#2003 - A simple colorimetric detection of Ureaplasma infections

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Body

Introduction: *Ureaplasma urealyticum,* as the one of the most common infections in sexually-active men and women, is typically sexually transmitted. The genus *Ureaplasma* belongs to the *Mycoplasmataceae*family, which are responsible for a numerous array of inflammatory states involving the respiratory and urogenital tracts of neonates, children, and adults. Greater attention is being given to these organisms in diagnostic microbiology. Rapid and sensitive detection of *Ureaplasma* species such as *Ureaplasma urealyticum* is an essential strategy for the intervention of a possible disease outbreak. *Ureaplasma urealyticum* may be associated with urogenital infections, infertility, and adverse pregnancy outcomes. Different methods have been used for detection of this pathogen such as serological analysis or molecular-based assays like multiplex PCR and Real-time PCR assay and so on, but a cost-effective and accurate one is needed to detect this pathogen faster. We can achieve this purpose by colorimetric assay.

Material and methods: First, gold nanoparticles (GNPs) were synthesized using the citrate reduction method and conjugated with the prepared thiolated single stranded DNA complementary to target to develop the new nano-biosensor. Next, the extracted target DNA of the bacteria was added to GNP-probe complex to check its efficacy for *Ureaplasma urealyticum* diagnosis.

Results and discussion: The result can be recorded by visual and/or spectrophotometric comparison of solutions before and after acid induced AuNP-probe aggregation. When the complementary target is present, the aggregation will not take place and the solution remains pink, but in the opposite event, it turns to purple.The application of the proposed method on isolated bacteria produced positive results with the *Ureaplasma urealyticum* isolates and negative with the controls.

Conclusion: The offered method can be used as a highly specific and sensitive screening tool for the detection of *Ureaplasma urealyticum* directly from clinical samples in a very simple manner, without the need of high-cost dedicated equipment. The technology described here, may develop into a platform that could accommodate detection of many bacterial species and could be easily adapted for high throughput and expedite screening of samples.

Keywords: Colorimetric detection, *Ureaplasma urealyticum*, Gold Nanoparticles, DNA probe, Hybridization

References

[1] N. Elahi, M. Kamali, M.H. Baghersad, Recent biomedical applications of gold nanoparticles: A review, Talanta (2018).

[2] K.W. Soli, M. Kas, T. Maure, M. Umezaki, A. Morita, P.M. Siba, A.R. Greenhill, P.F. Horwood, Evaluation of colorimetric detection methods for Shigella, Salmonella, and Vibrio cholerae by loop-mediated isothermal amplification, Diagnostic microbiology and infectious disease 77(4) (2013) 321-323.

[3] O.E. Ifeanyi, A Review on Ureaplasma urealyticum, Int. J. Curr. Res. Med. Sci 4(2) (2018) 66-74.

[4] Z. Fu, X. Zhou, D. Xing, Sensitive colorimetric detection of Listeria monocytogenes based on isothermal gene amplification and unmodified gold nanoparticles, Methods 64(3) (2013) 260-266.

[5] C. Leli, A. Mencacci, M.A. Latino, P. Clerici, M. Rassu, S. Perito, R. Castronari, E. Pistoni, E. Luciano, D. De Maria, Prevalence of cervical colonization by Ureaplasma parvum, Ureaplasma urealyticum, Mycoplasma hominis and Mycoplasma genitalium in childbearing age women by a commercially available multiplex real-time PCR: An Italian observational multicentre study, Journal of Microbiology, Immunology and Infection (2017).

[6] I.V. Michou, P. Constantoulakis, K. Makarounis, G. Georgoulias, V. Kapetanios, V. Tsilivakos, Molecular investigation of menstrual tissue for the presence of

Chlamydia trachomatis, Ureaplasma urealyticum and Mycoplasma hominis collected by women with a history of infertility, Journal of Obstetrics and Gynaecology Research 40(1) (2014) 237-242.

[7] M.S. Payne, L.L. Furfaro, R. Tucker, L.Y. Tan, E. Mokany, One-step simultaneous detection of Ureaplasma parvum and genotypes SV1, SV3 and SV6 from clinical samples using PlexPCR technology, Letters in applied microbiology (2017).

[8] J. Tang, Z. Xu, L. Zhou, H. Qin, Y. Wang, H. Wang, Rapid and simultaneous detection of Ureaplasma parvum and Chlamydia trachomatis antibodies based on visual protein microarray using gold nanoparticles and silver enhancement, Diagnostic microbiology and infectious disease 67(2) (2010) 122-128.

[9] H.H. Kletzel, R. Rotem, M. Barg, J. Michaeli, O. Reichman, Ureaplasma urealyticum: the Role as a Pathogen in Women’s Health, a Systematic Review, Current infectious disease reports 20(9) (2018) 33.

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