Opinion

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# Deoxyribonucleases and Their Applications in Biomedicine

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## Description

Extracellular DNA, also called cell-free DNA, released from dying cells or activated immune cells can be recognized by the immune system as a danger signal causing or enhancing inflammation. The cleavage of extracellular DNA is crucial for limiting the inflammatory response and maintaining homeostasis. Deoxyribonucleases (DNases) as enzymes that degrade DNA are hypothesized to play a key role in this process as a determinant of the variable concentration of extracellular DNA. DNases are divided into two families—DNase I and DNase II, according to their biochemical and biological properties as well as the tissue-specific production. Studies have shown that low DNase activity is both, a biomarker and a pathogenic factor in systemic lupus erythematosus. Interventional experiments proved that administration of exogenous DNase has beneficial effects in inflammatory diseases. Recombinant human DNase reduces mucus viscosity in lungs and is used for the treatment of patients with cystic fibrosis. This review summarizes the currently available published data about DNases, their activity as a potential biomarker and methods used for their assessment. An overview of the experiments with systemic administration of DNase is also included. Whether low-plasma DNase activity is involved in the etiopathogenesis of diseases remains unknown and needs to be elucidated [1].

## Persisting Health Disparities

Persisting health disparities have led to calls for an increase in health research to address them. Biomedical scientists call for research that stratifies individual indicators associated with health disparities, for example, ethnicity. Feminist social scientists recommend feminist intersectionality research. Intersectionality is the multiplicative effect of inequalities experienced by nondominant marginalized groups, for example, ethnic minorities, women, and the poor. The elimination of health disparities necessitates integration of both paradigms in health research. This study provides a practical application of the integration of biomedical and feminist intersectionality paradigms in nursing research, using a psychiatric intervention study with battered Latino women as an example [2].

In this review we describe label-free optical spectroscopy techniques which are able to non-invasively measure the (bio) chemistry in biological systems. Raman spectroscopy uses visible or near-infrared light to measure a spectrum of vibrational bonds in seconds. Coherent anti-Stokes Raman (CARS) microscopy and stimulated Raman loss (SRL) microscopy are orders of magnitude more efficient than Raman spectroscopy, and are able to acquire high quality chemically-specific images in seconds. We discuss the benefits and limitations of all techniques, with particular emphasis on applications in biomedicine—both in vivo (using fiber endoscopes) and in vitro (in optical microscopes). Optical microscopy is highly valuable to biomedical research. White light microscopy reveals changes in refractive index within cells and tissue, but lacks any kind of biochemical contrast and is only appropriate for monolayers of cells or thin (<10 μm) sections of tissue as it does not have a 3D sectioning ability. Fluorescence imaging is the current major technique of interest. This relies on the use of fluorescent dyes which are either expressed by genes which have been modified, or are tagged on to molecules of interest. The drawbacks of fluorescence imaging are numerous: firstly, sample modification is required by some kind of labeling; secondly, this label of size 1–5 nm can perturb the behaviour of the tagged molecule of interest; thirdly, photobleaching limits the observation time and prevents long term studies [3].

The term “nanoparticles” refers to materials with at least one dimension between approximately 1 and 100 nanometers (nm) and usually contain from several hundreds to 105 atoms. Magnetic materials are those materials that show a response to an applied magnetic field. They are classified into five main types; ferromagnetic, paramagnetic, diamagnetic, antiferromagnetic, and ferrimagnetic. In ferromagnetic materials (such as iron, nickel, and cobalt) an atom has a net magnetic moment due to unpaired electrons. The material is composed of domains each containing large numbers of atoms whose magnetic moments are parallel producing a net magnetic moment of the domain that points in some direction. The magnetic moments of the domains are randomly distributed giving a zero net magnetic moment of the material [4]. When the ferromagnetic material is placed in a magnetic field, the magnetic moments of the domains align along the direction of the applied magnetic field forming a large net magnetic moment. A residual magnetic moment exists even after the magnetic field is removed. In paramagnetic materials (such as gadolinium, magnesium, lithium, and tantalum) an atom has a net magnetic moment due to unpaired electrons but magnetic domains are absent. When the paramagnetic material is placed in a magnetic field, the magnetic moments of the atoms align along the direction of the applied magnetic field forming a weak net magnetic moment. These materials do not retain magnetic moment when the magnetic field is removed. In diamagnetic

materials (such as copper, silver, gold, and most of the known elements) atoms have no unpaired electrons which results in zero net magnetic moment [5].

## References

1. Mandel P (1948) Les acides nucléiques du plasma sanguin chez l'homme. C. R. Seances Soc. Biol. Fil 142: 241–243.
2. Kelly (2009) Integrating Intersectionality and Biomedicine in Health Disparities Research. Advances in Nursing Science 32: E42-E56.
3. Yang W (2009) In situ evaluation of breast cancer cell growth with 3D ATR-FTIR spectroscopy. Vib. Spectros 49: 64–67.
4. Kodama, R.H (1997) Foner, S. Surface spin disorder in ferrite nanoparticles ( invited). J. Appl. Phys 81: 5552–5558.
5. Makovec, D (2008) Non-stoichiometric zinc-ferrite spinel nanoparticles. J. Nanoparticle Res 2008, 10, 131–141.