

ELISA- A Mini Review

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Review Article

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ABSTRACT

The ELISA (Enzyme Linked Immunosorbent Assay) is a strategy versatile framework for quantitation of antigens and antibodies. The segregation of antibodies to understand substance structures helped ELISA unbounded uses of analytic estimation.

INTRODUCTION

ELISA may be a plate primarily based assay used for detective work and quantifying substances like peptides, proteins, antibodies and hormones. ELISA uses variety of enzymes like alkaline enzyme, horse radish oxidase and beta galactosidase. Specific substrates like ortho-phenyldiamine dihydrochloride (for peroxidase), paranitrophenyl phosphate (for alkaline phosphate) are used that are hydrolysed by on top of enzymes to grant coloured outcome.

History: ELISA was invented by Peter Perlmann and Eva Engvall at Stockholm University in Sweden.

PRINCIPLE

ELISA could be a touchy bioassay that utilizes a catalyst connected to a counter acting agent or matter as a marker for the invention of a selected super-molecule, significantly Associate in Nursing matter or immunizer ^[1]. It includes identification of "analyte" in a very fluid example utilizing a chemical agent (wet lab) or dry strips (dry lab). In dry examination, strips may be perused in reflectometry. The quantitative poring over depends on location transmitted light-weight by spectrophotometry at indicated wavelength ^[2-5]. The affectability of recognition depends on upon intensification of flag amid scientific response. In some protein response, the flag created by catalyst that square measure connected to the invention reagents in altered extents to allow precise measuring (protein connected) ^[6,7]. There square measure 2 primary minor departures from ELISA technique which contains

- ELISA may be used to differentiate the distance or group action of antigens that square measure perceived by a counter acting agent or
- It may be used to heck for associate in antibodies that understand a matter.

PROCEDURE

A general ELISA take once a five stage system ^[8-12]:-

- Coating of microtiter plate wells with substance,
- Blocking of each single unbound web site to anticipate false positive results,
- Adding of essential antibodies (e.g. Rabbit being antibodies) to the wells,
- Adding auxiliary antibodies conjugated to a macromolecule (e.g. Hostile to mouse IgG),
- Reaction of a substrate with the catalyst to form a hued item.

Sorts of ELISA

Often there are a unit four forms of ELISA on the premise of limiting structure between the neutralizer and substance [13-18] (Figure 1).

- Direct ELISA
- Indirect ELISA
- Sandwich ELISA
- Competitive ELISA

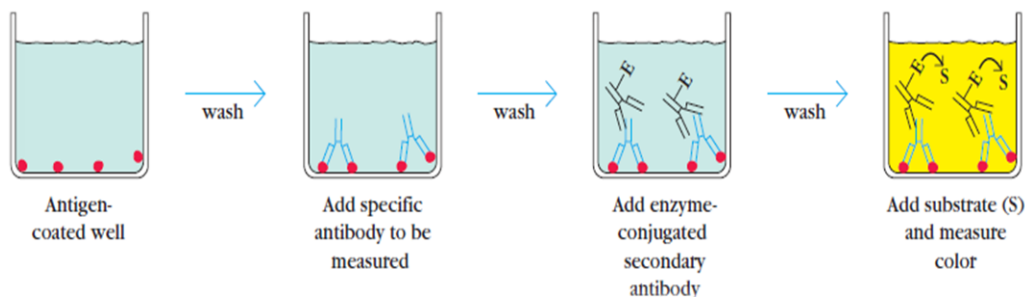


Figure 1. Steps of ELISA

Direct ELISA

It is suitable for the detection of proteinaceous antigens and may require pre-purification of sample [19,20]. It is performed when desired antibody is available in a pre-conjugated state [21-28] (Figure 2).

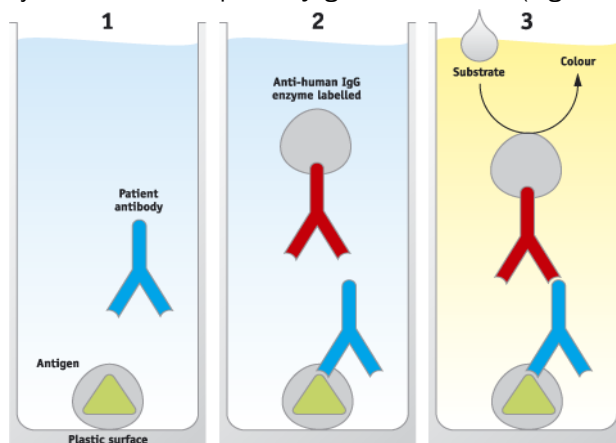


Figure 2. Direct ELISA

Indirect ELISA

The primary antibody is not conjugated, then indirect ELISA is required in which a conjugated secondary antibody is targeted to the isotope of the primary antibody [29-35] (Figure 3).

Indirect ELISA

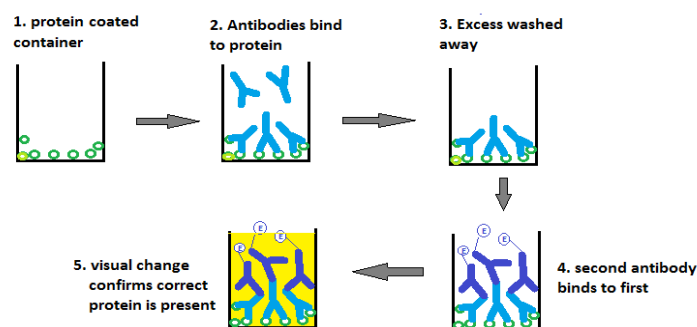


Figure 3. Indirect ELISA

Sandwich ELISA

It quantifies the measure of antigen between two layers of antibodies (i.e. catch and recognition immune response) [36,37]. The antigen to be measured must contain no less than two antigenic locales equipped for official to counter acting agent, since no less than two antibodies act in Sandwich [38-45].

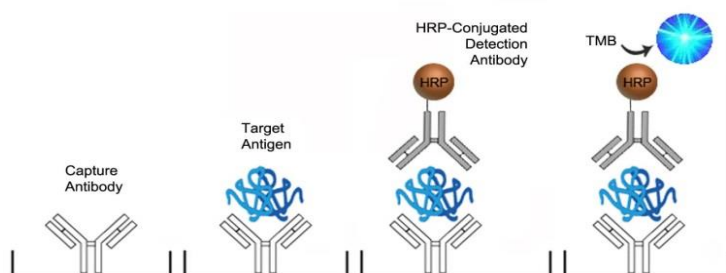
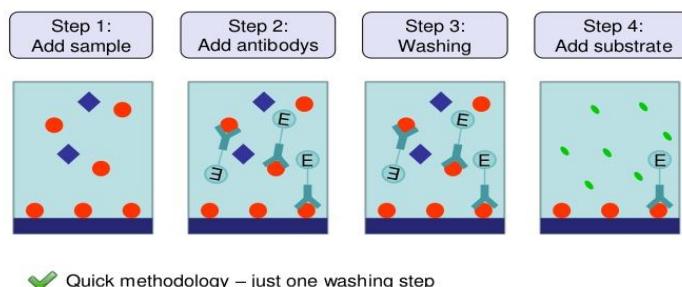


Figure 4. Sandwich ELISA

Competitive ELISA

In this sort neutralizer is initially brooded in arrangement with a specimen containing antigen [46-52]. The Antigen-immunizer blend [53-55] is then added to the microtitre well which is covered with antigen [56-60]. The more the antigen show in the example, the less free immune response will be accessible to tie to the antigen-covered well [61-69]. Subsequent to washing the well, compound conjugated auxiliary counter acting agent particular for isotype of the essential neutralizer is added to decide the measure of essential immune response bound to the well [70,71]. The higher the convergence of the antigen in the specimen, the lower is the absorbance [72-78] (Figure 5).

Competitive ELISA



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Figure 5. Competitive ELISA

Applications of ELISA:

- Detecting potential food allergens [79-80] (milk, peanuts, walnuts, almonds and eggs),
- Serum protein Concentrations [81-89]
- Disease outbreak- chase the unfold of malady [1,5,15,90-96] (e.g. HIV, bird flu, common colds, cholera, STD etc.)
- Detection of antigens [45,48,90,97-100] (e.g. gestation hormones, drugs)

CONCLUSION

ELISA may be a touchy bioassay that utilizes a catalyst connected to a counter acting agent or substance as a marker for the invention of a selected macromolecule, significantly Associate in Nursing substance or immunizer. It includes identification of "analyte" during a fluid example utilizing a chemical agent (wet lab) or dry strips (dry lab). In dry examination, strips are perused in reflectometry. The quantitative poring over depends on location transmitted lightweight by spectrophotometry at indicated wavelength. The affectability of recognition depends on upon intensification of flag amid scientific response. In some protein response, the flag created by catalyst that square measure connected to the invention reagents in altered extents to allow precise measuring (protein connected).

REFERENCES

1. Mucciolo M, et al. A Genome Wide Copy Number Variations Analysis in Autism Spectrum Disorder (Asd) and Intellectual Disability (Id) in Italian Families. *J Genet Syndr Gene Ther.* 2016;7.
2. Caselli E, et al. Influence of Sanitizing Methods on Healthcare-Associated Infections Onset: A Multicentre, Randomized, Controlled Pre-Post Interventional Study. *J Clin Trials.* 2016;6.
3. Elisabetta G, et al. Immunotherapy and Hypophysitis in the Clinical Practice: A Case Report. *J Clin Case Rep.* 2016;6.
4. Fabrizio A, et al. Diagnostic Imaging of the Diffuse Hepatic Epithelioid Hemangioendothelioma's Type: A Case Report. *J Clin Case Rep.* 2016;6.
5. Christina M, et al. A New Sandwich ELISA Test Simultaneously Detecting E7 Proteins of HPV-16, 18 and 45 in Cervical Smears. *Clin Microbiol.* 2016;5.
6. Levantesi L, et.al. Fluid Optimization in Liver Surgery. *J Anesth Clin Res.* 2016;7.
7. Rossella T, et.al. Personality Traits and Perception of Disability after Facial Palsy. *J Psychol Psychother.* 2016;6.
8. Bellia F, et.al. The Mock Code an Educational Tool in International Medical Missions. *J Nurs Care.* 2016;5.
9. Toni W, et.al. Neurocysticercosis Diagnosed in a Patient with Taenia saginata Taeniasis after Administration of Praziquantel: A Case Study and Review of the Literature. *Primary Health Care.* 2016;6.
10. Melaku T, et.al. Study of Ruminant Fasciolosis in Selected Districts in Upper Awash River Basin, South Western Shoa, Ethiopia. *J Vet Sci Technol.* 2016;7.
11. Matteo P, et.al. Risk-Benefit Profile of Novel Anti-diabetic Drugs: Current Perspectives. *J Pharmacovigil.* 2016;4.
12. Nguyen HT, et.al. Investigation of Ginsenoside Rb1 from *Acanthopanax koreanum* by Eastern Blotting and ELISA Analyses. *Pharm Anal Chem Open Access.* 2016;2.
13. Nicolai F, et.al. Effects of Age, APOE ϵ 4, Cognitive Reserve and Hippocampal Volume on Cognitive Intervention Outcome in Amnesic Mild Cognitive Impairment. *J Alzheimers Dis Parkinsonism.* 2016;6.
14. Jan N, et al. The National Quality Plan and More Caesarean Sections, Less Wound Infections, more Gestational Diabetes (GDM) and Fewer Smokers in Northern Norway: A Registry-based Retrospective Study. *J Preg Child Health.* 2016;3.
15. Arnaud B, et al. Long Read Sequencing Technology to Solve Complex Genomic Regions Assembly in Plants. *Next Generat Sequenc & Applic.* 2016;3.
16. Chief C, et al. Recurrence of Permanent Junctional Re-entry Tachycardia: Indication for Ablation of the Junctional Pathway. *Arrhythm Open Access.* 2016;1.
17. Moniek VH, et al. Patient Characteristics and Clinical Features of Acute Hepatitis E Infection in the South of the Netherlands. *J Gastrointest Dig Syst.* 2016;6.
18. Rochd S, et al. Modelisation of Membrane Distillation: Mass and Heat Transfer in Air Gap Membrane Distillation. *J Membra Sci Technol.* 2016;6.
19. Maria M, et al. A Mental Health and Parenting Intervention for Adolescent and Young Adult Mothers and their Infants. *J Depress Anxiety.* 2016;5.

20. Andrichi E, et al. Psychological Treatment for Headache: A Pilot Study on the Efficacy of Joint Psychoeducational Group and Relaxation Training. *J Neurol Neurophysiol.* 2016;7.
21. Elisabeth G, et al. An Uncommon Cause of Soft Tissue Mass of the Extremities, Report of 2 Cases and Review of Literature of Cystic Echinococcosis. *Primary Health Care.* 2016;6.
22. Roda E, et al. Evaluation of Two Different Screening ELISA Assays for Synthetic Cathinones (Mephedrone/Methcathinone and MDPV) with LC-MS Method in Intoxicated Patients. *J Clin Toxicol.* 2016;6.
23. Christian J, et al. Teacher Team Effectiveness and Teachers Well-being. *Clin Exp Psychol.* 2016;2.
24. Endalu M, et al. Prevalence of Bovine Trypanosomosis and Apparent Density of Tsetse Flies in Eastern Part of Dangur District, North Western Ethiopia. *J Vet Sci Technol.* 2016;7.
25. Elisa Z and Serena Di C. Better Together: Immunotherapy as Future Combination Strategy for Breast Cancer. *Immunother Open Acc.* 2016;2.
26. Marco D'O and Elisa Di G. Uncertainties in Life Cycle Cost Analysis of Buildings Energy Efficiency Measures. 2016;6.
27. Damien LD, et al. Maraviroc Intensification in HIV-1 Infected Patients with Persistent Low-level Viremia. *J AIDS Clin Res.* 2016;7.
28. Kumela L, et al. Prevalence of Small Ruminant Trypanosomosis in Dangur District, Metekel Zone, Benishangul Gumuz Region, North Western Ethiopia. *J Vet Sci Technol.* 2016;7.
29. Ada UC, et al. Compliance Difficulties in Atopic Children, Reflections from an Eczema School in Sweden. *J Clin Exp Dermatol Res.* 2016;7.
30. Elisangela SDOD, et al. Genetic Identification of Necrophagous Insect Species (Diptera) of Forensic Importance Sampled from Swine Carcasses in Mato Grosso, Midwestern Brazil. *J Forensic Res.* 2016;7.
31. Sidse KN, et al. Prepregnancy Body Mass Index and Offspring Birth Weight in Women with Type 1 and Type 2 Diabetes. *J Preg Child Health.* 2016;3.
32. Fabiani C, et al. Changes in BDNF and MAPK Signaling Pathways in Experimental Glaucoma. *J Clin Exp Ophthalmol.* 2016;7.
33. Roberta A, et al. Oxytocin Nasal Spray in the Treatment of Binge Eating Disorder and Obesity: A Pilot, Randomized, Double-Blind Trial. *Clin Pharmacol Biopharm.* 2016;5.
34. Maria PB, et al. Retinal and Optic Disc Alterations in Alzheimers Disease: the Eye as a Potential Central Nervous System Window. *J Alzheimers Dis Parkinsonism.* 2016;6.
35. Alessandra G and Elisabetta T. Adverse Effect of Ocean Acidification on Marine Organisms. *J Marine Sci Res Dev.* 2016;6.
36. Elisa L, et al. Personalized Therapeutic Ultrasound in Shoulder Disease: Multimodal Assessment and Results. *J Nov Physiother.* 2016;6.
37. Tania G, et al. Using Proteomics to Understand Abdominal Aortic Aneurysms: Where Are We. *J Proteomics Bioinform.* 2016;9.
38. Florian W, et al. Radiographically Breedspecific Morphology and Calcifying Tendinopathy in the Iliopsoas Muscle at the Lesser Trochanter in Rottweilers, German Shepherd Dogs and Bavarian Mountain Hounds. *J Veterinar Sci Techno.* 2016;7.
39. MCaroline V, et al. Differential Associations of MMP-2 and MMP-14 with Stromal Amounts and T lymphocyte Presence in Ovarian Cancer. *J Mol Genet Med.* 2016;10.
40. Lorenzo V, et al. Primitive Myeloid Sarcoma of the Breast: A Case Report. *J Clin Case Rep.* 2016;6.
41. Marcella M, et al. Gestational Weight Gain and Changes in Body Composition in Pregnant Women with BMI 25 Kg/m² Undergoing a Healthy Lifestyle Program Starting Early in Pregnancy. *J Obes Weight Loss Ther.* 2016;6.
42. Nicolas B, et al. Movement Smoothness Differentiates Voluntary from Parkinsonian Bradykinesia. *J Addict Res Ther.* 2016;7.
43. Agnese S, et al. Long-term Neuropsychological Outcome and Quality of Life in Perinatal Ischemic Stroke. *J Pediatr Neurol Med.* 2016;1.
44. Giada C, et al. Long Term Survival of a Patient with Metastatic Renal Cell Carcinoma Treated with Half-Dose Pazopanib: A Case Report. *J Clin Case Rep.* 2015;5.
45. Elisabete K, et al. Application of Meditation Techniques in Caregivers of Children and Adolescents with Chronic Kidney Disease on Hemodialysis Therapy. *J Nephrol Ther.* 2016;6.
46. Paolo ELS, et al. Antibiotics Use in Infertile Couples and During ART Procedures: A Review. *JFIV Reprod Med Genet.* 2016;4.

47. Elisabetta R and Persio DB. Colony-Stimulating Factor-1 Receptor in the Polarization of Macrophages: A Target for Turning Bad to Good Ones. *J Clin Cell Immunol.* 2015;6.
48. Keck T, et al. Tolerability and Treatment Effects of Pelargonium sidoides Preparation EPs 7630 in Adults Suffering from Acute Rhinopharyngitis A Prospective, Open-Label Trial. *Altern Integr Med.* 2015;4.
49. Daniele C, et al. A Rapid ELISA Method to Improve the Automated Test Throughput. *J Anal Bioanal Tech.* 2015;13.
50. Juçara Maria de CS, et al. Chlamydia trachomatis Co-infection in HPV Positive Women brings no Additional Risk of High-grade Cervical Intraepithelial Neoplasia. *J Cytol Histol.* 2015;3.
51. Renato CV, et al. Bio-Oil Production by Thermal Cracking in the Presence of Hydrogen. *J Fundam Renewable Energy Appl.* 2015;5.
52. Melese Y and Mesfin M. Competitive Enzyme Linked Immuno-Sorbent Assay (c-ELISA) Based Sero- Prevalence of Bluetongue Virus (BTV) on Small Ruminants in Selected Areas of Wolyita, Southern Ethiopia. *Virol-mycol.* 2015;4.
53. Subrata B and Malay KS. Uncertainty of Measurement for ELISA in a Serological Testing Laboratory. *Immunochem Immunopathol.* 2015;1.
54. Diego C, et al. Determination of Neutral Lipid and Cluster Formation for Screening Neurocognitive Impairment in Human Immunodeficiency Virus Patients. *J AIDS Clin Res.* 2015;6.
55. Teo V, et al. Neurobiological Evidence in Alcohol Addiction Can Help Pharmacological Treatment Personalization. *J Neuropsychopharmacol Mental Health.* 2015;1.
56. Remm E and Goze M. A Class of Nonassociative Algebras Including Flexible and Alternative Algebras, Operads and Deformations. *J Generalized Lie Theory Appl.* 2015;9.
57. Maria EPP, et al. Improvement in Gait Performance after Training Based on Declarative Memory Cues in Patients with Parkinsons Disease: A Randomized Clinical Trial. *J Nov Physiother.* 2015;5.
58. Adriana F and Elisabetta T. Sperm Vacuoles and Reproductive Outcome. *JFIV Reprod Med Genet.* 2015;3.
59. Elisa B, et al. Biological Characterization and In Vitro Effects of Human Concentrated Growth Factor Preparation: An Innovative Approach to Tissue Regeneration. *Biol Med (Aligarh).* 2015;7.
60. Elisabeth BL. Treatment of Multiple Sclerosis in Switzerland and the United States: What can be Learned from our Differences. *J Mult Scler (Foster City).* 2015;2.
61. Afayoa M, et al. Development and Evaluation of an Antigen Capture Enzyme-Linked Immunosorbent Assay (AC-ELISA) for the Diagnosis of African Swine fever. *Virol-mycol.* 2015;4.
62. Dehinenet T, et al. Serological and Molecular Study of Newcastle Disease Virus in Village Chickens in Selected Rift-Valley Areas, Ethiopia. *J Veterinar Sci Technol.* 2015;6.
63. Gallo A and Tosti E. The Ascidian Ciona Intestinalis as Model Organism for Ecotoxicological Bioassays. *J Marine Sci Res Dev.* 2015;5.
64. Jose MSI, et al. New Treatments for Degenerative Tendinopathy, focused on the Region-Specific of the Tendon. *Rheumatology (Sunnyvale).* 2015;6.
65. Elisabetta G, et al. Serological and Molecular Investigations of Babesia Microti in Dogs from Southern Italy. *J Veterinar Sci Technol.* 2015;6.
66. Jaco W, et al. Do Patients with Somatoform Disorders Present with Illusory Mental Health. *J Psychol Psychother.* 2015;5.
67. Eline PM. The Development and Application of ELISA for 3-Indole-Butyric Acid. *Immunochem Immunopathol.* 2015;1.
68. Renata C, et al. Overweight-Obesity Prevalence in Children of North-West Italy: Efficacy of Counselling. *J Gastrointest Dig Syst.* 2015;5.
69. Jose MSI, et al. Ultrasound-Guided EPI® Technique and Eccentric Exercise, New Treatment for Achilles and Patellar Tendinopathy Focused on the Region-Specific of the Tendon. *Orthop Muscular Syst.* 2015;4.
70. Elisabetta V, et al. Human Factors Approach in the Design of an Electronic Medication Management System for Preventing Inpatient Medication Errors. *J Pharmacovigilance.* 2015;2.
71. Paolo ELS, et al. Subspecialty in Reproductive Medicine and Training in Reproductive Endocrinology and Infertility: An International Open Debate. *JFIV Reprod Med Genet.* 2015;3.
72. Maria EP, et al. Heart Assisted Therapy-Self-Regulation (HAT-SR) for Caregivers of Persons with Dementia. *Gerontol Geriatr Res.* 2015;4.

73. Rafael RT, et al. ISS Versus R-ISS for Risk Stratification of Multiple Myeloma Patients undergoing Autologous Stem Cell Transplant. *J Leuk (Los Angel)*. 2015;3.
74. Cinzia B, et al. Cross-Informant Agreement on Preadolescent's Emotional and Behavioral Problems in a Non-Clinical Cohort of Northern Italy Subjects: A Pilot Study. *J Child Adolesc Behav*. 2015;3.
75. Marni B, et al. Sexual Disclosure among College Students in the American Deep South: Toward a Sexuality as Structure Approach. *J Child Adolesc Behav*. 2015;3.
76. Eleonora M, et al. Disentangling the Mechanisms of Radiation-Induced Heart Disease in the Treatment of Breast Cancer. *Transl Med*. 2015;5.
77. Eom Y, et al. The Effect of Ambient Titanium Dioxide Microparticle Exposure to the Ocular Surface on the Expression of Inflammatory Cytokines in the Eye and Cervical Lymph Nodes. *Invest Ophthalmol Vis Sci*. 2016;57.
78. Jehs T, et al. Induction of Chemokine Secretion and Monocyte Migration by Human Choroidal Melanocytes in Response to Proinflammatory Cytokines. *Invest Ophthalmol Vis Sci*. 2016;57.
79. Auer M, et al. Serum Cotinine Does Not Predict Neutralizing Antibodies Against Interferon Beta in an Austrian MS Cohort. *J Interferon Cytokine Res*. 2016;36.
80. Naschberger A, et al. The N14 anti-afamin antibody Fab: a rare VL1 CDR glycosylation, crystallographic re-sequencing, molecular plasticity and conservative versus enthusiastic modelling. *Acta Crystallogr D Struct Biol*. 2016;72.
81. Selcoki Y, et al. Galectin-3: A biochemical marker to detect paroxysmal atrial fibrillation. *Clin Invest Med*. 2016;39.
82. Erdamar H and Cakmak M. Effect of One Unit Blood Donation on Appetite-Related Biomarkers. *Clin Invest Med*. 2016;39.
83. Hosseini RN, et al. Enhanced Immune Responses against HIV-1 with Adenovector (Gag and Tat) Prime/Protein Boost Regimen and GM-CSF Injection. *Iran J Allergy Asthma Immunol*. 2016;15.
84. Zamanzadeh Z, et al. Association of New Putative Epitopes of Myelin Proteolipid Protein (58-74) with Pathogenesis of Multiple Sclerosis. *Iran J Allergy Asthma Immunol*. 2016;15.
85. Vaseghi H, et al. T-helper Cell Type-1 Transcription Factor T-Bet Is Down-regulated in Type 1 Diabetes. *Iran J Allergy Asthma Immunol*. 2016;15.
86. Paknejad M, et al. Relationships between High-mobility Group Protein B1 and Triggering Receptor Expressed on Myeloid Cells Concentrations in Gingival Crevicular Fluid and Chronic Periodontitis. *Iran J Allergy Asthma Immunol*. 2016;15.
87. Mohamadi M, et al. Identification and Characterization of Main Allergic Proteins in Cooked Wolf Herring Fish. *Iran J Allergy Asthma Immunol*. 2016;15.
88. Homayouni V, et al. Preparation and characterization of a novel nanobody against T-cell immunoglobulin and mucin-3 (TIM-3). *Iran J Basic Med Sci*. 2016;19.
89. Habibi P, et al. Involvement of microRNA-133 and -29 in cardiac disturbances in diabetic ovariectomized rats. *Iran J Basic Med Sci*. 2016;19.
90. Wang Z, et al. Association of interleukin 17 / angiotensin II with refractory hypertension risk in hemodialysis patients. *Afr Health Sci*. 2016;16.
91. Hudu SA, et al. Molecular and serological detection of occult hepatitis B virus among healthy hepatitis B surface antigen-negative blood donors in Malaysia. *Afr Health Sci*. 2016;16.
92. Zhu H, et al. CD16+ Monocyte Subset Was Enriched and Functionally Exacerbated in Driving T-Cell Activation and B-Cell Response in Systemic Lupus Erythematosus. *Front Immunol*. 2016;21.
93. Fujioka KM, et al. Hyaluronic Acid Gel-Based Scaffolds as Potential Carrier for Growth Factors: An In Vitro Bioassay on Its Osteogenic Potential. *J Clin Med*. 2016;5.
94. Li N, et al. Coupling Factor 6 Is Upregulated in Monocrotaline-induced Pulmonary Arterial Hypertension in Rats. *Am J Med Sci*. 2016;352.
95. Diego F, et al. Adverse reaction to food screening test: new multiparametric ELISA kit for patients with gastrointestinal symptomatology linked to ingesting food. *World Allergy Organization Journal*. 2015;8.
96. Dary LM, et al. Environmental and occupational respiratory diseases – 1034. A novel ELISA method for the detection of dust mite allergens using IgY technology. *World Allergy Organization Journal*. 2013;6.
97. Nijenhuis S, et al. A rapid ELISA based method to determine peptidyl-arginine deiminase activity in biological samples. *Arthritis Res Ther*. 2003;5.

98. Martie V, et al. Analysis of Pru av 1.0101 protein expression in Prunus avium cultivars with ELISA and liquid chromatography/mass spectrometry. *Clinical and Translational Allergy*.2014;4.
99. Paul TF, et al. Comparison of multiplex, ELISA and immunofluorescence for detecting autoantibodies in JIA patients. *Pediatric Rheumatology*.2012;10.
100. Garnero P, et al. Fecal S100A12 levels measured by a new ELISA are increased in ulcerative colitis (UC) and Crohn's disease (CD) and correlates with intestinal damage. *Journal of Translational Medicine*.2010;8.