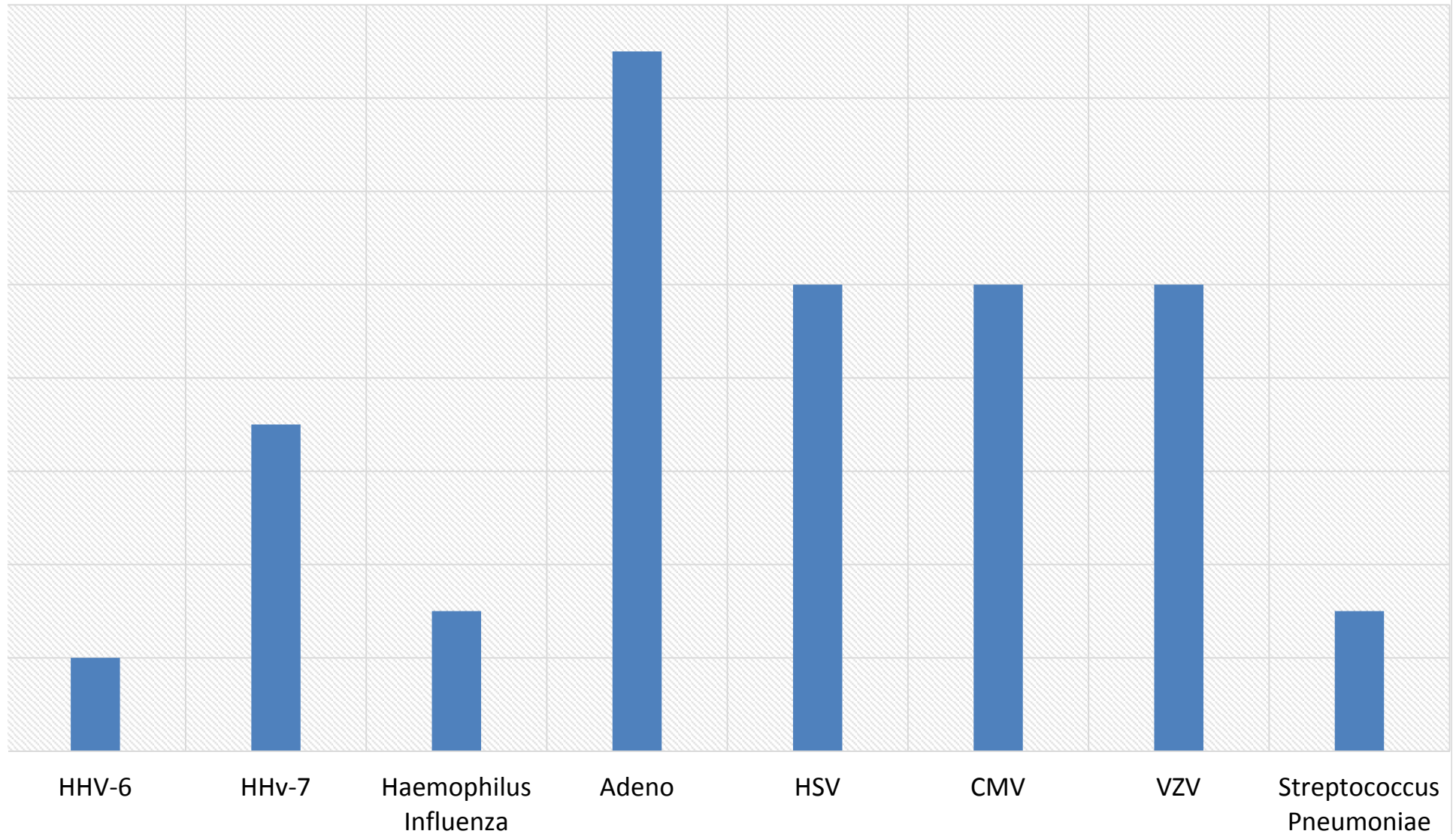
Neurology Positive Results; Different Specimen <15 Years Old



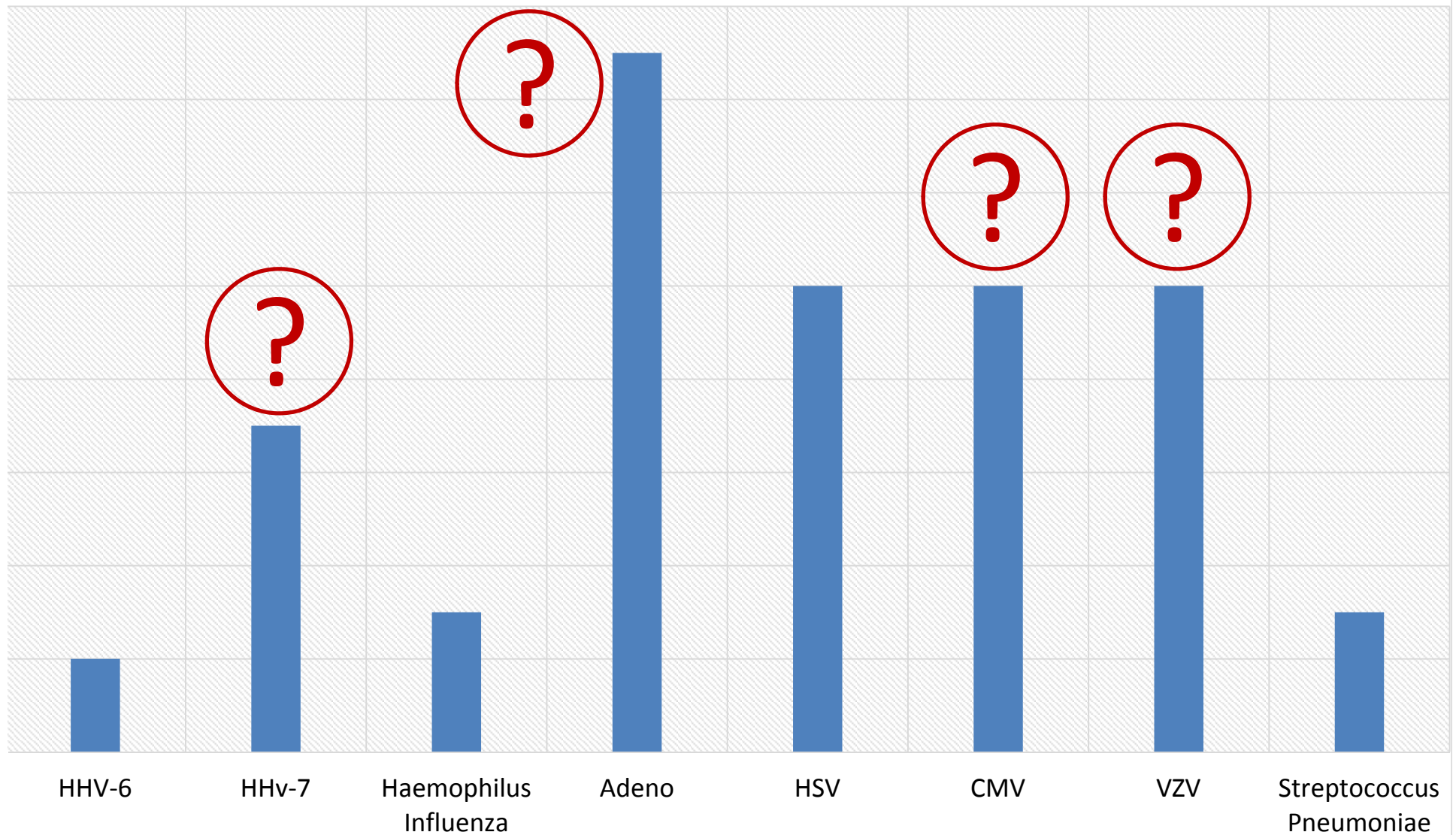
Neurology Positive Results In Adults; Different Specimens Pathogens



Neurology Results; In CSF Specimens



Neurology Results; In CSF Specimens



Viral Coinfections

- Cases of delayed primary HHV-7 infection and encephalitis, good recovery has been evident after a prolonged hospitalization.
- CMV, EBV and Herpes are highly prevalence in the context of bacterial meningitis.
- Dual viral and bacterial infection are associated with greater CSF inflammation and worse outcome.

STD Multiplex

N= 1552



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STD9

Gardnerella Vaginalis

Chlamydia Trachomatis

Neisseria Gonorrhoeae

Mycoplasma Genitalium

HSV-1

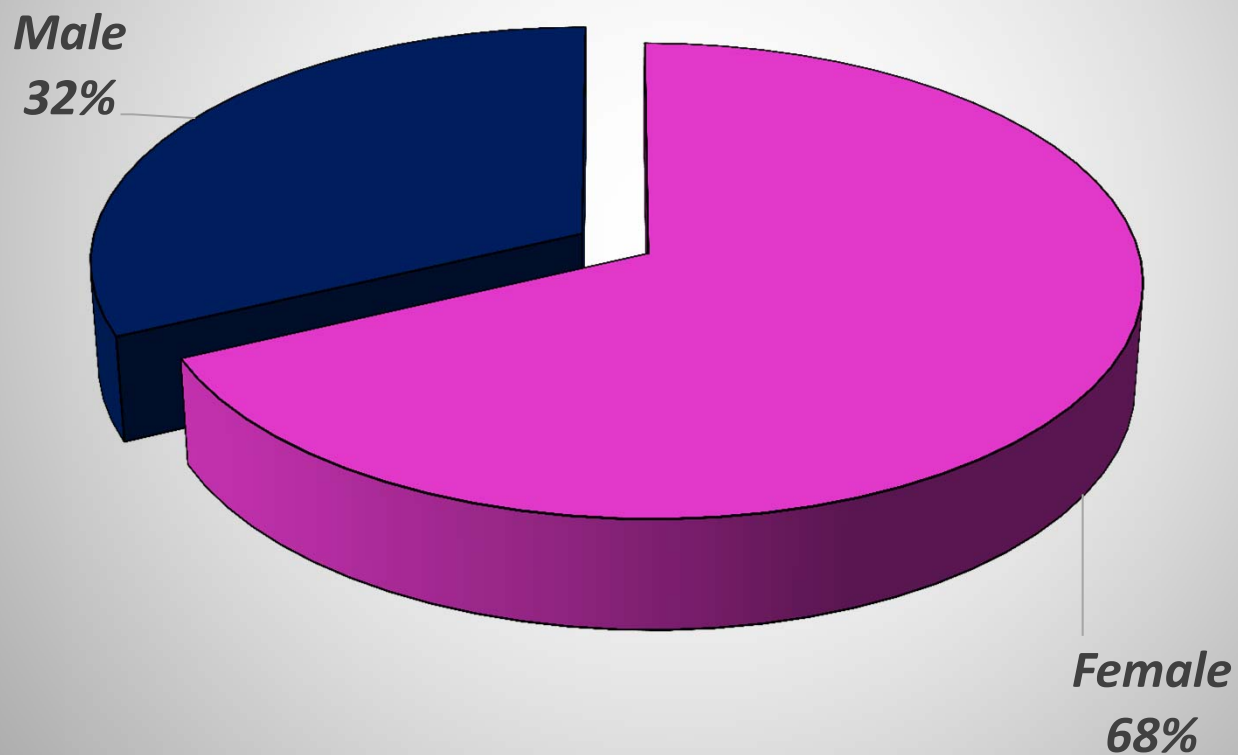
HSV-2

Trichomonas Vaginalis

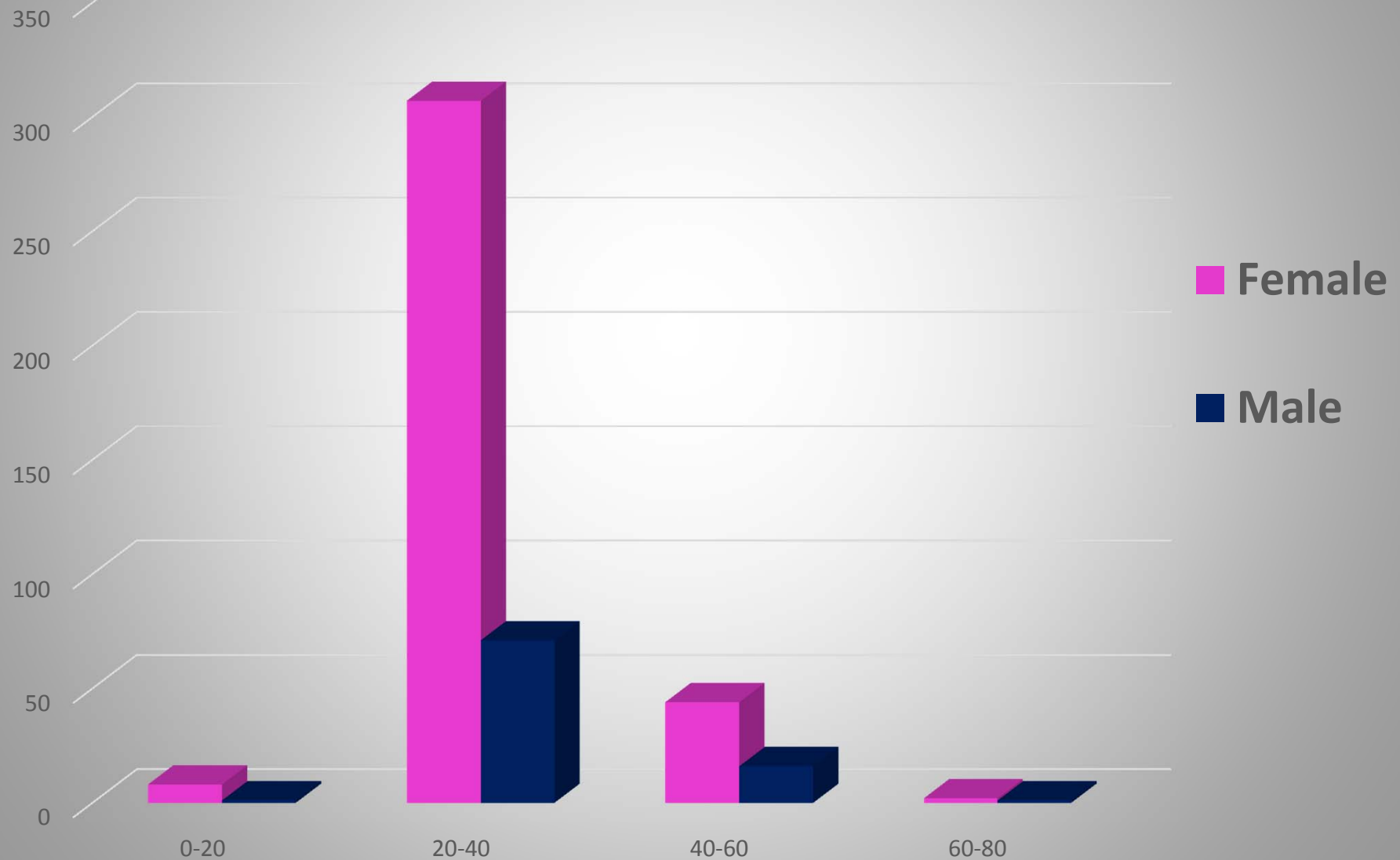
Ureaplasma Urealyticum

Ureaplasma Parvum

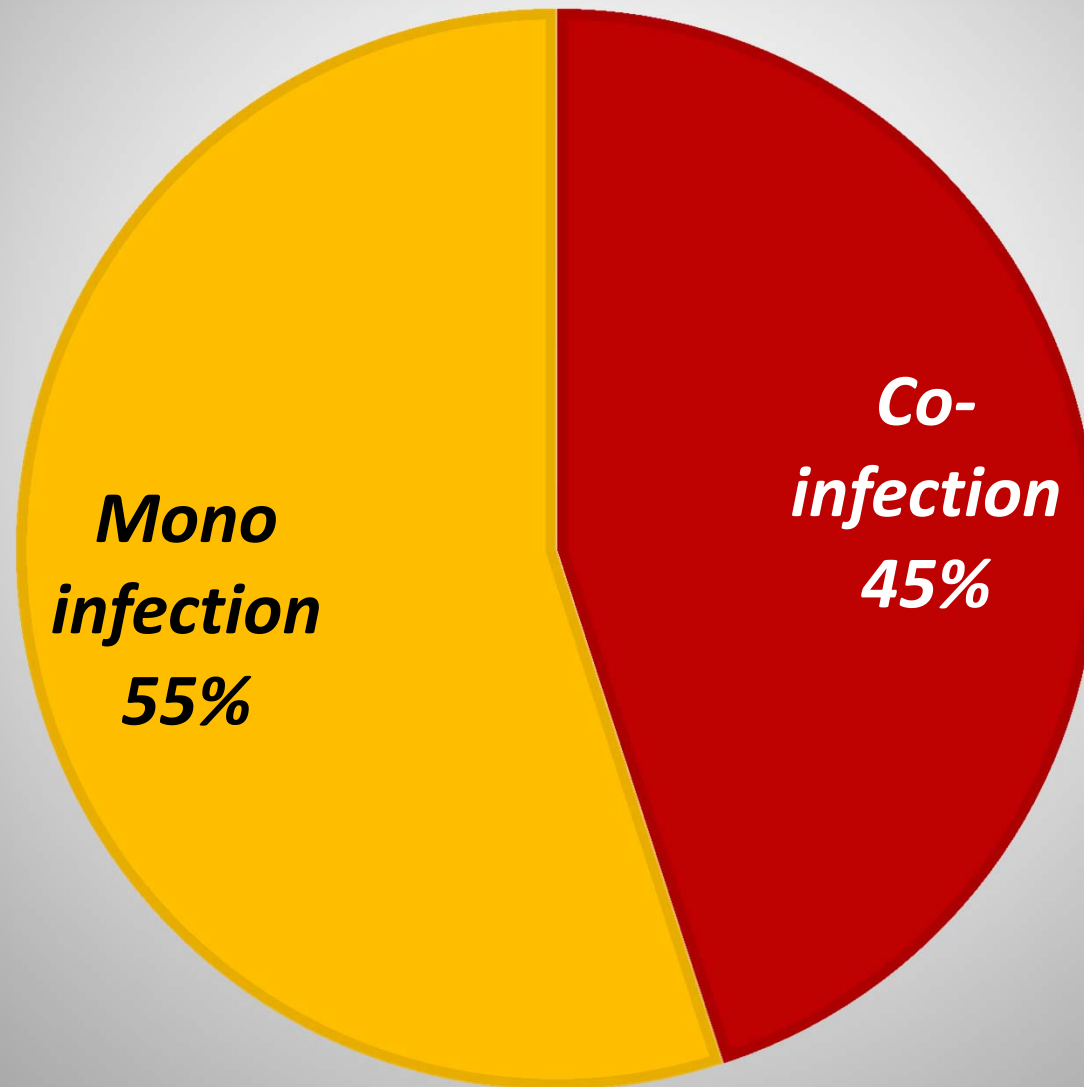
Multiplex STD Positive Results; Gender



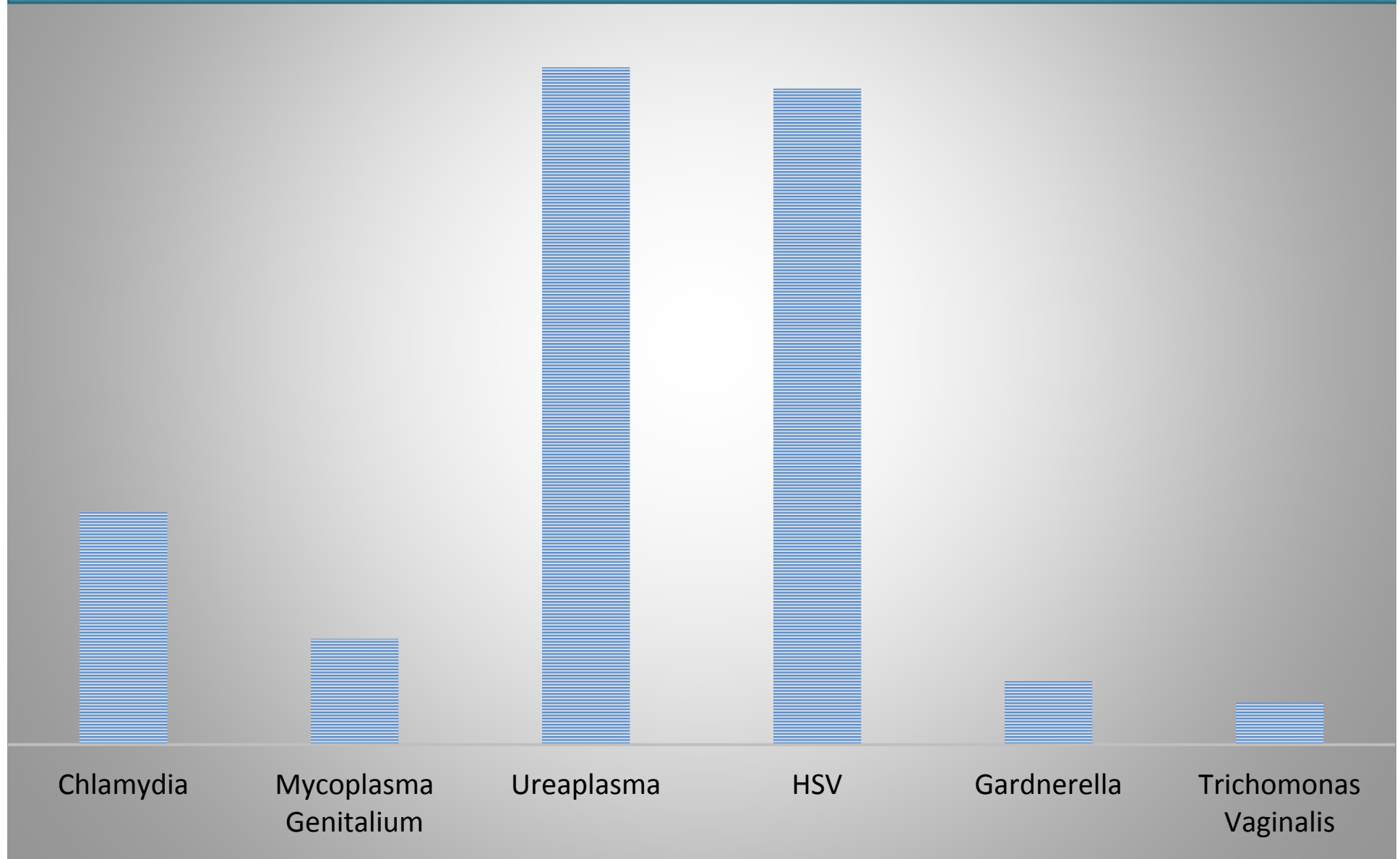
Multiplex STD Positive Results; Age



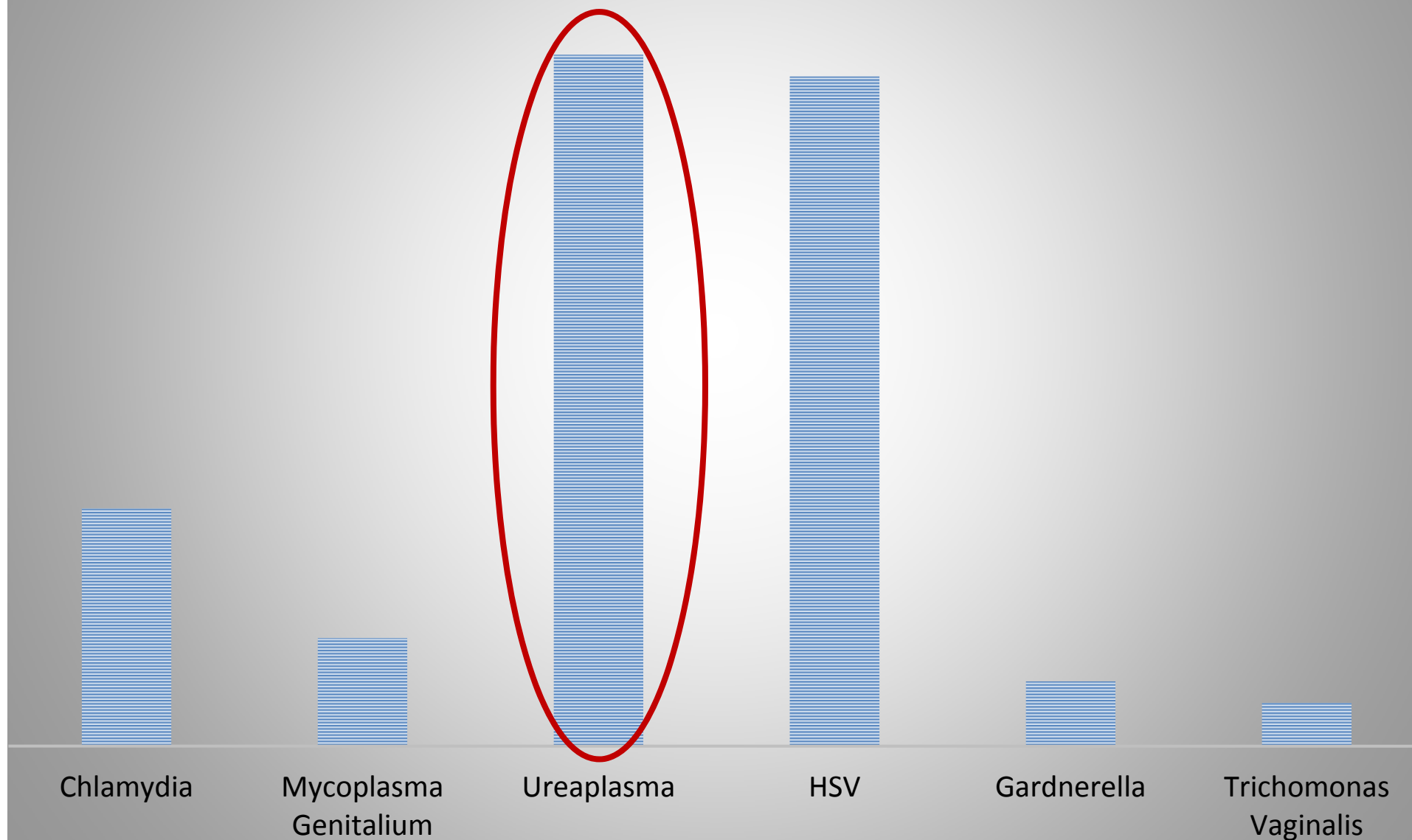
Multiplex STD Positive Results; Monoinfection/ Coinfection



Multiplex STD Positive Results



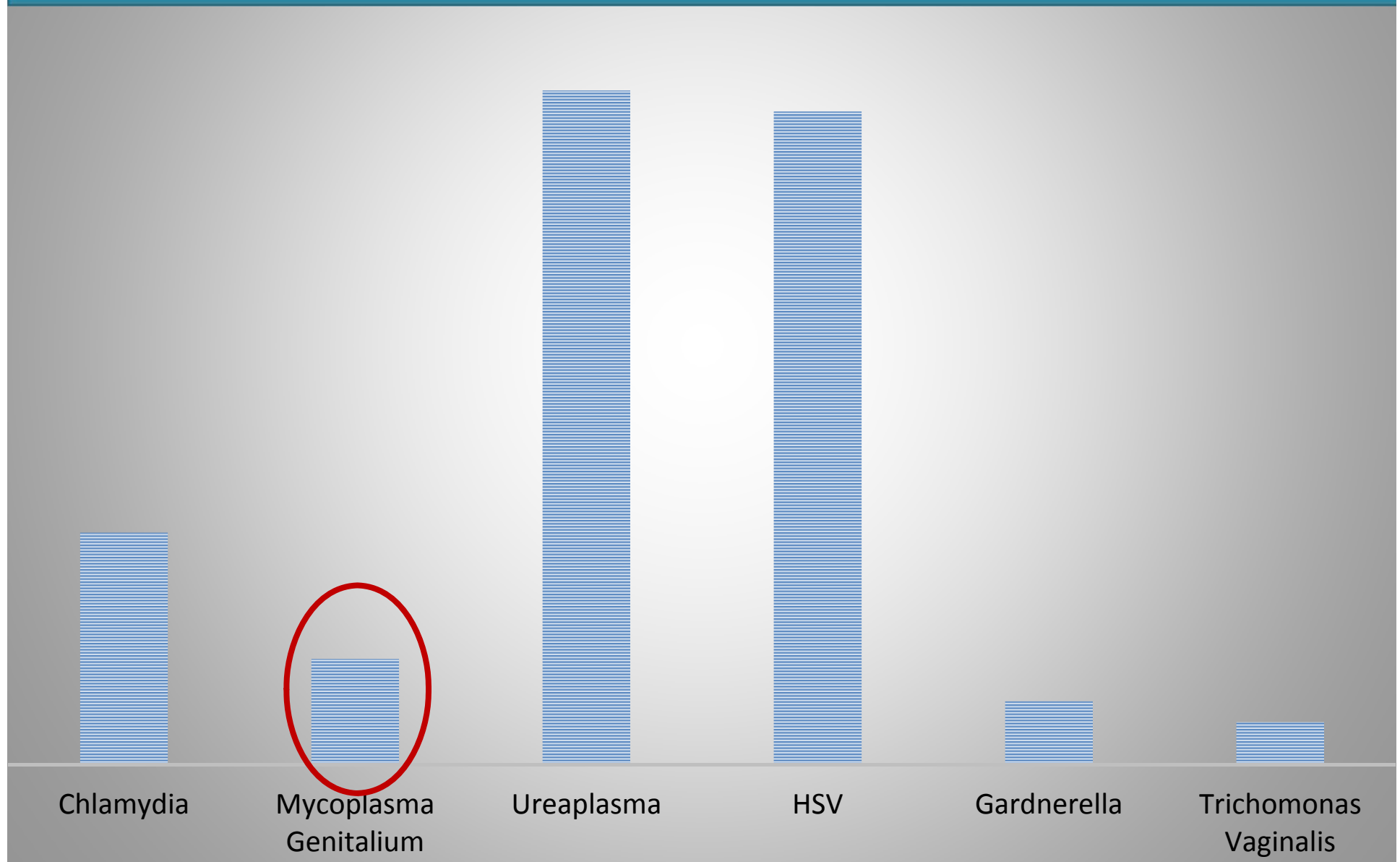
Multiplex STD Positive Results



Ureaplasma spp: *urealyticum* and *parvum*

- Generally, Ureaplasma urealyticum is not known as a clinical pathogen but it can be a cause of urethritis, especially in patients resistant to routine treatment.
- Recently, many reports have revealed that microorganisms such as Ureaplasma urealyticum can contribute not only to lower genitourinary infection but also to infertility.

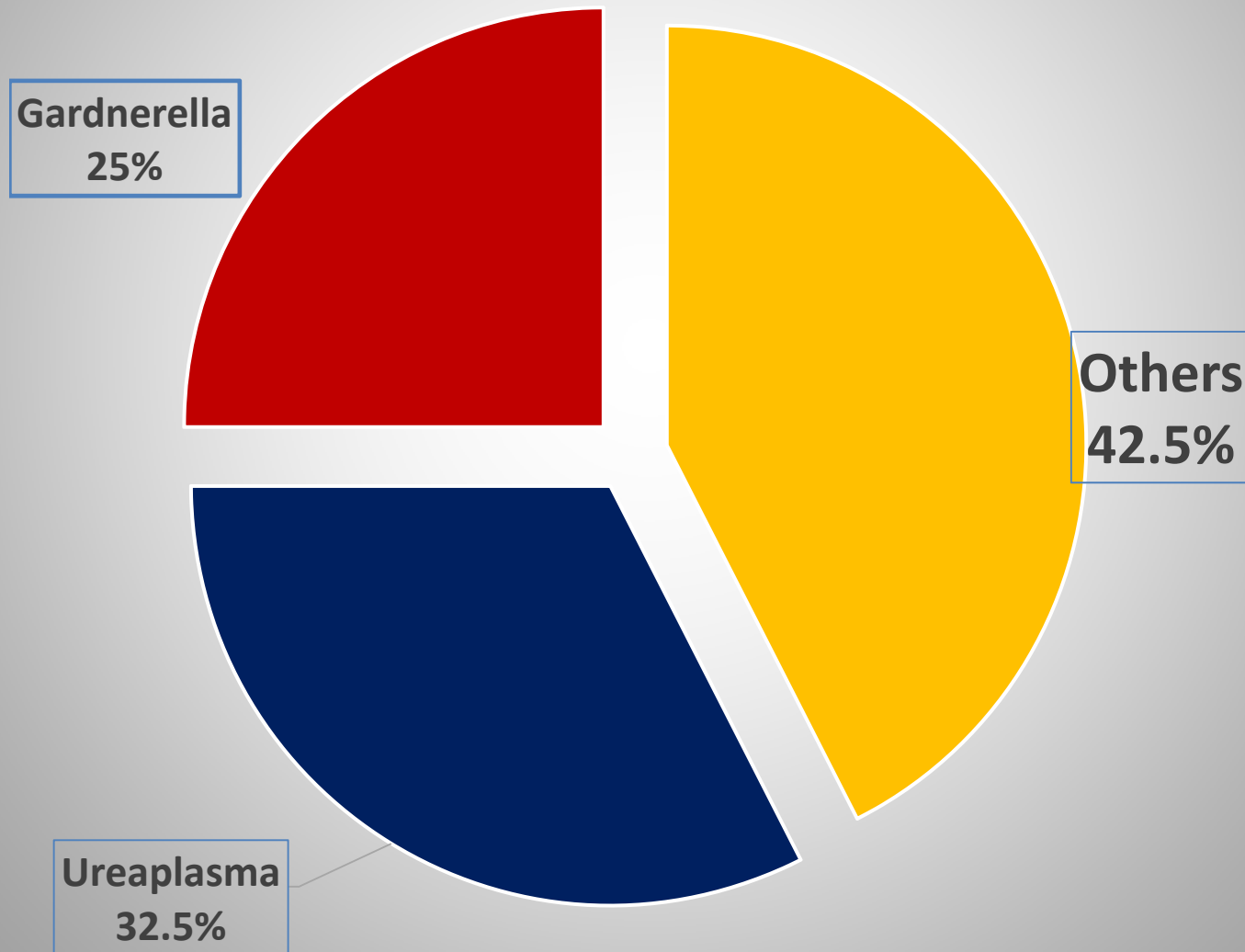
Multiplex STD Positive Results



Mycoplasma genitalium

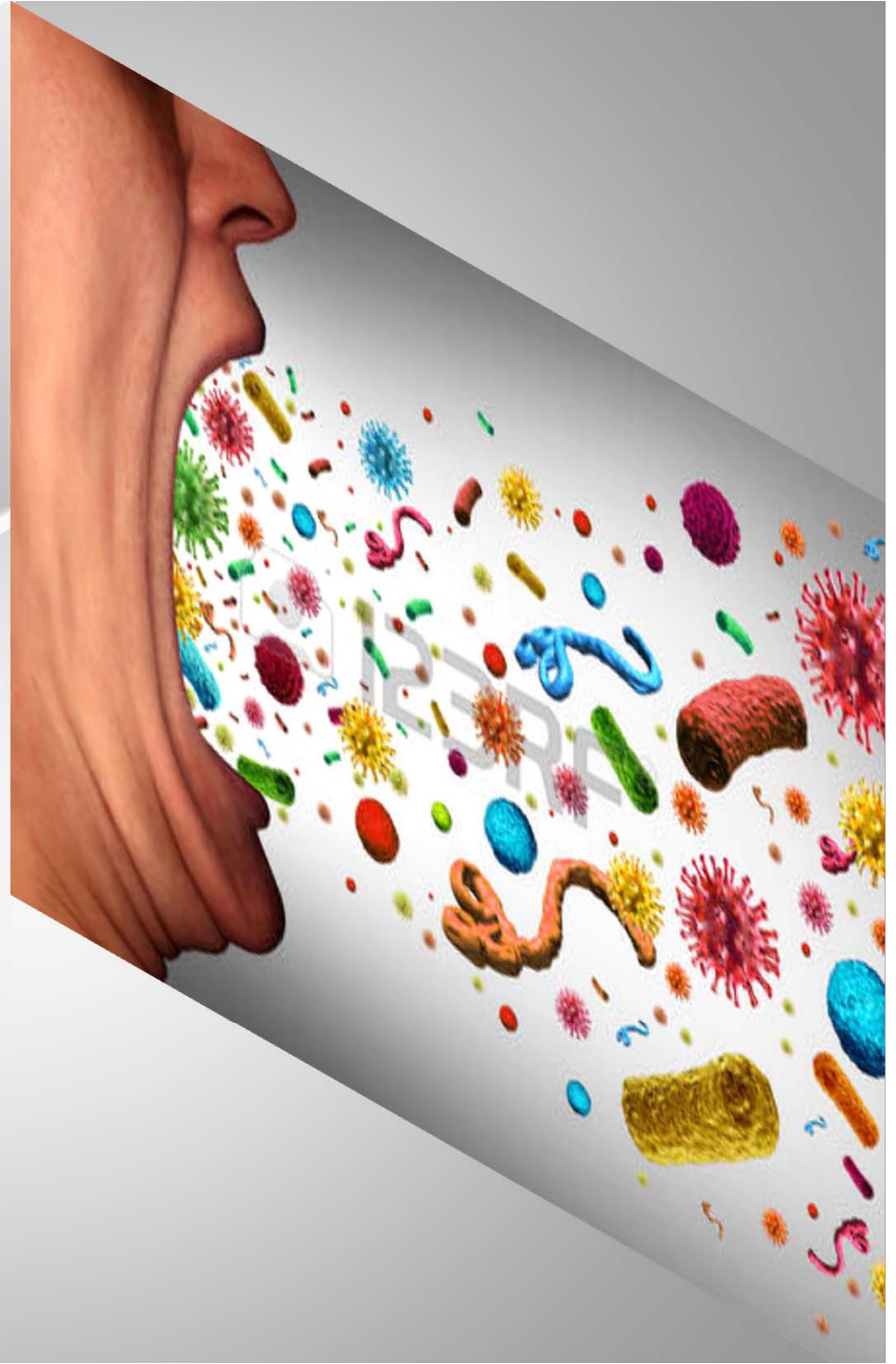
- Mycoplasma genitalium is a common cause of persistent or recurrent urethritis among men treated with doxycycline, and erythromycin appears to be less efficient than azithromycin in eradicating the infection.
- Therefore, when physicians encounter patients who complain of continuous symptoms of urethritis, they should consider drug-refractory urethritis such as that caused by Mycoplasma genitalium.

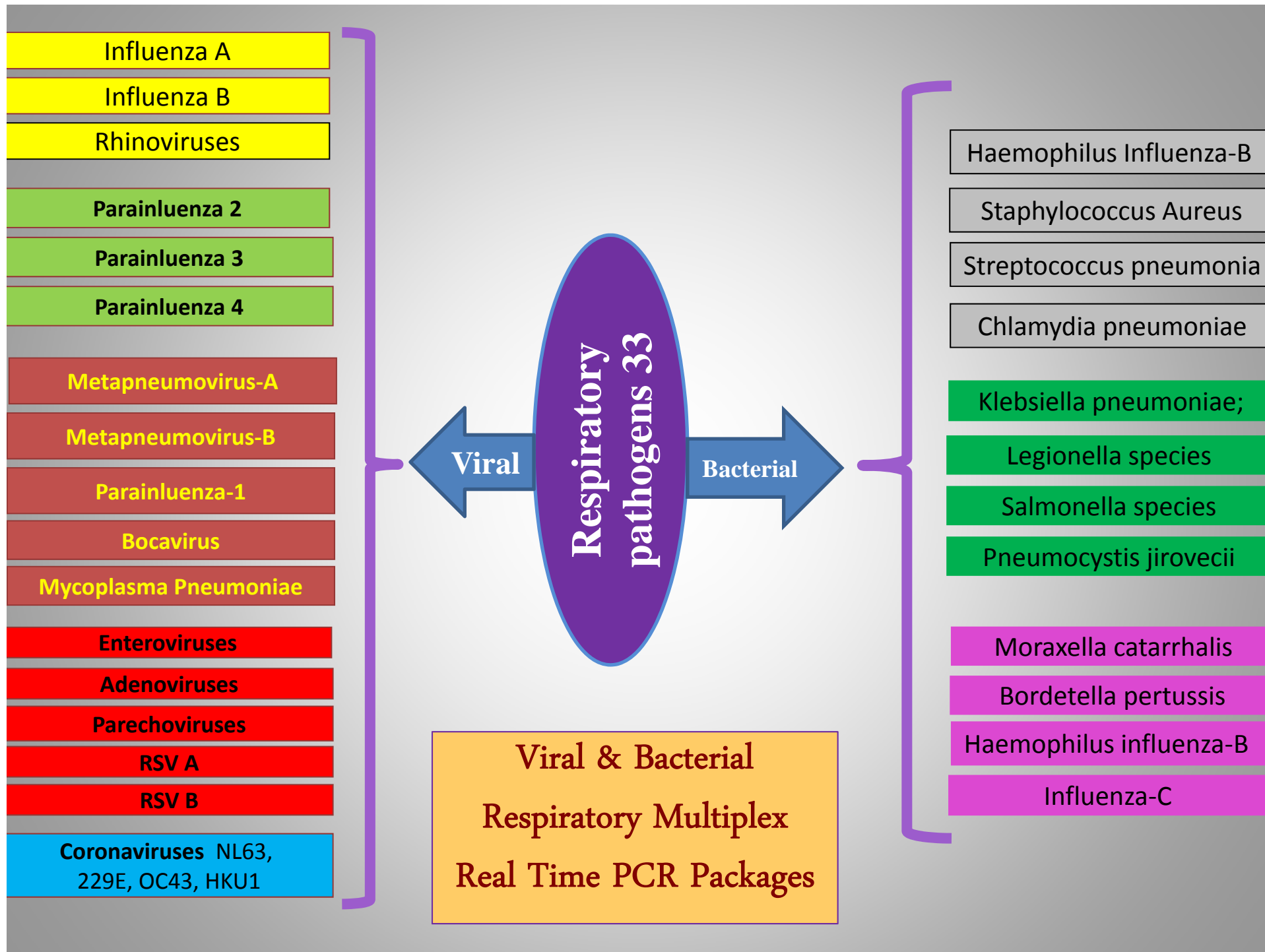
Multiplex STD Positive Results; Coinfection Pathogens



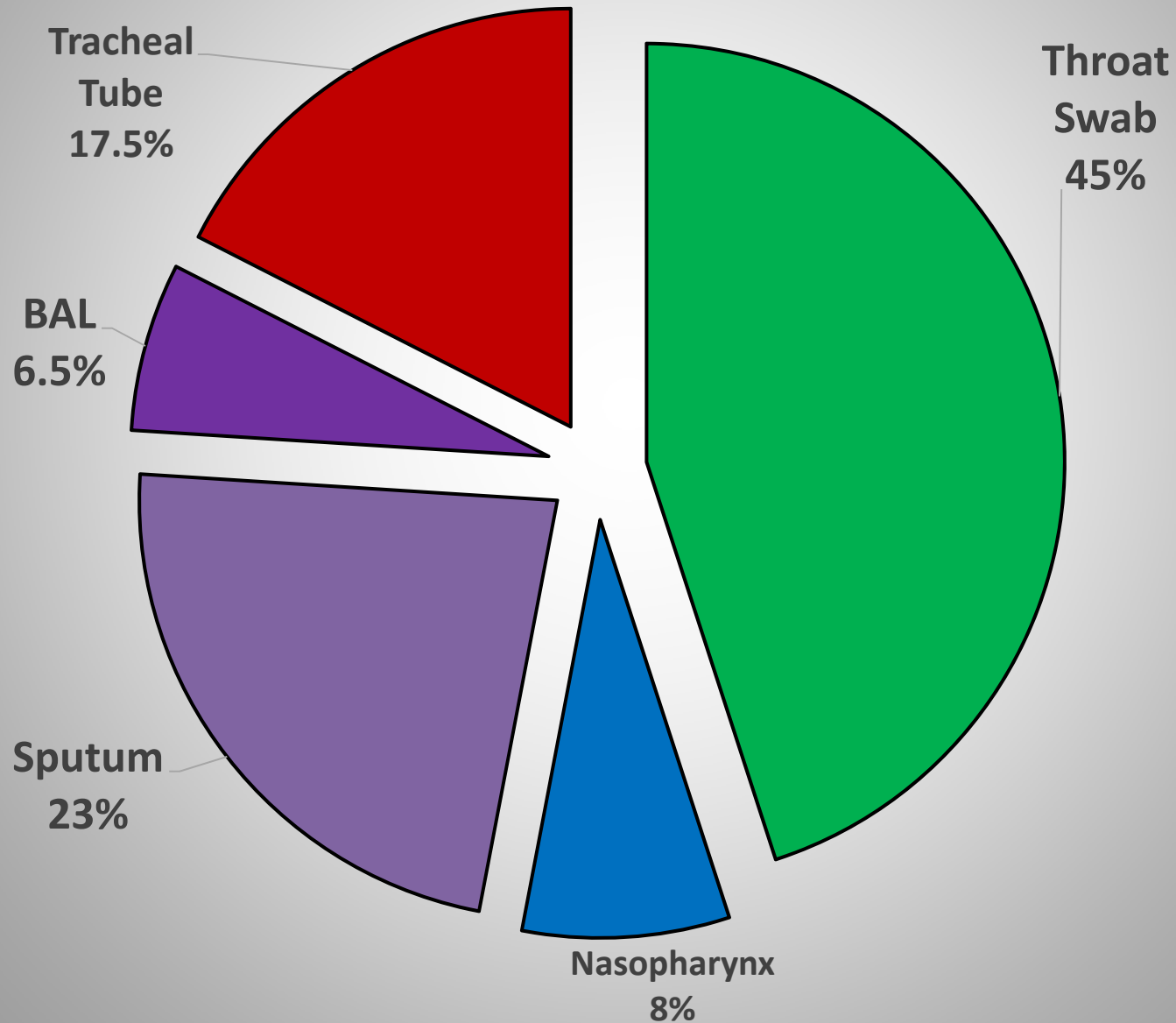
Respiratory Multiplex

Respiratory Multiplex
N= 993

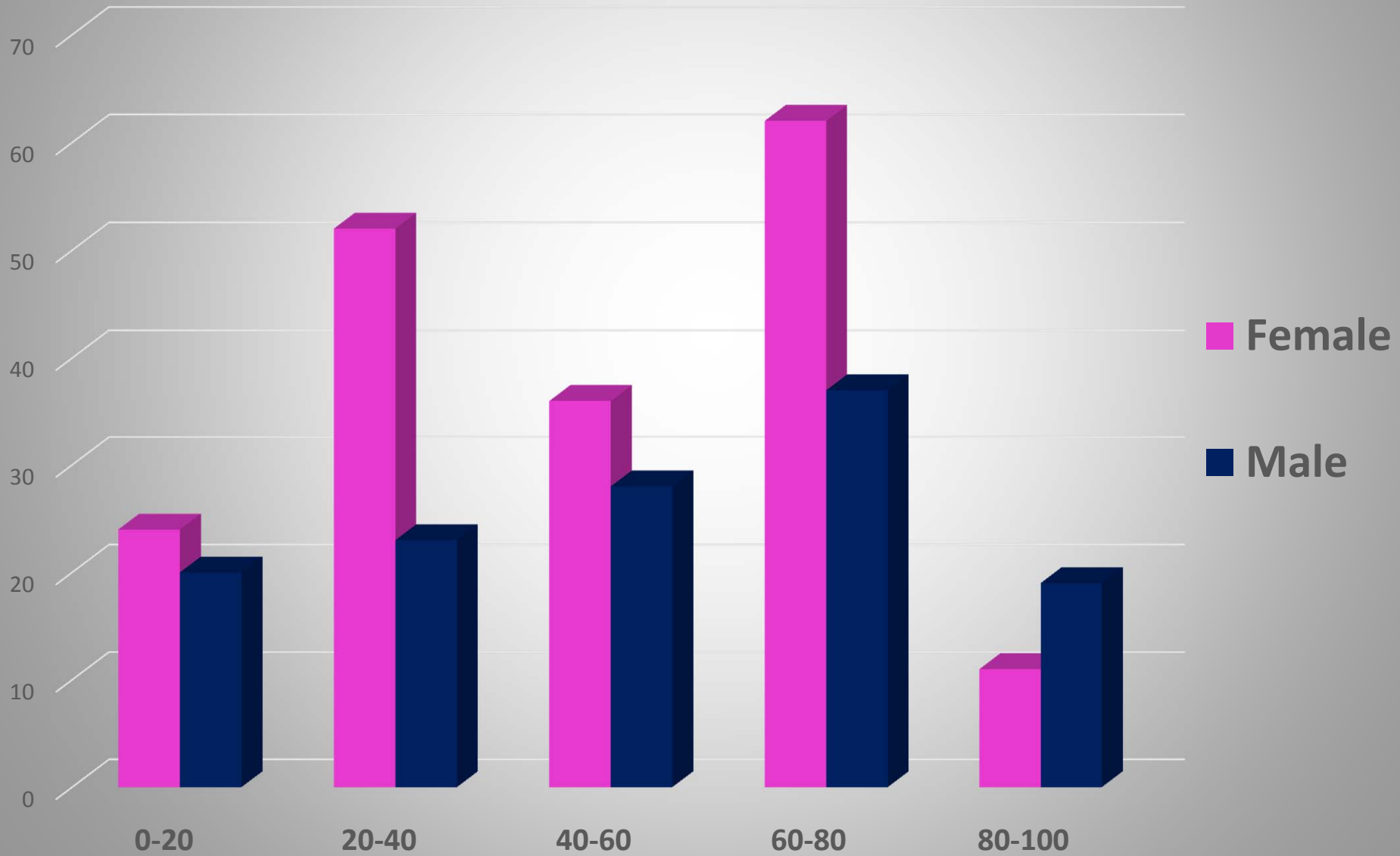




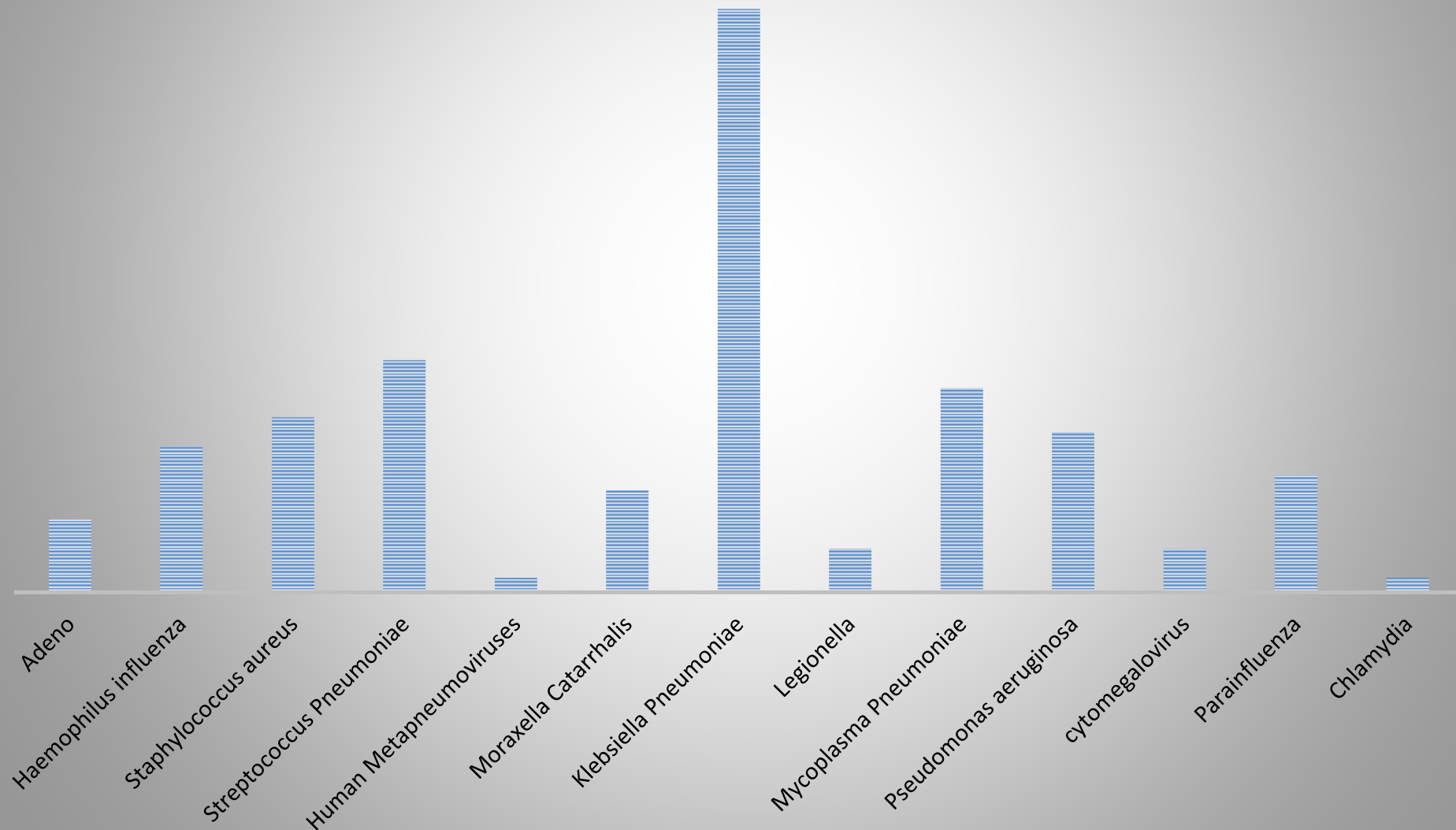
Respiratory Results; Specimen



Respiratory Results; Age Groups



Respiratory Multiplex; Pathogens



Conclusions

1. It is unlikely that clinicians are correct about the exact pathogen
2. Rapid negative leads to a focus on other pathogens
3. Positive is believable and can lead to a reduction in other tests and drugs
4. Value for **money per pathogen**.
5. Rapid test result **saves the time**.
6. Limited and valuable **samples**

Acknowledgment

- گروه ویروس شناسی دانشگاه علوم پزشکی تهران
- بیمارستان لاله
- آزمایشگاه آلبرت
- آزمایشگاه نورا
- آزمایشگاه مندل
- آزمایشگاه پارسه
- آزمایشگاه شفا-بیرجند

STOP Microbes!



**Thank You
For Your
Attention!**