Online ISSN : 2249-4618
Print ISSN : 0975-5888
DOI : 10.17406/GJMRA

Global Journal

of Medical Research: D

Radiology, Diagnostic Imaging and Instrumentation

Highlights

- Optic Disc and Blood Vessels
- Review of the Automatic Methods
- Diffusion MRI of Human Brain
- Computed Tomography Examination

Discovering Thoughts, Inventing Future

VOLUME 16 ISSUE 1 VERSION 1.0

Global Journal of Medical Research: D
Radiology, Diagnostic, Imaging and Instrumentation

Global Journal of Medical Research: D
Radiology, Diagnostic, Imaging and Instrumentation

Volume 16 Issue 1 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

*(A Delaware USA Incorporation with "Good Standing"; **Reg. Number: 0423089**)*

Sponsors: Open Association of Research Society
Open Scientific Standards

Publisher's Headquarters office

Global Journals® Headquarters
945th Concord Streets,
Framingham Massachusetts Pin: 01701,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin: 452009, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at *local@globaljournals.org*

eContacts

Press Inquiries: *press@globaljournals.org*
Investor Inquiries: *investors@globaljournals.org*
Technical Support: *technology@globaljournals.org*
Media & Releases: *media@globaljournals.org*

Pricing (Including by Air Parcel Charges):

For Authors:
22 USD (B/W) & 50 USD (Color)
Yearly Subscription (Personal & Institutional):
200 USD (B/W) & 250 USD (Color)

Integrated Editorial Board
(Computer Science, Engineering, Medical, Management, Natural Science, Social Science)

Dr. Bart Lambrecht
Director of Research in Accounting and Finance Professor of Finance
Lancaster University Management School
BA (Antwerp); MPhil, MA, PhD (Cambridge)

Dr. Carlos García Pont
Associate Professor of Marketing
IESE Business School, University of Navarra
Doctor of Philosophy (Management), Massachusetts Institute of Technology (MIT)
Master in Business Administration, IESE, University of Navarra
Degree in Industrial Engineering, Universitat Politècnica de Catalunya

Dr. Fotini Labropulu
Mathematics - Luther College
University of Regina Ph.D., M.Sc. in Mathematics
B.A. (Honors) in Mathematics
University of Windso

Dr. Lynn Lim
Reader in Business and Marketing
Roehampton University, London
BCom, PGDip, MBA (Distinction), PhD, FHEA

Dr. Mihaly Mezei
ASSOCIATE PROFESSOR
Department of Structural and Chemical Biology, Mount Sinai School of Medical Center
Ph.D., Etvs Lornd University
Postdoctoral Training,
New York University

Dr. Söhnke M. Bartram
Department of Accounting and Finance Lancaster University Management School Ph.D. (WHU Koblenz)
MBA/BBA (University of Saarbrücken)

Dr. Miguel Angel Ariño
Professor of Decision Sciences
IESE Business School
Barcelona, Spain (Universidad de Navarra)
CEIBS (China Europe International Business School).
Beijing, Shanghai and Shenzhen
Ph.D. in Mathematics
University of Barcelona
BA in Mathematics (Licenciatura)
University of Barcelona

Philip G. Moscoso
Technology and Operations Management
IESE Business School, University of Navarra
Ph.D in Industrial Engineering and Management, ETH Zurich
M.Sc. in Chemical Engineering, ETH Zurich

Dr. Sanjay Dixit, M.D.
Director, EP Laboratories, Philadelphia VA Medical Center
Cardiovascular Medicine - Cardiac Arrhythmia
Univ of Penn School of Medicine

Dr. Han-Xiang Deng
MD., Ph.D
Associate Professor and Research Department Division of Neuromuscular Medicine
Davee Department of Neurology and Clinical Neuroscience Northwestern University Feinberg School of Medicine

Dr. Pina C. Sanelli
Associate Professor of Public Health
Weill Cornell Medical College
Associate Attending Radiologist
NewYork-Presbyterian Hospital
MRI, MRA, CT, and CTA
Neuroradiology and Diagnostic Radiology
M.D., State University of New York at Buffalo,School of Medicine and Biomedical Sciences

Dr. Roberto Sanchez
Associate Professor
Department of Structural and Chemical Biology
Mount Sinai School of Medicine
Ph.D., The Rockefeller University

Dr. Wen-Yih Sun
Professor of Earth and Atmospheric SciencesPurdue University Director
National Center for Typhoon and Flooding Research, Taiwan
University Chair Professor
Department of Atmospheric Sciences, National Central University, Chung-Li, TaiwanUniversity Chair Professor
Institute of Environmental Engineering, National Chiao Tung University, Hsin-chu, Taiwan.Ph.D., MS The University of Chicago, Geophysical Sciences
BS National Taiwan University, Atmospheric Sciences
Associate Professor of Radiology

Dr. Michael R. Rudnick
M.D., FACP
Associate Professor of Medicine
Chief, Renal Electrolyte and Hypertension Division (PMC)
Penn Medicine, University of Pennsylvania
Presbyterian Medical Center, Philadelphia
Nephrology and Internal Medicine
Certified by the American Board of Internal Medicine

Dr. Bassey Benjamin Esu
B.Sc. Marketing; MBA Marketing; Ph.D Marketing
Lecturer, Department of Marketing, University of Calabar
Tourism Consultant, Cross River State Tourism Development Department
Co-ordinator , Sustainable Tourism Initiative, Calabar, Nigeria

Dr. Aziz M. Barbar, Ph.D.
IEEE Senior Member
Chairperson, Department of Computer Science
AUST - American University of Science & Technology
Alfred Naccash Avenue – Ashrafieh

Contents of the Issue

Global Journal of Medical Research: D
Radiology, Diagnostic Imaging and Instrumentation
Volume 16 Issue 1 Version 1.0 Year 2016
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Computed Tomography Examination Reveals Brain Lesions in Guangzhou AIDS Patients

By Ming-ya Zhang, Meng Liu, Hui Zhao, Song-feng Jiang, Shuai Li, Liang-ping Luo & Xuesong Yang

Medical College, Jinan University

Abstract- Cranial computed tomography (CT) plays an important role in the diagnosis of AIDS. However, our understanding of the CT scan images on the diagnosis or evaluating treatment results has not yet been completed. In this study, we conducted an investigation on the usefulness of cranial CT examination in diagnosing HIV patients. Among them, 34 AIDS patients tested positive for brain lesions indicated by cranial CT scan examination. Patients who had AIDS with brain lesions were primarily diagnosed with tuberculous meningitis (TBM), HIV encephalitis (HIVE), cerebral toxoplasmosis (CT) and cryptococcal meningitis (CM). Furthermore, we thoroughly compared the characteristics of various brain lesions in CT images so that it could be helpful for future diagnoses and treatment evaluations of AIDS with brain lesions. Additionally, we demonstrated that a count of less than 50 CD4+ T lymphocytes primarily occurred in the TBM and HIVE groups, thus resulting in higher mortality.

Keywords: AIDS brain lesions, CT scan, tuberculous meningitis, HIV encephalitis, cerebral toxoplasmosis and cryptococcal meningitis.

GJMR-D Classification : NLMC Code: WN 206

Strictly as per the compliance and regulations of:

Computed Tomography Examination Reveals Brain Lesions in Guangzhou AIDS Patients

Ming-ya Zhang [1#], Meng Liu [2#], Hui Zhao [3], Song-feng Jiang [4], Shuai Li [5], Liang-ping Luo [6] & Xuesong Yang [7]

Abstract- Cranial computed tomography (CT) plays an important role in the diagnosis of AIDS. However, our understanding of the CT scan images on the diagnosis or evaluating treatment results has not yet been completed. In this study, we conducted an investigation on the usefulness of cranial CT examination in diagnosing HIV patients. Among them, 34 AIDS patients tested positive for brain lesions indicated by cranial CT scan examination. Patients who had AIDS with brain lesions were primarily diagnosed with tuberculous meningitis (TBM), HIV encephalitis (HIVE), cerebral toxoplasmosis (CT) and cryptococcal meningitis (CM). Furthermore, we thoroughly compared the characteristics of various brain lesions in CT images so that it could be helpful for future diagnoses and treatment evaluations of AIDS with brain lesions. Additionally, we demonstrated that a count of less than 50 $CD4^+$ T lymphocytes primarily occurred in the TBM and HIVE groups, thus resulting in higher mortality.

Keywords: AIDS brain lesions, CT scan, tuberculous meningitis, HIV encephalitis, cerebral toxoplasmosis and cryptococcal meningitis.

I. Introduction

Acquired immune deficiency syndrome (AIDS) is caused by an infection of the human immunodeficiency virus (HIV); hence, it is also known as HIV disease/infection[1,2]. Since being discovered, AIDS has caused the deaths of millions of people's deaths all over the world. Unfortunately, AIDS is far from stable in the world[3, 4]. In fact, AIDS itself does not cause death; it interferes dramatically with the human immune system because of the progression of the infection, and it causes HIV-infected people to be considerably more susceptible to common infections, thus enhancing mortality in such conditions[5].

The human immunodeficiency virus and acquired immunodeficiency syndrome can result in several types of complications in the central or peripheral nervous system, which comprise nearly 15 to 40 percent of all AIDS or HIV complications[6]. Tuberculous meningitis (TBM) is one of two brain tuberculosis manifestations. The diagnoses of tuberculous meningitis often relies on image features supplied by CT and MR (magnetic resonance) scans; however, it is desirable if a histological examination is available. An operation is required if there is hydrocephalus associated with TBM[7, 8]. HIV encephalitis (HIVE) refers to a complex of neuropathological alterations induced by the infiltration of HIV-infected macrophages in the early stages of HIV infection9, 10. It should be noted that antiretroviral therapy (HAART) has quickly altered HIV related neuropathology and neurological manifestations, which could lead to confusion in the treatment of AIDS[9]. Cryptococcal meningitis (CM) presents in brain lesions of AIDS patients because cryptococcus neoformans tend to be present in cerebrospinal fluid. The manifestations of cryptococcal meningitis are characterized by non-specific symptoms, such as headache, fever, nausea, or altered mental state/behaviour. To confirm the CM diagnosis, a lumbar puncture appears to be vital[11]. Cerebral toxoplasmosis (CT) is one of the most frequent pathogenies that causes brain lesion complication in AIDS patients, especially in developing countries. CT is fatal if not treated properly, although there is possibility for complete recovery as long as the patient is treated legitimately[12, 13].

To diagnose the neurological complications of AIDS, the imaging data supplied by computed tomography (CT) and magnetic resonance (MR) are indispensable. The CT scan is more useful in the diagnosis and evaluation of focal brain lesions, particularly when a MRI facility is not available in under-equipped hospitals. For example, a CT scan is able to specifically diagnose cerebral toxoplasmosis in approximately 80% of cases[14]. The accumulating evidence indicates that by mastering the characteristics of the neurological complications of AIDS in CT scans, we can further diagnose these complications and evaluate treatment results. In this study, we performed an investigation of 35 CT scan images of AIDS patients with neurological complications at the 8th Guangzhou People's Hospital.

II. Materials and Methods

a) Patients

General: From 2004 to 2009, 65 AIDS patients were diagnosed using clinical and laboratory examinations at the 8th Guangzhou People's Hospital. Among the 65

Author 1 6 : The First Affiliated Hospital of Jinan University, Guangzhou, 510630, China. e-mail: tluolp@jnu.edu.cn
Author 2 5 7: Division of Histology and Embryology, Key Laboratory for Regenerative Medicine of the Ministry of Education, Medical College, Jinan University, Guangzhou 510632, China.
e-mail: yang_xuesong@126.com
Author 3 4: The Eighth People's Hospital of Guangzhou, Guangzhou, Guangdong 510060, China.
 # Ming-ya Zhang and Meng Liu Contributed to the work equally.

patients, there were 45 male and 20 female patients, whose ages ranged from 11 to 65 years old; the average age was 39.3 years old. All of the patients were scanned using cranial computed tomography (CT) (MX 8000 CT, Philips).

b) Diagnosis

AIDS diagnosis: AIDS could be diagnosed if the patients had epidemiological history (Table 2), HIV positive results in laboratory examination, and any one of the following: fever for more than one month without specific reason, chronic diarrhoea (>3 times/day) for more than one month, over 10% weight loss within half a year, repeated oral candidiasis, repeated herpes simplex/herpes zoster virus infection, pneumocystis pneumonia, repeated bacterial pneumonia, active tuberculosis/mycobacterium tuberculosis, deep fungal infection, occupancy lesions in the central nervous system, middle-age dementia, active cytomegalovirus infection, toxoplasma cerebropathy, penicillium infection, repeated sepsis and Kaposi's sarcoma in the skin or viscera.

AIDS complication diagnosis: The diagnosis of tuberculous meningitis (TBM), HIV encephalitis (HIVE), cryptococcal meningitis (CM) and cerebral toxoplasmosis (CT) was followed by the respective standards of the Chinese Medical Association Branch of Infection Diseases in 200415.

III. Results

a) General information on patients suffering from AIDS

The 65 patients suffering from AIDS, proven by their clinical and laboratory examination results, were examined using computed tomography (CT) scan at the 8th Guangzhou People's Hospital from 2004 to 2009. Among the 65 AIDS patients, 45 patients are male (69.2%) and 20 patients are female (31.8%). The patients range in age from 11 to 65 years old, and the average age is 39.3 years old (Table 1).

Table 1 : General information about the 65 AIDS patients

Patients	Percentage(%)
Sex	
male	45(69.2%)
female	20(31.8%)
Age group	
(mean 39.3 yrs, range 11-65 yrs)	

b) CT scan indicated that there were various brain lesions in certain AIDS patients

In the 65 patients suffering from AIDS, several AIDS complications, such as tuberculous meningitis (TBM), HIV encephalitis (HIVE), cerebral toxoplasmosis (CT) and cryptococcal meningitis (CM) were presented, and the incidence of these complications were 35.4% (n=23/65) in TBM, 29.2% (n=19/65) in HIVE, 16.9% (n=11/65) in CT and 18.5% (n=12/65) in CM (Figure 1A). Among the same 65 patients who had been diagnosed with AIDS, numerous brain lesions could be seen in the CT scans of 34 patients. They will be denoted as brain lesion positive in the remainder of this report. These brain lesions included low density foci, local mess effect, ventricle extension, hydrocephaly and encephalatrophy, as illustrated in Figure 2A-D. We determined that the CT scan revealed that 53.3% (n=34/65) of the AIDS patients had brain lesions whereas 47.7% (n=31/65) of the patients did not (Figure 1B). In the CT-indicated positive brain lesion cases, there were 50.0% (n=17/34) HIV+TBM, 23.5% (n=8/34) HIVE, 14.7% (n=5/34) HIV+CT and 11.8% (n=4/34) HIV+CM (Figure 1C). Additionally, low density foci was the most predominant syndrome observed in CT scans for patients with AIDS combined with tuberculous meningitis (TBM) (Figure 1A1). Encephalatrophy was the most apparent syndrome observed in CT scans for patients with AIDS combined with encephalitis (HIVE) (Figure 1B1). Furthermore, encephalatrophy was observed relatively more often in CT scans compared to other syndromes in AIDS combined with cryptococcal meningitis (CM) (Figure 1C1). Low density foci and local mess effect were more common syndromes compared to others in AIDS combined with cerebral toxoplasmosis (CT) (Figure 1D1).

Furthermore, we conducted a questionnaire survey on the personal lifestyle of the 34 AIDS patients with CT-indicated brain lesions. Among these patients, 12 visited prostitutes (35.5%), 10 abused drugs (29.4%), 3 possessed multiple sexual partners (8.8%), 4 patients' spouses suffered from AIDS (11.8%), 2 visited prostitutes and abused drugs (5.9%), 2 visited prostitutes and had blood transfusions (5.9%), and 1 abused drugs and had blood transfusions (2.9%) (Table 2).

Table 2 : Epidemiological statistics

History taking	Number	Percentage
visiting prostitutes	12	35.3%
drug abuse	10	29.4%
multiple sexual partner	3	8.8%
spouse with AIDS	4	11.8%
visiting prostitutes & drug abuse	2	5.9%
visiting prostitutes & blood transfusion	2	5.9%
drug abuse & blood transfusion	1	2.9%
total	34	100%

The $CD4^+$ T lymphocyte numbers were counted in the four AIDS complications (TBM, HIVE, CM and CT) (Table 3), in which a $CD4^+$ T lymphocyte count of less than 50 occurred in 61.8% (n=21/34) of AIDS with complications, and they occurred more often in the TBM and HIVE groups; almost none of the complications had $CD4^+$ T lymphocyte numbers higher than 200, thus

suggesting that CD4+ T lymphocyte numbers dramatically reduced after the AIDS infection was combined with these complications.

Table 3 : CD4+ T lymphocyte count

CD4+ count	TBM	HIVE	CM	CT	Total(%)
<50	7	6	4	4	21(61.8%)
100-199	5	1	0	1	7(20.6%)
50-99	3	1	0	0	4 (11.8%)
≥200	2	0	0	0	2 (5.9%)

The combination of AIDS with these complications might increase the death rate of the AIDS patients. Here, we demonstrate that the highest mortality of AIDS patients with those complications occurred in the TBM group (Table 4).

Table 4 : Mortality of AIDS with different brain disease

	TBM	HIVE	CM	CT
number of deaths	4	3	2	1
total	17	8	4	5
mortality	11.8%	8.8%	5.9%	2.9%

IV. Discussion

Neurological complications account for approximately 40–80% of patients with the human immunodeficiency virus (HIV) infection, especially at a higher frequency in the late stages of severe acquired immune deficiency syndrome (AIDS)[16, 17]. To diagnose AIDS-related brain complications, physicians typically use brain imaging information, including internal bleeding, white matter irregularities, and other brain abnormalities based on the patients' medical history and laboratory examination. Furthermore, the diagnosis can be made by combining the general neurological exam to assess various nervous system functions with the brain imaging data, which are primarily supplied by CT and MRI scans. Furthermore, the majority of brain image information is obtained through CT examination due to the expensive costs of MRI examinations in most counties. Thus, precise and thorough CT scans for AIDS-related brain complications are absolutely indispensable. In this study, we conducted cranial CT scans for 65 AIDS patients who visited doctors from 2004 to 2009 at the 8th Guangzhou People's Hospital. A cardinal CT scan revealed that 34 AIDS patients had various brain complications among the 65 patients. Although there were a few differences in the patients' gender and age, we did not determine any significant impact of gender and age difference on the CT scan images of AIDS-related brain complications (Table-1). However, the positive CT scan AIDS complications in epidemiological statistics indicated that 35% of patients had a history of visiting prostitutes, and 29% of patients had a history of drug abuse among the positive CT scan cases, suggesting that visiting prostitutes or abusing drugs certainly enhanced the risk of having AIDS brain complications (Table-2). Clearly, we could also see other factors, such as multiple sexual partners and spouses with AIDS, contribute to AIDS related brain complications.

Out of 65 AIDS patients, the percentages of tuberculous meningitis (TBM), cryptococcal meningitis, cerebral toxoplasmosis (CT) and HIV encephalitis were 35.4%, 18.5%, 16.9% and 29.5%, respectively. Furthermore, the percentages of the percentages of tuberculous meningitis (TBM), cryptococcal meningitis, cerebral toxoplasmosis (CT) and HIV encephalitis became 50.0%, 11.8%, 14.7% and 23.5%, respectively in the 53% of CT scan-indicated AIDS-related brain complications, thus demonstrating that AIDS with tuberculous meningitis (HIV+TBM) accounted for half of the brain complications (Fig. 1). This observation is similar to reports by other authors18. It should be noted that AIDS with brain lesions could present as various clinical manifestations or multiple nervous system manifestations simultaneously, or one clinical manifestation could be derived from different pathogenesis. The primary cause for AIDS patients in later stages to see doctors in this study was because of neurological symptoms induced by AIDS-related brain lesions. There are different image characteristics for various AIDS-related brain lesions in CT scans. Additionally, these image features in the CT scan could be useful for diagnosing different AIDS-related brain lesions. For example, low density foci in a tuberculous meningitis (TBM) CT scan indicates an enlarged brain ventricle, hydrocephaly and encephalatrophy. The CT scan images of HIVE encephalitis (HIVE) indicate the presence of broadening subarachnoid space and bilateral ventriculomegaly. The CT scan images of cryptococcal meningitis (CM) present a significant enhancement of bilateral cerebral hemisphere meninx intensity. Furthermore, more low density foci with adjacent oedema and local mess effect appear in CT scan images of cerebral toxoplasmosis (CT).

Additionally, we determined that the CD4+ T lymphocyte count, one indicator for evaluating HIV infection and treatment effect, dramatically dropped (<50) in the TBM and HIVE groups (Table-3). Similarly, a higher mortality of patients who had AIDS with brain lesions could be found in the TBM and HIVE groups, suggesting that it is noteworthy that our physicians should pay more attention to the progress of AIDS with various brain lesions because they could result in a risk to human life. Clearly, a more precise combination of clinical syndromes and CT scan imaging is required in the future to explore the correlation of the types of AIDS brain diseases and their progress.

Conflicts of interest

The authors declare that there are no conflicts of interest.

V. Acknowledgments

This study was supported by the Chinese outstanding doctors' training program by the Ministry of Education, Guangdong province project of discipline construction & pedagogical reform of high education (2011-473), and the 15th research project of pedagogical reform in Jinan University (2013-47).

Figure Legends

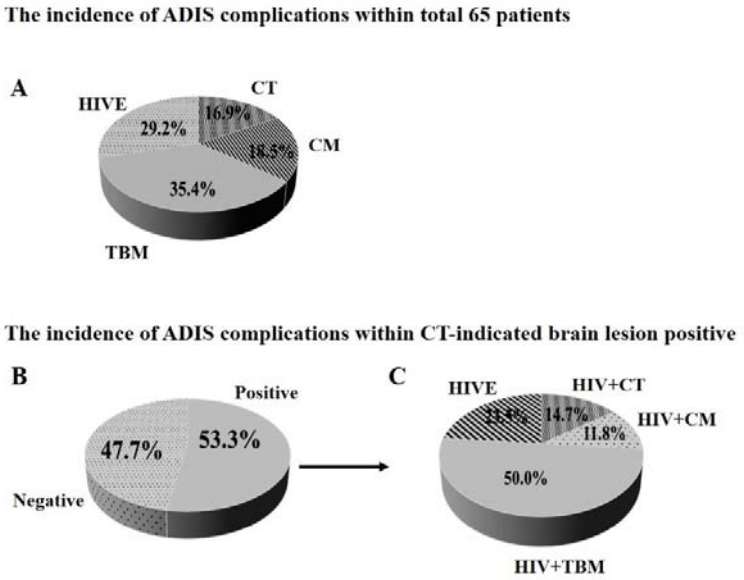


Fig. 1 : Typical CT images for brain lesions in AIDS complication patients

A-D: Typical CT images for brain lesions in AIDS complications, including TBM, CM, HIVE and CT among 65 AIDS patients. A1-D1: The bar charts depict the incidences of brain lesions in AIDS complications, including TBM, CM, HIVE and CT, respectively. Abbreviations: TBM: tuberculous meningitis; CM: cryptococcal meningitis; HIVE: HIV encephalitis; and CT: cerebral toxoplasmosis.

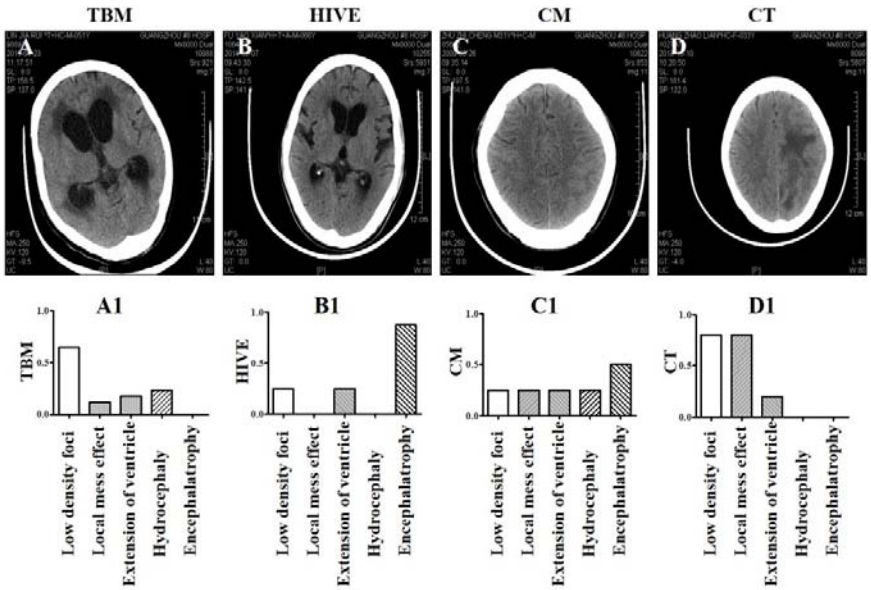


Fig. 2 : Incidences of AIDS complications or CT-indicated brain lesion cases

A: A pie chart depicting the percentage of AIDS complications, including TBM, CM, HIVE and CT in a total of 65 AIDS patients. B: The pie chart depicts the percentage of CT examination-indicated brain lesion negative and positive cases in a total of 65 AIDS patients. C: The pie chart depicts the percentage of AIDS complications, including TBM, CM, HIVE and CT in positive CT examination-indicated brain lesion cases. Abbreviations: TBM: tuberculous meningitis; CM: cryptococcal meningitis; HIVE: HIV encephalitis; and CT: cerebral toxoplasmosis.

References Références Referencias

1. Sepkowitz KA. AIDS--the first 20 years. *N Engl J Med*. 2001; 344: 1764-72.
2. Blair JM, Fagan JL, Frazier EL, et al. Behavioral and clinical characteristics of persons receiving medical care for HIV infection - Medical Monitoring Project, United States, 2009. *MMWR Surveill Summ*. 2009; 63 Suppl 5: 1-22.
3. The 2015 Clinical Guidelines for the Diagnosis and Treatment of HIV/AIDS in HIV-Infected Koreans. *Infect Chemother*. 47: 205-11.
4. Oliveira Rdo S, Benzaken AS, Saraceni V and Sabido M. HIV/AIDS epidemic in the State of Amazonas: characteristics and trends from 2001 to 2012. *Rev Soc Bras Med Trop*. 48 Suppl 1: 70-8.
5. Gallo RC. A reflection on HIV/AIDS research after 25 years. *Retrovirology*. 2006; 3: 72.
6. Newton HB. Common neurologic complications of HIV-1 infection and AIDS. *Am Fam Physician*. 1995; 51: 387-98.
7. Rajshekhar V. Surgery for brain tuberculosis: a review. *Acta Neurochir (Wien)*. 157: 1665-78.
8. Berenguer J, Moreno S, Laguna F, et al. Tuberculous meningitis in patients infected with the human immunodeficiency virus. *N Engl J Med*. 1992; 326: 668-72.
9. Everall IP, Hansen LA and Masliah E. The shifting patterns of HIV encephalitis *neuropathology*. *Neurotox Res*. 2005; 8: 51-61.
10. Dedicoat M and Livesley N. Management of toxoplasmic encephalitis in HIV-infected adults--a review. *S Afr Med J*. 2008; 98: 31-2.
11. van Spil WE, Nooijen S, de Jong PY, Aliredjo RP, de Sevaux RG and Verhave JC. [Cryptococcal meningitis]. *Ned Tijdschr Geneeskd*. 159: A8478.
12. Dannemann B, McCutchan JA, Israelski D, et al. Treatment of toxoplasmic encephalitis in patients with AIDS. A randomized trial comparing pyrimethamine plus clindamycin to pyrimethamine plus sulfadiazine. The California Collaborative Treatment Group. *Ann Intern Med*. 1992; 116: 33-43.
13. Shankar SK, Mahadevan A, Satishchandra P, et al. Neuropathology of HIV/AIDS with an overview of the Indian scene. *Indian J Med Res*. 2005; 121: 468-88.
14. Shyam babu C, Satishchandra P, Mahadevan A, et al. Usefulness of stereotactic biopsy and neuroimaging in management of HIV-1 Clade C associated focal brain lesions with special focus on cerebral toxoplasmosis. Clinical *neurology and neurosurgery*. 115: 995-1002.
15. Wang A. The guidance for ADIS/HIV treatment. *Chinese journal of infectious diseases*. 2006; 02: 133-44.
16. Simpson DM and Tagliati M. Neurologic manifestations of HIV infection. *Ann Intern Med*. 1994; 121: 769-85.
17. Simpson DM, Tagliati M and Ramcharitar S. Neurologic complications of AIDS: new concepts and treatments. *Mt Sinai J Med*. 1994; 61: 484-91.
18. Eze KC and Eze EU. Brain computed tomography of patients with HIV/AIDS before the advent of subsidized treatment program in Nigeria. *Niger Med J*. 53: 231-5.

This page is intentionally left blank

Global Journal of Medical Research: D
Radiology, Diagnostic Imaging and Instrumentation
Volume 16 Issue 1 Version 1.0 Year 2016
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Primary Hydatic Cyst of the Spleen

By Abraham Gampel Cohen, Fabiola Romero Ruperto, Maria Luz Parrra Gordo,
Maria Jesus Sanchez Garcia-Altares, Francisco Javier Gonzalez sendra,
Claudio Laganâ, Josima Luchsinger Heitmann & Estela Bentolila de Gampel

La Princesa University Hospital

Abstract- A 87 years old woman, natural and from a rural area of the province of Cordoba, Spain. Personal history of depressive disorder (treated with lorazepam, bupropion, triazolam and escitalopram), hypertension and transient ischemic attack 10 years ago (in treatment with acetylsalicylic acid) and advanced glaucoma for 4 years (treated with latanoprost and timolol).

Visits with abdominal pain of insidious onset, diffuse, intermittent, with a month of evolution, located in the stomach region without irradiation, associated with nausea and intermittent vomiting. Patient refers long-standing loss of appetite. She denies urinary clinic. The last deposition was 2 days ago, with usual constipated habit.

During the clinical examination she maintains its stable vital functions and remains conscious and oriented. The abdomen is soft and depressible, tenderness in the stomach region to touch without mass or organ enlargement or peristalsis. The rest of the exam without significant alterations.

GJMR-D Classification : NLMC Code: WH 600

PRIMARYHYDATICCYSTOFTHESPLEEN

Strictly as per the compliance and regulations of:

Primary Hydatic Cyst of the Spleen

Abraham Gampel Cohen [α], Fabiola Romero Ruperto [σ], María Luz Parra Gordo [ρ], María Jesús Sánchez García-Altares [ω], Francisco Javier González Sendra [¥], Claudio Laganà [§], Josima Luchsinger Heitmann [χ] & Estela Bentolila de Gampel [ν]

Abstract- A 87 years old woman, natural and from a rural area of the province of Cordoba, Spain. Personal history of depressive disorder (treated with lorazepam, bupropion, triazolam and escitalopram), hypertension and transient ischemic attack 10 years ago (in treatment with acetylsalicylic acid) and advanced glaucoma for 4 years (treated with latanoprost and timolol).

Visits with abdominal pain of insidious onset, diffuse, intermittent, with a month of evolution, located in the stomach region without irradiation, associated with nausea and intermittent vomiting. Patient refers long-standing loss of appetite. She denies urinary clinic. The last deposition was 2 days ago, with usual constipated habit.

During the clinical examination she maintains its stable vital functions and remains conscious and oriented. The abdomen is soft and depressible, tenderness in the stomach region to touch without mass or organ enlargement or peristalsis. The rest of the exam without significant alterations.

The blood count values are: hemoglobin 16.7, VCM 85.7, HCM 28, platelets 302,000, 11,000 leukocytes, neutrophils 78.2%, 16.4% lymphocytes and eosinophils 0.5%. Biochemical values are within normal parameters.

In the posteroanterior and lateral chest radiographs (Figures 1 and 2) can be seen a nodular lesion with left infradiaphragmatic peripheral calcification. In plain abdominal radiography (Figure 3) abundant stool and gas in the colon, distal presence of gas are evident; the presence of a round 5 cm in diameter calcified lesion, located in the left upper quadrant is confirmed.

It is given metamizol, metoclopramide and ranitidine in 100 ml of physiological saline and 0.5 mg sublingual alprazolam. Clinical response is favorable and the pain disappears.

Home treatment consists ina soft laxative diet regimen, chamomile tea, rectal enema to achieve effectiveness, and she is referred to his family physician for control.

A month later, the patient was referred to a doctor specialist in digestive tract with a presumptive diagnosis of calcified hydatid cyst. During the consultation an abdominal ultrasound is done in which was not identified the lesion displayed on the radiograph, so computerized tomography (CT) scan was requested for further study.

The radiologist previously performed a new abdominal ultrasound (Figure 4), confirming the presence of a splenic injury, therefore he completes the study with abdominal CT with and without intravenous contrast. There is confirmation of the presence of a localized mass in the upper pole of the spleen, with rounded morphology, 49 mm in length, heterogeneous solid-cystic, grossly calcified and well-defined edges, which is not enhanced with contrast (Figure 5). The rest of the study does not show significant alterations.

The patient is discharged with a diagnosis of calcified splenic hydatid cyst. Periodic clinical and imaging controls are scheduled.

Author α σ ρ ω ¥ § χ ν: Alto Guadalquivir Hospital, Andújar, Jaen, Spain Primary Care ZBS, Cordoba, Spain La Princesa University Hospital, Madrid, Spain. e-mails: drgampel@hotmail.com, fromeroruperto@gmail.com, lparrag@telefonica.net, gonzalezsendra@yahoo.es, claudiolaga@hotmail.it, joluchsinger@gmail.com, estela_ale@hotmail.com

I. Comment

Hydatid disease is a parasitic zoonosis caused by Echinococcus granulosus. It can affect any organ of the host. Primarily infects the liver (approximately 75% of cases), followed by lung (25%), kidney (4%) and peritoneum (4%); splenic location constitutes 1% of cases.

Due to its low frequency, the clinical diagnosis of splenic hydatid disease can be challenging, especially in non-endemic areas. However, when the size of the cyst is large enough, the patient may feel a painful mass in the left upper quadrant; it can even compress the renal artery and cause systemic hypertension. Sometimes, there can be complications and breakage thereof, accompanied by bleeding or infection later.

Diagnosis is mainly done through Imaging studies (ultrasound or CT). Usually, the image can be described as a single cystic lesion or multiple, well defined. Some show membranes or daughters vesicles inside, or they can present their walls calcified.

Immunological tests are a support for the diagnostic but their efficiency is variable. The most sensitive and specific are ELISA, indirect immunofluorescence and double diffusion arc 5 Capron (DDA5). However, a negative serological result does not exclude infection.

The treatment of choice is surgery, often related with increased risk of complications derived to the cyst breakage, which can produce peritoneal dissemination. Not all cases are eligible for surgery, as our patient, either by baseline conditions of the own patient or the characteristics of the cyst. Calcified cysts (Dead cyst), with diameter less than 5cm, negative serological test and / or casual diagnosis during a radiological study, are sufficient justifications to rule out surgery, but is not anexemption from clinical and radiological control over the years.

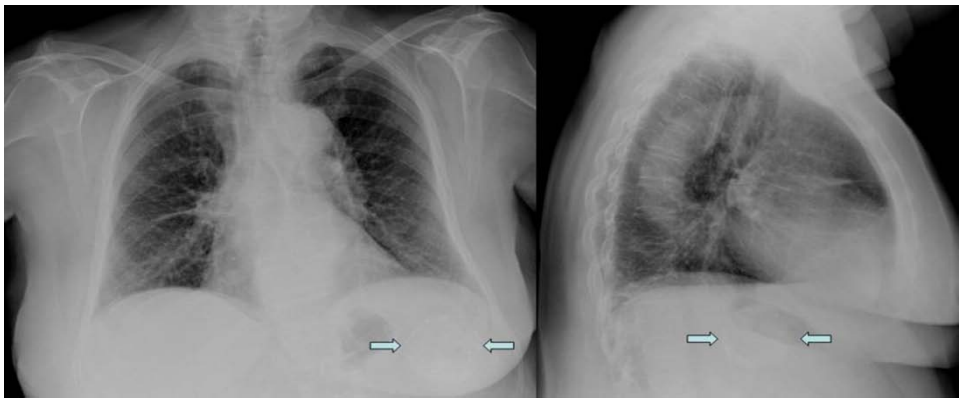


Figure 1 and 2 : Posteroanteriorand lateral chest radiographs. Aleft calcified nodular lesion seen infradiaphragmatic (arrows).

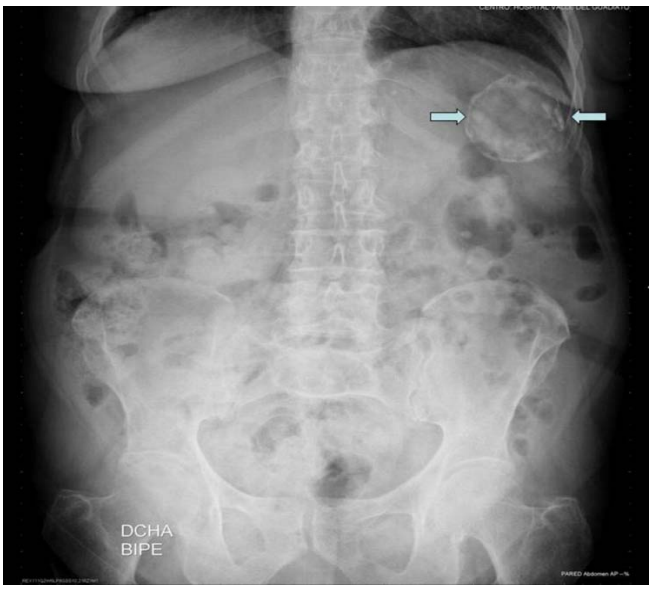


Figure 3 : X-ray of the abdomen. A 5 cm in diameter calcified lesion in the left upper quadrant (arrows).

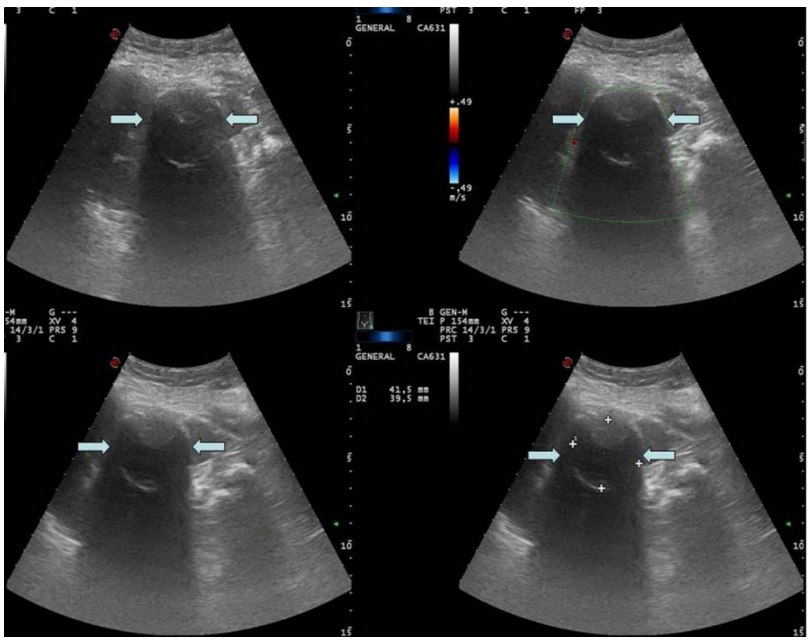


Figure 4 : Abdominal ultrasound. Confirms the presence of an avascular hypoechoic splenic injury with peripheral calcification (arrows).

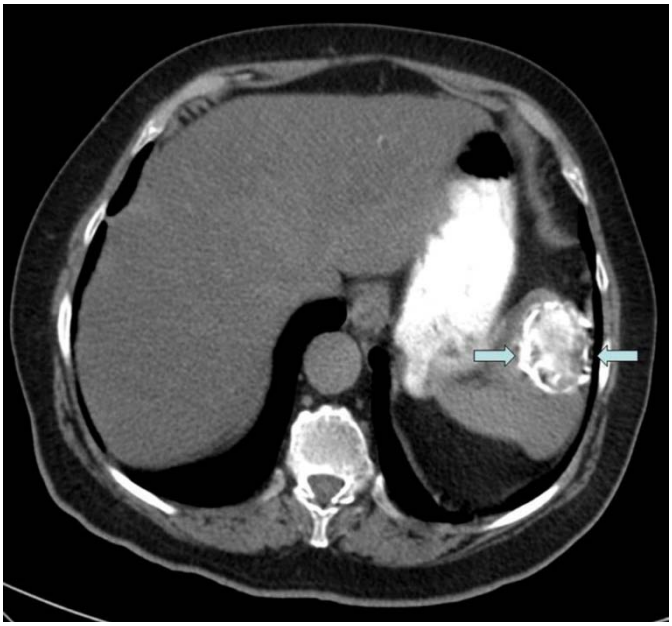


Figure 5 : Abdominal CT scan. Mass in the upper pole of the spleen, of rounded morphology and 49 mm in length, solid-cystic, calcified coarsely edges and well defined (arrows).

Bibliography

1. Polat P, Kantarci M, Alper F, Suma S, Koruyucu MB, Okur A. Hydatid disease from head to toe. Radiographics. 2003; 23: 475–94, quiz 536-7.
2. Kiresi DA, Karabacakoglu A, Odev K, Karaköse S. Uncommon locations of hydatidcysts. Acta Radiol. 2003; 44: 622–36.
3. Cebolero MP, Córdoba E, Escartín J, Cantín S, Artigas JM, Esarte JM. Hydatidcyst of spleen. J Clin Gastroenterol. 2001; 33: 89–90.
4. Celebi S, Basaranoglu M, Karaaslan H, Demir A. A splenic hydatid cyst case presented with lumbar pain. Intern Med. 2006; 45: 1023–4.
5. Ovejero Gómez VJ, Bermúdez García MV, Pérez Martín A, Matute Cuartero MA, Ingelmo Setién A. Quiste hidatídico hepático calcificado: actitud quirúrgica en la práctica actual. Medicina General. 2008; 111: 731–4.

This page is intentionally left blank

Global Journal of Medical Research: D
Radiology, Diagnostic Imaging and Instrumentation
Volume 16 Issue 1 Version 1.0 Year 2016
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Diffusion MRI of Human Brain: Key Points and Innovations

By Alessandro Arrigo MD, Alessandro Calamuneri PhD & Enricomaria Mormina MD

University of Messina

Abstract- MRI-based investigations represent, to date, very powerful approaches for the study of the brain. One set of tools, provided by diffusion MRI, allows the non-invasive analysis of structural aspects of gray and white matter, by analyzing how water molecules diffuse within the brain. Although number of clinical studies employing diffusion MRI has grown in last years, some aspects still result poorly known or poorly understood by unfamiliar researchers and clinicians, due to their technical complexity. The main goal of the present work is to resume the main landmarks of diffusion MRI investigation and to show the current state as well as future perspectives of related methodologies.

Keywords: magnetic resonance imaging, diffusion-weighted imaging, diffusion models, diffusion tensor imaging, constrained spherical deconvolution, tracto-graphy.

GJMR-D Classification : NLMC Code: WL 348

Strictly as per the compliance and regulations of:

Diffusion MRI of Human Brain: Key Points and Innovations

Alessandro Arrigo MD [α], Alessandro Calamuneri PhD [σ] & Enricomaria Mormina MD [ρ]

Abstract- **MRI-based investigations represent, to date, very powerful approaches for the study of the brain. One set of tools, provided by diffusion MRI, allows the non-invasive analysis of structural aspects of gray and white matter, by analyzing how water molecules diffuse within the brain. Although number of clinical studies employing diffusion MRI has grown in last years, some aspects still result poorly known or poorly understood by unfamiliar researchers and clinicians, due to their technical complexity. The main goal of the present work is to resume the main landmarks of diffusion MRI investigation and to show the current state as well as future perspectives of related methodologies.**

Keywords: magnetic resonance imaging, diffusion-weighted imaging, diffusion models, diffusion tensor imaging, constrained spherical deconvolution, tracto-graphy.

I. Introduction

Diffusion MRI (dMRI) represents nowadays a powerful tool for the non-invasive investigation of the brain. It allows to perform both qualitative and quantitative evaluation of brain features as well as of its alterations, with particular regards to white matter ones. All diffusion-based techniques are dedicated to the analysis of signals provided by the diffusion process of water molecules within brain tissues. Goal of this manuscript is two-fold: firstly, we want to provide a summary of the state of the art for researchers unfamiliar with dMRI models and related techniques; secondly, we want to address some of future perspectives in the field.

II. Diffusion Models

Diffusion models consist in a set of algorithms attempting to estimate how water molecules diffuse within each voxel (imaging unit). The mostly known model is diffusion tensor, which is the basis of Diffusion Tensor Imaging (DTI) (Basser et al., 2000); however a cohort of other models which overperform DTI have been developed over the years, such as Q-ball imaging (QBI) (Tuch, 2004), Diffusion Spectrum Imaging (Wedeen et al., 2008), Constrained Spherical Deconvolution (CSD) (Tournier et al., 2007), multi-compartments models (see for instance Panagiotaki et al., 2012). All above mentioned techniques return back a geometrical object (e.g. the tensor for DTI) which encodes diffusion process for each analyzed voxel; the sensitivity as well as the type of information which can be extracted from such objects vary according to the algorithm/model used. Based on these objects, qualitative and quantitative analyses can be performed.

a) Qualitative analysis

One of the most explored applications of diffusion MRI is tractography (Soares et al., 2013), i.e. the reconstruction of the path followed by a given white matter bundle. This can be achieved by means of both deterministic (one direction assigned for each voxel) and probabilistic (the most probable path obtained after a given number of attempts) tractographic algorithms (Soares et al., 2013; Behrens et al., 2007). Tractography reconstruction outcomes strongly rely on the underlying diffusion model used In this context, several issues can affect the reliability of tractographic results, e.g. the presence of voxels with multiple fiber directions (Farquharson et al., 2013). DTI cannot handle multiple fiber directions, as it can only provide a unique diffusion direction. This is the reason why other more advanced approaches outperform DTI based tractography, like CSD (Tournier et al., 2008; Farquharson et al., 2013). An exemplificative case showing how tractographic output can be different according to the model used, namely DTI and CSD, is shown in Figure 1, where corticospinal tract and optic radiations were reconstructed with both methods.

Correspondence Author α: University of Messina, Department of Biomedical Sciences and Morphological and Functional Imaging, Via Consolare Valeria, 1 Messina, 98125, Italy.
e-mail: alessandro.arrigo@hotmail.com
Author σ ρ: Department of Biomedical Sciences and Morphological and Functional Images, University of Messina, Messina, Italy.
e-mails: alecalamuneri@gmail.com, enricomaria.mormina@gmail.com

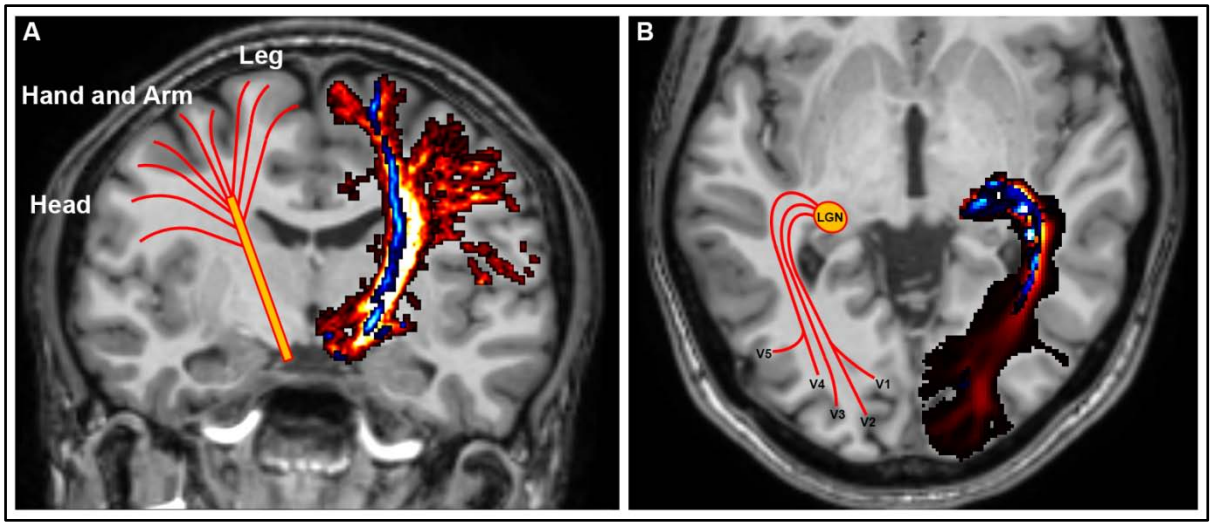


Figure 1 : Tractography of left corticospinal tract (A) and left optic radiations (B). Reconstructions of these two eloquent white matter bundles were obtained by means of probabilistic CSD model (red) and DTI one (blue), which were overlapped in order to show qualitative differences. On the right side, the schematic representation of anatomical features of these bundles, as well as their end points in the cortex, are shown.

b) Quantitative analysis

From each diffusion model a number of useful features can be extracted in a given voxel. Those features can be used to quantify WM and perform investigation both in normal and pathological conditions. It is important to clarify that nature and validity of features extracted depend on a number of factors, e.g. quality of scans used. Here we want however to keep focus on what different diffusion model can offer. If based on tensor model, quantitative analysis can provide information regarding how much anisotropic is the signal within a voxel, through a number of parameters among which fractional anisotropy (FA) and mean diffusivity (MD) are the most used (Soares et al., 2013). Those measures have been considered indirect measures of axonal integrity (Alexander et al., 2007; Soares et al., 2013). Due to the ability of other models to better reconstruct WM bundles, it was suggested to sample tensor features on voxels reached by tractographic reconstructions obtained by other methods, like CSD (Mormina et al., 2014; Arrigo et al., 2014; Mormina et al., 2015; Arrigo et al., 2015; Arrigo et al., 2016).

FA measures level of anisotropy in the voxel: the higher this number, the higher the probability that a single predominant fiber direction is appearing in that voxel. It has to be noticed however that (Jeurissen et al., 2013), if we were to compare FA values obtained by averaging within voxels sampled by means ofCSD-based tractographic reconstruction with the same average performed on the basis of DTI tractography, we would observe a FA reduction. This happens because, with CSD, voxels with multiple dominant fiber directions are involved; as result, water diffusion anisotropy is spread across different directions, and tensor model is able to fit an overall anisotropy decreasing. Due to the huge number of voxels showing this behavior in WM (Jeurissen et al, 2013), new features were developed to the better describe diffusion models. As an example, based on CSD, Apparent Fiber Density (AFD) (Raffelt et al., 2012), was developed to measure contribute of each dominant direction. Figure 2 illustrates the situation.

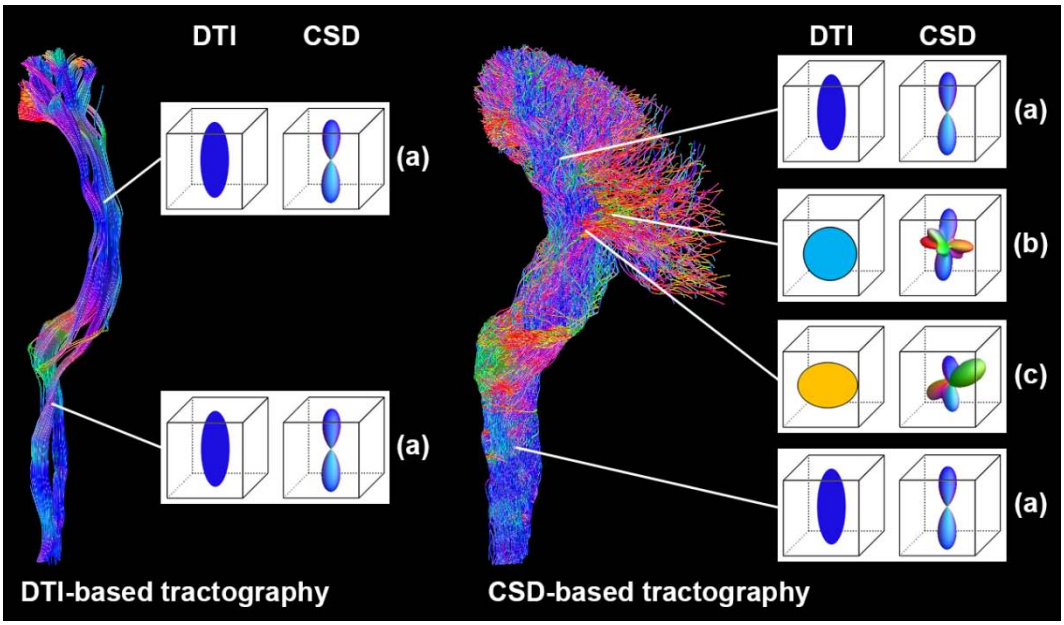


Figure 2 : Tractography of the left corticospinal tract obtained by means of DTI and CSD models. Some exemplificative voxels showed differences regarding calculation of diffusion signals, if using tensor model or CSD, in the following cases: monodirectional (a), multidirectional (b) and crossing fibers (c) voxels. The presence of (b) and (c) affects tensor model, thus causing poor qualitative reconstruction. Moreover, also quantitative analysis is affected, since only voxels with a well-represented principal direction are considered.

III. Limitations, Validations and Future Perspectives

Diffusion MRI results, particularly tractography, are often criticized due to a number of limitations potentially affecting outputs. Moving beyond the intrinsic limitation represented by the impossibility to discriminate directionality of afferent or efferent signal transmission (Parker et al. 2013; Chung et al. 2011), as previously described, tractographic output strongly depends on the algorithm used for diffusion signal modelling (Farquharson et al., 2013).Several inaccuracies caused by possible artefactual effects as well as false positive tracts should be also taken into account (Jones and Cercignani, 2010). Furthermore, since tractography represents the reconstruction of white matter paths provided by a mathematical computation (deterministic or probabilistic), it is often criticized by declaring that dissection is preferable due to its ability to definitely assess the real existence of a given connection. However, a number of studies have validated DTI tractographic output through histological investigations (Seehaus et al., 2013; Gao et al., 2013; Seehaus et al., 2015). The adoption of more advanced algorithms have allowed a better detection of white matter bundles; those techniques have obtained histological validations as well (Dirby et al., 2007; Azadbakht et al., 2015). Recently, in vivo neurite orientation dispersion and density imaging (NODDI) (Zhang et al., 2012) was proposed: this technique allows a multi-compartmental analysis of the brain, i.e. separately considering glial, axonal and extracellular components, thus restituting a detailed profile of brain microstructure. Although technical requirement are not easily reachable, this represents a promising investigative technique for a deeper study of the brain both in healthy and pathological conditions.

Interesting future perspectives will be to make more feasible these innovative approaches for clinical settings as well as to integrate them with other investigative techniques, such as electrophysiology and transcranial magnetic stimulation.

IV. Conclusion

In this paper the main key points of diffusion MRI investigations have been neatly described. We wanted to provide a brief and simplified description of the complex methodological aspects, in order to offer necessary pills for better understanding diffusion-based studies.

References Références Referencias

1. Basser PJ, Pajevic S, Pierpaoli C, Duda J, Aldroubi A.In vivo fiber tractography using DT-MRI data. Magn Reson Med. 2000 Oct; 44(4): 625-32.
2. Tuch DS. Q-ball imaging. Magn Reson Med. 2004 Dec; 52(6): 1358-72.
3. Wedeen VJ, Wang RP, Schmahmann JD, Benner T, Tseng WY, Dai G, Pandya DN, Hagmann P, D'Arceuil H, de Crespigny AJ. Diffusion spectrum magnetic resonance imaging (DSI) tractography of

crossing fibers. Neuroimage. 2008 Jul 15; 41(4): 1267-77. doi: 10.1016/j.neuroimage.2008.03.036
4. Tournier JD, Calamante F, Connelly A. Robust determination of the fibre orientation distribution in diffusion MRI: non-negativity constrained super-resolved spherical deconvolution. Neuroimage. 2007 May 1; 35(4): 1459-72.
5. Panagiotaki E, Schneider T, Siow B, Hall MG, Lythgoe MF, Alexander DC. Compartment models of the diffusion MR signal in brain white matter: a taxonomy and comparison. Neuroimage. 2012 Feb 1; 59(3): 2241-54. doi: 10.1016/j.neuroimage.2011.09.081
6. Soares JM, Marques P, Alves V, Sousa N.A hitchhiker's guide to diffusion tensor imaging. Front Neurosci. 2013 Mar 12; 7: 31. doi: 10.3389/fnins.2013.00031
7. Behrens TE, Berg HJ, Jbabdi S, Rushworth MF, Woolrich MW. Probabilistic diffusion tractography with multiple fibre orientations: What can we gain? Neuroimage. 2007 Jan 1; 34(1): 144-55.
8. Farquharson S, Tournier JD, Calamante F, Fabinyi G, Schneider-Kolsky M, Jackson GD, Connelly A.White matter fiber tractography: why we need to move beyond DTI.J Neurosurg. 2013 Jun; 118(6): 1367-77. doi: 10.3171/2013.2.JNS121294
9. Tournier JD, Yeh CH, Calamante F, Cho KH, Connelly A, Lin CP. Resolving crossing fibres using constrained spherical deconvolution: validation using diffusion-weighted imaging phantom data. Neuroimage. 2008 Aug 15; 42(2): 617-25. doi: 10.1016/j.neuroimage.2008.05.002
10. Alexander AL, Lee JE, Lazar M, Field AS. Diffusion tensor imaging of the brain. Neurotherapeutics. 2007 Jul; 4(3): 316-29.
11. Mormina E, Arrigo A, Calamuneri A, Granata F, Quartarone A, Ghilardi MF, Inglese M, Di Rocco A, Milardi D, Anastasi GP, Gaeta M.Diffusion tensor imaging parameters' changes of cerebellar hemispheres in Parkinson's disease. Neuroradiology. 2015 Mar; 57(3): 327-34. doi: 10.1007/s00234-014-1473-5
12. Arrigo A, Mormina E, Anastasi GP, Gaeta M, Calamuneri A, Quartarone A, De Salvo S, Bruschetta D, Rizzo G, Trimarchi F, Milardi D. Constrained spherical deconvolution analysis of the limbic network in human, with emphasis on a direct cerebello-limbic pathway. Front Hum Neurosci. 2014 Dec 8; 8: 987. doi: 10.3389/fnhum.2014.00987
13. Mormina E, Longo M, Arrigo A, Alafaci C, Tomasello F, Calamuneri A, Marino S, Gaeta M, Vinci SL, Granata F. MRI Tractography of Corticospinal Tract and Arcuate Fasciculus in High-Grade Gliomas Performed by Constrained Spherical Deconvolution: Qualitative and Quantitative Analysis. AJNR Am J Neuroradiol. 2015 Oct; 36(10): 1853-8. doi: 10.3174/ajnr.A4368
14. Arrigo A, Mormina E, Calamuneri A, Gaeta M, Granata F, Marino S, Anastasi GP, Milardi D, Quartarone A. Inter-hemispheric Claustral Connections in Human Brain: A Constrained Spherical Deconvolution-Based Study. Clin Neuroradiol. 2015 Dec 22. [Epub ahead of print]
15. Arrigo A, Calamuneri A, Mormina E, Gaeta M, Quartarone A, Marino S, Anastasi GP, Aragona P. New Insights in the Optic Radiations Connectivity in the Human Brain.Invest Ophthalmol Vis Sci. 2016 Jan 1; 57(1): 1-5. doi: 10.1167/iovs.15-18082
16. Jeurissen B,Leemans A, Tournier JD, Jones DK, Sijbers J.Investigating the prevalence of complex fiber configurations in white matter tissue with diffusion magnetic resonance imaging.Hum Brain Mapp. 2013 Nov; 34(11): 2747-66. doi: 10.1002/hbm.22099
17. Raffelt D, Tournier JD, Rose S, Ridgway GR, Henderson R, Crozier S, Salvado O, Connelly A. Apparent Fibre Density: a novel measure for the analysis of diffusion-weighted magnetic resonance images. Neuroimage. 2012 Feb 15; 59(4): 3976-94. doi: 10.1016/j.neuroimage.2011.10.045
18. Jones DK, Cercignani M. Twenty-five pitfalls in the analysis of diffusion MRI data.NMR Biomed. 2010 Aug; 23(7): 803-20. doi: 10.1002/nbm.1543
19. Seehaus AK, Roebroeck A, Chiry O, Kim DS, Ronen I, Bratzke H, Goebel R, Galuske RA. Histological validation of DW-MRI tractography in human postmortem tissue. Cereb Cortex. 2013 Feb; 23(2): 442-50. doi: 10.1093/cercor/bhs036
20. Gao Y, Choe AS, Stepniewska I, Li X, Avison MJ, Anderson AW. Validation of DTI tractography-based measures of primary motor area connectivity in the squirrel monkey brain. PLoS One. 2013 Oct 1; 8(10): e75065. doi: 10.1371/journal.pone.0075065
21. Seehaus A, Roebroeck A, Bastiani M, Fonseca L, Bratzke H, Lori N, Vilanova A, Goebel R, Galuske R. Histological validation of high-resolution DTI in human post mortem tissue. Front Neuroanat. 2015 Jul 23; 9: 98. doi: 10.3389/fnana.2015.00098
22. Dyrby TB, Søgaard LV, Parker GJ, Alexander DC, Lind NM. Validation of in vitro probabilistic tractography. Neuroimage. 2007;37: 1267-1277.
23. Azadbakht H, Parkes LM, Haroon HA, Augath M, Logothetis NK. Validation of High-Resolution Tractography Against In Vivo Tracing in the Macaque Visual Cortex. Cereb Cortex. 2015; 25: 4299-4309.
24. Roebroeck A, Galuske R, Formisano E, Chiry O, Bratzke H, Ronen I, Kim DS, Goebel R.High-resolution diffusion tensor imaging and tractography of the human optic chiasm at 9.4 T.Neuroimage. 2008 Jan 1; 39(1):157-68.
25. Dell'Acqua F, Simmons A, Williams SC, Catani M. Can spherical deconvolution provide more information than fiber orientations? Hindrance

modulated orientational anisotropy, a true-tract specific index to characterize white matter diffusion. Hum Brain Mapp. 2013 Oct; 34(10): 2464-83. doi: 10.1002/hbm.22080

26. Smith RE, Tournier JD, Calamante F, Connelly A.SIFT: Spherical-deconvolution informed filtering of tractograms. Neuroimage. 2013 Feb 15; 67: 298-312. doi: 10.1016/j.neuroimage.2012.11.049
27. Zhang H, Schneider T, Wheeler-Kingshott CA, Alexander DC.NODDI: practical in vivo neurite orientation dispersion and density imaging of the human brain. Neuroimage. 2012 Jul 16; 61(4):1000-16. doi: 10.1016/j.neuroimage.2012.03.072

Global Journal of Medical Research (D) Volume XVI Issue I Version I Year 2016
16

This page is intentionally left blank

Global Journal of Medical Research: D
Radiology, Diagnostic Imaging and Instrumentation
Volume 16 Issue 1 Version 1.0 Year 2016
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Tunnel Hemodialysis Catheter Placement using the Supra-clavicular Approach to Overcome Stenosis of the Internal Jugular Vein at its Origin

By Magbri A MD, Brandt M CV RT, Mock L RT, Colosimo V RN, Zurawsky R RN & McCartney P BSN, RN

Pine (Partners in Nephrology and Endocrinology), United States

Abstract- A case of ESRD on HD who is referred for placement of tunnel hemodialysis catheter insertion because his arterial-venous fistula is still immature to be used for HD. He had had 3 TDC placed in the right IJ on previous occasions. His angiogram revealed stenosis of the internal jugular vein at its junction with subclavian vein. After 3 failed attempts at right internal jugular vein cannulation the Supraclavicular approach of the SCV cannulation was achieved with ease overcoming the stenosis in the right internal jugular vein.

The case is 68 years Caucasian male with end stage renal disease secondary to renal cell carcinoma and hypertension. He had three tunnel hemodialysis catheters (TDC) placed in the right internal jugular vein and failed radial-cephalic arterial-venous fistula in the left forearm.

Keywords: supraclavicular vein cannulation, end-stage renal disease, tunnel dialysis access, arterial-venous fistula, pneumothorax, subclavian vein.

GJMR-D Classification : NLMC Code: WG 625.J8

Strictly as per the compliance and regulations of:

Tunnel Hemodialysis Catheter Placement using the Supra-clavicular Approach to Overcome Stenosis of the Internal Jugular Vein at its Origin

Magbri A MD [α], Brandt M CV RT [σ], Mock L RT [ρ], Colosimo V RN [ω], Zurawsky R RN [¥] & McCartney P BSN, RN [§]

Abstract- A case of ESRD on HD who is referred for placement of tunnel hemodialysis catheter insertion because his arterial-venous fistula is still immature to be used for HD. He had had 3 TDC placed in the right IJ on previous occasions. His angiogram revealed stenosis of the internal jugular vein at its junction with subclavian vein. After 3 failed attempts at right internal jugular vein cannulation the Supraclavicular approach of the SCV cannulation was achieved with ease overcoming the stenosis in the right internal jugular vein.

The case is 68 years Caucasian male with end stage renal disease secondary to renal cell carcinoma and hypertension. He had three tunnel hemodialysis catheters (TDC) placed in the right internal jugular vein and failed radial-cephalic arterial-venous fistula in the left forearm. He had recently placed brachial-cephalic AVF in the left arm which was not matured to be used in HD. He was referred to the Dialysis Access Center of Pittsburgh, PA for placement of right internal jugular vein tunneled hemodialysis catheter. Three attempts were made to place TDC in the right IJ vein were without avail due to stenosis in the origin of the right IJ at its junction with the sub-clavian vein as illustrated in the angiogram. A decision was made to place the TDC using the supra-clavicular approach as described below to overcome the stenosis in the right IJ. The procedure was accomplished without difficulty using the ultra-sound- guided cannulation of the subclavian vein and the supra-clavicular approach. Supra-clavicular placement of tunnel dialysis catheter is easy and safe method to overcome stenosis in the internal jugular vein.

Keywords: supraclavicular vein cannulation, end-stage renal disease, tunnel dialysis access, arterial-venous fistula, pneumothorax, subclavian vein.

I. Sedation

- Explain the procedure, benefits, risks, and complications, and obtain signed informed consent.
- Sedate the patient using versed and fentanyl injected into the central veins. Vital signs were monitored by the nurse for the entire period of the procedure.

II. Technique

- The skin at the cannulation site is infiltrated with local anesthesia (1% lidocaine), then using real time ultra-sound guidance, the subclavian vein (SCV) was cannulated using a 45° bisection of the approximately 90° angle formed by the superior aspect of the clavicle and the lateral border of the sternocleidomastoid.
- Under continuous aspiration with the syringe the needle is directed parallel to the chest wall in the coronal plane aiming for the contra- lateral nipple or the supra-sternal notch 10-15° to the sagittal plane and 35° posteriorly from the coronal plane (1, 2).
- When blood is freely aspirated the 0.018 inch guide wire was inserted in the needle and then co-axial 3 and 5 Fr dilators were placed. The puncture site to the SCV is achieved easily using the direction explained earlier, 1.5 cm lateral to the heads of the sternocleidomastoid muscle and about 1 cm above the clavicle.
- The 0.018 wire is advance into the vein and the needle is exchanged for the co-axial dilators. A 0.035 inch Bentson (Merit-Medical system Inc Jordan, Utah, USA) guide wire is placed with its distal tip in the inferior vena cava under fluoroscopy.
- A 1 cm incision was made at the venotomy site and the area was bluntly dissected with a pair of hemostat. A tunnel was created following a subcutaneous infiltration with 1% lidocaine along the expected course of the tunnel. The tunnel should be at least 8-10 cm in length. A # 11 blade is used to create a 5 mm incision on the chest wall at the desired entry site on the chest.
- The tunnel was then dilated with a pair of hemostat as well as the catheter-tunnelet combination from the exit site towards the venotomy site.
- The desired catheter length was advanced from the exit site in the anterior chest wall to the venotomy site and the SVC under direct fluoroscopy without the peel-away sheath.
- The tip of the catheter is placed between the junctions of the SCV with the right atrium. Making sure there is no evidence of malposition, kinks of the catheter or complication.
- The catheter ports are then tested by flushing them with 10cc syringe. The ports of the catheter are flushed with heparin and the catheter was sutured in place with 2-0 non-absorbable suture.

Author α σ ρ ω ¥ §: Dialysis Access Center of Pittsburgh, PA.
e-mail: elmagbri@hotmail.com

III. Complications and Advantages of the Supra-clavicular Approach for Tunnel Hemodialysis Catheter Insertion

1. The rate of all procedure- related complications has dropped significantly with image-guided insertion. Arterial puncture (0.8-3.36%), pneumothoraces (0.48-0.56%), and catheter malpositioning are virtually non-existing with image guided insertion (3-12).
2. Venous laceration that often occurs with the traditional method can also happen in this approach. Puncture or laceration of the subclavian artery is theoretical possibility. Also this approach should be avoided in patients who are anticoagulated because the subclavian vein cannot be compressed.
3. The supra-clavicular approach is easy to accomplish and avoids stenosis at the origin of the internal jugular vein as in this case. It is underused procedure for gaining access to the central veins. It offers several advantages over the other methods because the SCV at the insertion site is quite superficial and the right side offer straight path to the SCV. In obese patients this anatomical area is less distorted.
4. Air embolism is caused by the negative intra-thoracic pressure created with the inspiration into an open hub. Placing the patient in Trendelenburg position and making sure the hubs are always occluded would lower this risk.
5. The overall complication rate is significantly less compared to the other methods (4). The success rate is 92% as reported by Czamik et al (6) even in those being mechanically ventilated. The use of the US guidance to locate the vessel prior to cannulation remains an option and lessens the complication rate (7-10).

References Références Referencias

1. Jung CW, Seo JH, Lee W, et al. A novel Supra-clavicular approach to the right subclavian vein based on three-dimensional computed tomography. Anesth Analg. 2007 Jul 105(1): 200-204
2. Mansfield PF, Hohn DC, Fomage BD, et al. Complications and failures of subclavian vein catheterization. N Eng J Med 1994Dec 29; 331(26): 1735-38
3. Nevarre DR, Domingo OH. Supraclavicular approach to subclavian catheterization: review of the literature and results of 178 attempts by the same operator. J Trauma 1997 Feb 42(2): 305-309
4. Muhm M, Sunder-Plassmann G, Apsner R, et al. Supraclavicular approach to the subclavian/ innominate vein for large –bore central venous catheters. Am J Kidney Dis 1997 Dec 30(6): 802-808
5. McGee DC, Gould MK. Preventing complications of central venous catheterization. N Eng J Med 2003 Mar 20; 348(12): 1123-33
6. Czamik T, Gawda R, Perkowski T, Weron R. Supraclavicular approach is an easy and safe method of subclavian vein catheterization even in mechanically ventilated patients: analysis of 370 attempts. Anesthesiology. 2009 Aug; 111(2): 334-339
7. Bertini P, Frediani M. Ultrasound guided Supra-clavicular central vein cannulation in adults: a technical report. J Vasc Access 2013 Jan-Mar 14(1): 89-93
8. Guilbert AS, Xavier L, Ammouche C, et al. Supra-clavicular ultrasound guided catheterization of the subclavian vein in pediatric and neonatal ICUs: a feasibility study. Pediatr Crit Care Med. 2013 May 14(4): 351-355
9. Byon HJ, Lee GW, Lee JH, et al Comparison between ultrasound-guided Supraclavicular and infraclavicular approaches for subclavian venous catheterization in children-a randomized trial. Br J Anaesth. 2013 Nov 111(5): 788-92
10. Patrick SP, Tijunelis MA, Johnson S, et al. Supra-clavicular subclavian vein catheterization: the forgotten central line. West J Emerg Med. 2009 May; 10(2): 110-114
11. Elliott TS, Faroqui MH, Armstrong RF, et al. Guidelines for good practice in central venous catheterization. Hospital Infection Society and the Research Unit of the Royal College of Physicians. J Hosp Infect. 1994 Nov 28(3): 163-76
12. Timsit JF, Farkas JC, Boyer JM, et al. Central vein catheter-related thrombosis in intensive care patients: incidence, risk factors, and relationship with catheter-related sepsis. Chest. 1998 Jul 114(1): 207-213.

Global Journal of Medical Research: D
Radiology, Diagnostic Imaging and Instrumentation
Volume 16 Issue 1 Version 1.0 Year 2016
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Optic Disc and Blood Vessels Screening in Diabetes Mellitus using Otsu's Method

By Ms. Jyoti Patil & Dr. S.R. Chaudhari
Pratibha Senior College

Abstract- Diabetes Mellitus (DM) has type-1 & type 2. So in diabeties type-2 is very severe disease which creates complications and effect on various part of body. Most sensitive part of body is Eye which is affected by DM responsible in progression of Diabetic Retinopathy (DR). DR is a slowly effects on eye & come to focus when the changes on the retina have progressed to a level at which treatment turns complicate, so an early diagnosis and referral to an ophthalmologist or optometrist for the management of this disease can prevent 98% of severe visual loss. The aim of this work is to automatically identify Diabetic Retinopathy (DR), and Background Retinopathy using fundus images. Our results show a classification accuracy of 92%, with sensitivity and specifity of 95%.

Keywords: diabetic retinopathy, thresholding, otsu.

GJMR-D Classification : NLMC Code: WK 810

Strictly as per the compliance and regulations of:

Optic Disc and Blood Vessels Screening in Diabetes Mellitus using Otsu's Method

Ms. Jyoti Patil [α] & Dr. S.R. Chaudhari [σ]

Abstract- Diabetes Mellitus (DM) has type-1 & type 2. So in diabeties type-2 is very severe disease which creates complications and effect on various part of body. Most sensitive part of body is Eye which is affected by DM responsible in progression of Diabetic Retinopathy (DR). DR is a slowly effects on eye & come to focus when the changes on the retina have progressed to a level at which treatment turns complicate, so an early diagnosis and referral to an ophthalmologist or optometrist for the management of this disease can prevent 98% of severe visual loss. The aim of this work is to automatically identify Diabetic Retinopathy (DR), and Background Retinopathy using fundus images. Our results show a classification accuracy of 92%, with sensitivity and specifity of 95%.

Keywords: diabetic retinopathy, thresholding, otsu.

I. Introduction

The Diabetes Mellitus (DM) is nothing but it is a set of chronic and degenerative disorders that involves alterations in the metabolism of carbohydrates, lipids, and proteins, as a consequence of a decreasing in the production of the hormone insulin for the β cells from the pancreas, and a resistance to the hormone's action in the different tissues [1]. One of the most serious complications of the DM is the DR [2], which is the main cause of worldwide blindness in the economically active population, because it affects people between 20 to 74 years old [3, 4]. Two types of clinical DR exist: Non-Proliferative Diabetic Retinopathy (NPDR), also called Background Retinopathy and Proliferative.

Diabetic Retinopathy (DR), this work aims to detect the optic disc (OD) and the blood vessels; these are very important & sensitive part from anatomy of eye. Also, the optic disc and the exudates are the bright area of the image. Detection of optic disc and the blood vessels can help the ophthalmologists to detect the diseases earlier and faster. With help of using mathematical morphology methods such as closing, filling, morphological reconstruction and Otsu algorithm Optic disc and the blood vessels can be detected and eliminated.

Main cause of Diabetic Retinopathy is increase in high sugar level in the small blood vessels in retina. This increase in glucose level attacks on tiny blood vassals and optic disk in eye causes increase in ocular pressure in eye. Due to increase in pressure vassals may leak, or swelling may be observed in severe stage of retinopathy.

We in this research work using the screening method of diabetic retinopathy which can reduce the risk of blindness by 50% [1]-[2]. Therefore, early detection could reduce the severity of the disease and treating the disease more efficiently. It is very important to detect the optic disc so that after optic disk detection we can identify the other fundus features. The optic disc looks like as the elliptical shape in the eye fundus image. Its size varies from human eye to eye, between one-tenth and one-fifth of the image [3]. In color image, it appears as the bright yellowish region as the exudates. The optic disc is the normal feature of the image but the exudates are the abnormal case. Detection the optic disc can be used to reduce the false positive in the detection of the exudates [4] [5].

A number of methods for optic disc detection and blood vessels detection have been published. Osareh et al. [6] located the optic disc center by means of template matching and extracted its boundary using a snake initialized on a morphologically enhanced region of the optic disc. Lowell et al. [7] also localized the OD by means of template matching as well as also selected a deformable contour model for its segmentation. Another deformable model-based approach was presented in [8]. Another template-matching approach for OD segmentation is the Hausdorff-based template matching presented by Lalonde et al. [9]. Initially, they determined a set of OD candidate regions by means of multi resolution processing through pyramidal decomposition. For each OD region candidate, they calculated a simple confidence value representing the ratio between the mean intensity inside the candidate region and inside its neighborhood. As final step, using the Hausdorff distance between the edge map regions and circular templates with different radii, they decided the OD among all the candidates. There are some methods for blood vessels detection in retinal fundus images such as region growing technique [10], morphological and thresholding techniques [11], neural network based approaches [12], statistical classification based methods [13-14] and hierarchical methods [12].

We introduce different algorithms. Our work has explain about two methods of the optic disc detection and blood vessels detection like Otsu's thresholding method based on mathematical morphology on the

Author α: P D E A's Baburaoji Gholap College, Sangvi, Pune-411057 India. e-mail: jyot.physics@gmail.com
Author σ: Department of Physics, P D E A's Baburaoji Gholap College, Sangvi, Pune-27. e-mail: shar_chaudhari@yahoo.co.in

fundus images because it requires lower computing time. In second of filtering we have removed a Noise of grayscale image & then applied adaptive Averaging filter by estimating the local mean and variance around area of detection in which we can detect each pixel. The detail of pre -processing steps and detection of optic disc are described below.

II. Otsu's Method of Thresholding

We have removed a Noise of grayscale image & then applied adaptive Averaging filter to detect Optic Disk & Blood Vessals; by estimating the local mean and variance around each pixel, then selected damage nerve fibers & optic disk using otsu's Method. Otsu's thresholding method is based on selecting the lowest point between two classes (peaks). Frequency and Mean value:

Frequency:

$$\omega = \sum_{i=0}^{T} P(i) \qquad P(i) = n_i / N$$

Mean:

$$\mu = \sum_{i=0}^{T} iP(i) / \omega$$

N: total pixel number, ni: number of pixels in level i Analysis of variance (variance=standard deviation-2) Total variance.

$$\partial_i^2 = \sum_{i=0}^{T} (i - \mu)^2 P(i)$$

Between-classes variance (δb2): The variation of the mean values for each class from the overall intensity mean of all pixels:

$$\delta b2 = \omega 0\ (\mu 0 - \mu t)\ 2 + \omega 1(\mu 1 - \mu t)\ 2,$$

Substituting $\mu t = \omega 0\ \mu 0 + \omega 1 \mu 1$, we get:

$$\delta b2 = \omega 0 \omega 1(\mu 1 - \mu 0)2$$

ω0, ω1, μ0, μ1 stands for the frequencies and mean values of two classes, respectively. The criterion function involves between-classes variance to the total variance is defined as:

All possible thresholds are evaluated in this way, and the one that maximizes η is chosen as the optimal threshold.

III. Algorithm for Otsu's Method

Step 1: Convert the RGB values in Grayscale values

Step 2: Use a 2-D Laplacian of the Gaussian

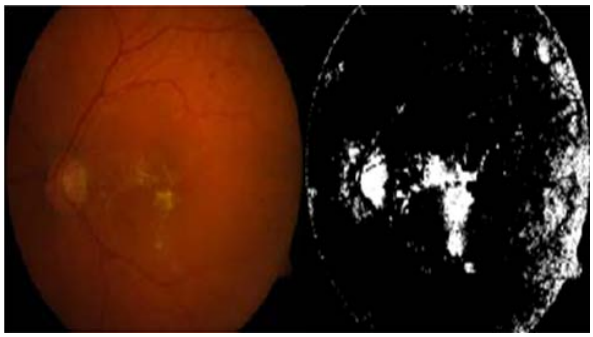
Step 3: Convolving the image with output from kernel

Step 4: Subtract the image with a constant value to reduce noise.

Step 5: Noise removal by adaptive wiener filtering by estimating the local mean and variance around each pixel.

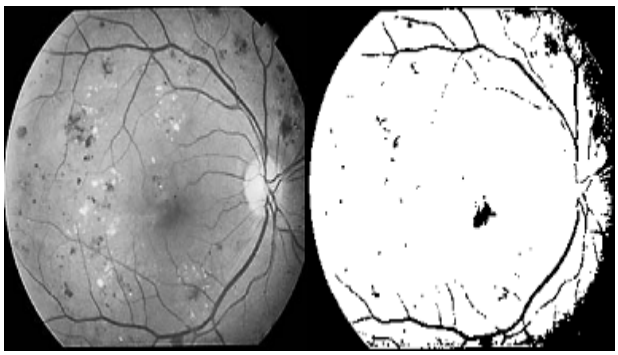
Step 6: Apply Averaging filter to remove noise of the image in two dimensions & to detect Optic Disk & Blood Vessals.

Step 7: Compute a global threshold to convert an intensity image to a binary image. By normalized intensity value that lies in the range [0, 1].



(a) (b)

Fig.1 : (a)Original diabetic Infected image, b)clearly Shows damaged optic disk.after application of ostu's method



(C) (D)

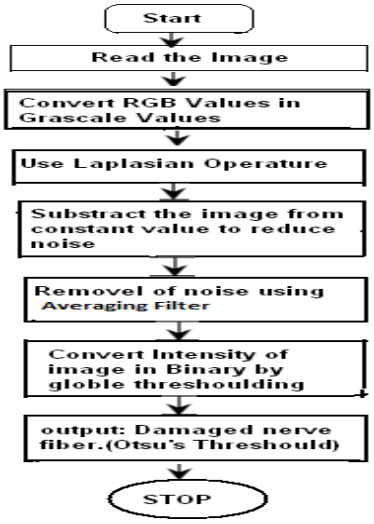
Fig. 2 : Shows Damaged Nerve fibers with dameged optic disk by application of Otsu's method

IV. Blood Vessels Detection and Elimin Ation

Blood vessels are the normal features of the retinal images. So the blood vessels detection and elimination is also important. The general flow chart of the blood vessels detection is shown in Fig.7. To detect the blood vessels, first the input image is converted into grayscale image due to strengthen the appearance of the blood vessels. Then Laplacian operator is applied.

Then the median filtering and the CLAHE techniques are used for reducing noise and image enhancement purposes. Then, the closing and the filling operators are used to close the same intensity values and fill the holes in the vessels.

V. Flowchart for Otsu's Method



a) Thresholding

The Otsu's thresholding technique is applied to the image to detect the desire area. Equations of Otsu algorithm is

$$\sigma^2_{Between}(T)=w_B(T)w_o(T)[\mu_B(T)-\mu_o(T)]^2$$

$$w_B(T)=\sum_{i=0}^{T-1} p(i) \quad , \quad \mu_B=\sum_{i=0}^{T-1}\left(\frac{ip(i)}{p(i)}\right)$$

$$w_0(T)=\sum_{i=T}^{L-1} p(i) \quad , \quad \mu_O=\sum_{i=T}^{L-1}\left(\frac{ip(i)}{p(i)}\right)$$

- $\sigma^2_{Between}(T)$= Between-class variance
- w=weight, B=background of the image, o=object of image
- μ= combined mean,
- T= threshold value

The optic disc is the largest and brightest region of the image. The optic disc detection is useful because it can reduce the false positive detection of the exudates. Fig.5 shows the general flow chart of the optic disc detection.

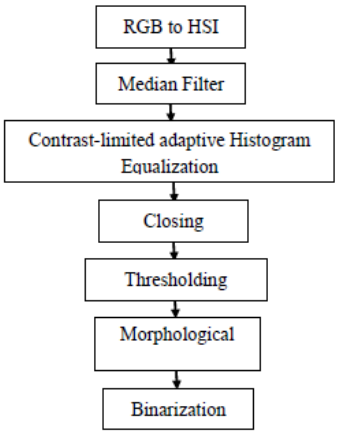


Fig. 5 : Flow Chart of disc Detection

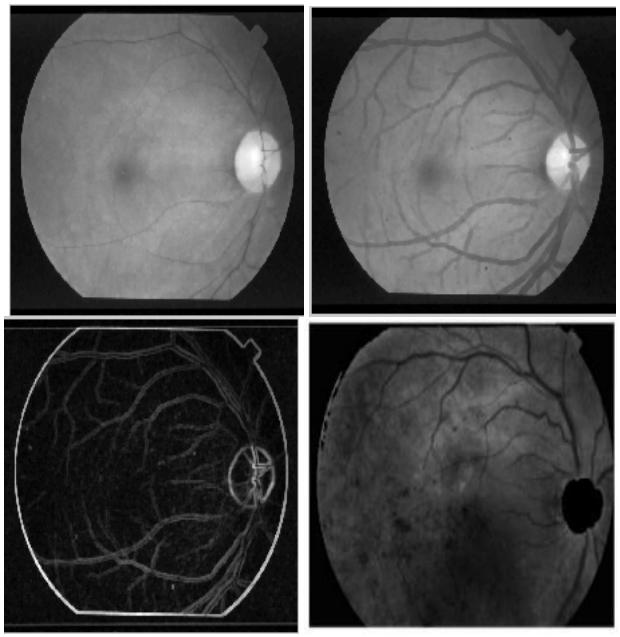


Fig. 6 : (a) Closing (b) Thresholding (c) Filling (e)(d) Reconstruction

b) Detected Optic disc

The closing (morphology) operator is useful in detection of vessels. While using closing operator it is important to select structuring element. The closing is a dilation followed by erosion that joins the very close objects together. Then, the result image is binaries by thresholding using Otsu algorithm [16]. The result image is shown in Fig.6 (b).The filling operator is applied to fill the holes in the image and the result image is shown in Fig.6 (c). The result image is reconstructed by using the morphology reconstruction and is shown in Fig.6 (d). To detect the optic disc region, the Otsu algorithm is applied on the difference between the original image and the reconstructed image. The optic disc detected area is shown in Fig.6 (e). The results of the optic disc detection are shown in Fig.6 (a), (b), (c), (d) and (e). Fig.6 (a) shows the result of the closing operator

VI. Averaging Filter

It is necessary to remove grain noise from image of retina to get selected part of optic disk & vassals from a photograph. Each pixel gets set to the average of the pixels in its neighborhood. The result of the averaging filter is shown in Fig.5 (b).

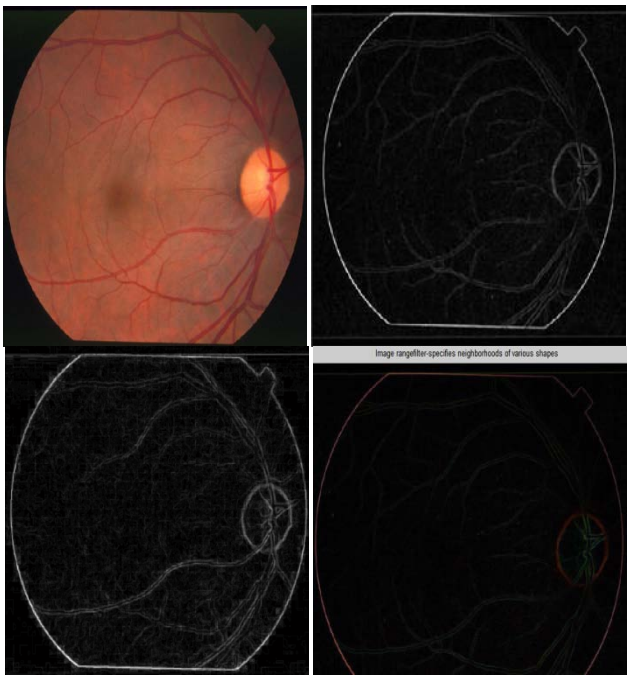


Fig. 5 : (a) original Image

Fig. 5 : (b) Result of averaging filter

VII. Result & Discussion

Otsu's method is used to detect damaged optic disk & damaged nerve fibers.

For which 1) we compute a mean value of colors with maximum intensity by applying a global threshold to convert an intensity image to a binary image. By normalized intensity value that lies in the range [0, 1].

2) We have removed a Noise of grayscale image & then applied adaptive wiener filtering & by median filter; by estimating the local mean and variance around each pixel. Thus as shown in figure (1 & 2) only selected damage nerve fibers & optic disk is observed.

References Références Referencias

1. Organización Mundial de la Salud. Diabetes. Nota descriptiva N.° 312. Available on: http://www.who.int/mediacentre/factsheets/fs312/es/index.html Accessed: October 9, 2014.
2. R. Frank. "Diabetic Retinopathy". The New England Journal of Medicine. Vol. 350. 2004. pp. 48-58.23. N. Otsu. "A Threshold Selection Method from Gray-Level Histograms". IEEE Transactions on Systems, Man and Cybernetics. Vol. 9. 1979. pp. 62-66.
3. Bill Silver, "An Introduction to Digital Image Processing", Cognex Corporation, Modular Vision Systems Division, 2000.
4. Mr. R. Vijayamadheswaran, Dr. M. Arthanari, Mr. M. Sivakumar," Detection of Diabetic Retinopathy using Radial Basis Function", Doctoral Research Scholar, Anna University, Coimbatore.
5. Ma, L., Tan, T., Wang, Y., Zhang, D.: "Personal Recognition Based on Iris Texture Analysis", IEEE Trans. Pattern Analysis and Machine Intelligence, 25 (12) (2003) 1519–1533.
6. Zhu, X., Liu, Y., Ming, X., Cui, Q.: "A Quality Evaluation Method of Iris Images Sequence Based on Wavelet Coeffi-cients in 'Region of Interest'", Proc. of the 4th Int. Conf. on Computer and Information Technology, pp. 24-27, 2004.
7. Big Fang, Wynne, HsuMong Li Lee'" On the Detection of Retinal Vessels in Fundus Images", Singapore-MIT
8. Alliance, National University of Singapore, Department of Computer Science, School of Computing National University of Singapore.
9. Iqbal, M.I, Aibinu, A.M, Gubbal, N.S. Khan, "Automatic Diagnosis of Diabetic Retinopathy using Fundus Images", Masters Thesis Blekinge Institute of Technology October 2006
10. Jing Wan, Xiaofu He, Pengfei Shi," An Iris Image Quality Assessment Method Based on Laplacian of Gaussian Operation", Institute of Image Processing and Pattern Recognition, MVA2007 IAPR Conference on Machine Vision Applications, May 16-18, 2007, Tokyo, JAPAN.
11. VIII. www.utdallas.edu/~dxa081000/IMAGEFILTERING.ppt

Global Journal of Medical Research: D
Radiology, Diagnostic Imaging and Instrumentation
Volume 16 Issue 1 Version 1.0 Year 2016
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

A Review of the Automatic Methods of Cancer Detection in Terms of Accuracy, Speed, Error, and the Number of Properties (Case Study: Breast Cancer)

By Jalilvand Farnaz
Tehran University

Abstract- The purpose of this article is a review of the automatic methods of cancer detection in terms of accuracy, speed, error, and the number of properties and we have selected the breast cancer as the subject of the case study.

The data used in this academic study area courtesy of the UCI in California. This database is called The Wisconsin Breast Cancer Datasets and includes 699 data units divided into benign and malignant classes. Ten properties were assigned to each datum. Four types of algorithms are used in this article, namely, classification algorithms, vector machine algorithms, neural networks algorithms, and data mining algorithms. Each category was evaluated separately and the best method in each category was identified in terms of accuracy, speed, error, and the number of properties.

Keywords: automatic methods of cancer detection, breast cancer, classification algorithms, vector machine algorithms, neural network algorithms, dat ining algorithms.

GJMR-D Classification : NLMC Code: WN 180

Strictly as per the compliance and regulations of:

A Review of the Automatic Methods of Cancer Detection in Terms of Accuracy, Speed, Error, and the Number of Properties (Case Study: Breast Cancer)

Jalilvand Farnaz

Abstract- The purpose of this article is a review of the automatic methods of cancer detection in terms of accuracy, speed, error, and the number of properties and we have selected the breast cancer as the subject of the case study.

The data used in this academic study area courtesy of the UCI in California. This database is called The Wisconsin Breast Cancer Datasets and includes 699 data units divided into benign and malignant classes. Ten properties were assigned to each datum. Four types of algorithms are used in this article, namely, classification algorithms, vector machine algorithms, neural networks algorithms, and data mining algorithms. Each category was evaluated separately and the best method in each category was identified in terms of accuracy, speed, error, and the number of properties.

Keywords: automatic methods of cancer detection, breast cancer, classification algorithms, vector machine algorithms, neural network algorithms, dat ining algorithms.

I. Introduction

Breast cancer is a common type of cancer. According to the calculations of the U.S. National Cancer Institute one of every eight women may be afflicted with cancer throughout of her life[1].

Generally, this disease is a result of the convergence of some risk factors that cause the disease. The breast cancer is a cancer with high mortality rate among women such that it is the most common cause of death in the female community [2]. Timely detection of breast cancer (maximum 5 years after the first cancer cell division) increases the chance of the patient survival from 56% to over 86% [3]. So, it seems essential to have a precise and reliable system for timely diagnosis of benign or malignant breast tumors [4]. In or country, the breast cancer ranks second after lung cancer and ranks first among female cancers and is responsible for a fifth of the women's deaths caused by cancer [5]. Traditionally, this type of cancer is diagnosed by biopsy via surgery and this method is the most accurate one among the existing methods but it is an expensive and invasive procedure and raises emotional and psychological concerns and anxiety for the patient [6]. However, because of biological similarity between benign and malignant patterns, the diagnostic specificity is not reasonable yet and differentiating between benign and malignant through mammography is highly dependent on the radiologist's skill. But it is not always possible to find a skilled radiologist for the interpretation of mammography images; therefore there is a strong urge to have an experienced radiologist at hand because it is the only way that one may raise the bar for both diagnostic sensitivity and specificity at the same time. But since access to a qualified radiologist for interpretation of the images is not possible in all parts of Iran, and even in the case of availability there is the possibility of human errors, therefore designing a computer model as a rapid and cost effective and easily available diagnostic method could be in order. Clearly if the mass is correctly diagnosed as benign, there is no need for surgery and that will dismiss many concerns imposed on the patient as a result of such operations [7-10]. In this study, the researcher intends to choose the best model by comparing various techniques.

Author: Faculty of Fine Arts Department of Industrial Design, Tehran university, Iran –Tehran. e-mail: Farnazjalilvand01@gmail.com

[1] http://www1.ics.uci.edu/~mlearn/MLSummary.html[breast-cancerwis-consin]

II. Materials and Methods

a) Introduction to algorithms

i. Identification via support vector machine (SVM)

In 1965, the Russian researcher Vladimir Pnik came up with the idea of minimizing the risk and it was a very important step in the design of classifiers. The SVM is a binary classifier that separates two classes using a linear border or super plane so that the maximum margin of the super plane may result. Maximizing the margin of the super plane will result in maximum separation between the classes. The training points that are closest to the maximum super plane margin are called support vectors. Only these vectors (points) are used to determine the boundary between the classes. In this method, the boundary line between the two classes can be calculated in a way that:

- All instances of class +1 are on one side of the border and all instances of class -1 are on the other side of the border.
- The decision boundary must be such that the distance between the closest training instances of both classes in the direction perpendicular to the decision making boundary is maximized as much as possible.
- The general form of decision making border line can be written as equation (1):

$$W.x+b=0 \quad (1)$$

where, X is a point on the decision making border line and W is an n-dimensional vector perpendicular to the decision making border line. The distance from the origin to the decision making border line and w.x indicates the internal multiplication of the two vectors w, x [11].

b) K-means algorithm

In the clustering technique is a famous data mining method in which an automatic process is used to classify samples in a given data space into distinct categories based on their characteristics and each category is called a cluster. Therefore, the cluster is a collection of objects that contains objects with the highest similarity together and they have the lowest level of similarity to the objects in other clusters. A number of criteria may be used to define the similarity including the parameter of distance, i.e. nodes that have the minimum distance with one another are grouped in one cluster and such clustering method is called distance-based clustering [12].

Thereafter, some useful information may be extracted by checking and comparing the data in each cluster. K-means is one of the well-known clustering algorithms. This algorithm is one of the cluster-center based algorithms with the following order of execution [13]:

- Obtaining points as the clusters' centers at random
- Attributing each data sample to a cluster such that the data sample has the lowest distance to the center of the cluster.

In the standard presentation of the algorithm, first some points are randomly selected corresponding to the number of the required clusters (K). Then the data are assigned to one of the clusters based on the level of proximity (similarity) and thus, new clusters are generated.

The same procedure can be repeated and each time by averaging the data, new centers can be calculated for the data and the data can be assigned to new clusters again. This process continues until the clusters do not change anymore. Usually, the condition for algorithm termination and its convergence criterion is the lack of change in the existing clusters, achieving a predetermined number of iterations, or the expiration of the deadline.

The precise choice of the initial cluster centers highly influences the convergence of this algorithm and the optimal final clusters. These centers must be selected carefully and should be located at appropriate distances relative to each other.

c) Imperialist competitive algorithm (ICA)

The evolutionary algorithms are a subset of the evolutionary calculations that belong to the branch of artificial intelligence and include algorithms wherein the search takes place from several points in the problem space. These algorithms are based on random search and exemplify natural biological evolution and work on potential answers that have superior characteristics and are capable of providing a better approximation of the optimal answer.

The ICA algorithm, like other evolutionary optimization methods, starts out with an initial population. In this algorithm, each data point is called a country. Countries are divided into two categories: colony and imperialist. Each imperialist country, depending on the extent of its power, dominates several colony countries and controls them. This algorithm is based on the colonial competition and absorption policy. In the provision of this algorithm, such policy is implemented via movement of an empire's colonies in accordance with a specific relationship [14-15].

d) Neural network algorithm

The neural network design has two main aspects of architecture and learning algorithm. The target neural network has a multilayer perceptron (MLP) structure with a better performance in comparison with other methods. MLP structure is a standard combination of inputs, linear and nonlinear neural units, and outputs [15-16].

The output of all processing units of each layer is fed to all of the processing units of the next layer as input. The input layer processing units are all linear but in the hidden layers, especially in the output layer, nonlinear neurons with hyperbolic or sigmoid tangent function or any other possible continuous and derivable nonlinear function can be used.

Neural networks have this ability to learn from the past, experience and environment; and improve their behavior during learning.MLP neural network's learning method uses a supervised learning method for training. In the supervised learning method, a set of paired data called training samples are defined as A = (Xi, ti) wherein Xi is the input and ti is the desired network output corresponding to the input.

After feeding the Xi input to the neural network, the actual output of Yi network is compared to ti and the learning error is calculated and used later to set the parameters of the network in such a way that if the next time the same Xi input is fed to the network, the network

output approximates closer. The learning algorithm used in the MLP neural network is the post-error-propagation learning algorithm.

There are two computational paths in the above algorithm. The departure path in which the stimulating functions act on each neuron and the return path in which the sensitivity vectors (error vectors) are returned back to the first layer. Finally, the information obtained from the above two paths is used to set up the network's weight matrices and Bias vectors of MLP network. In order to stop the repetition of the post-error-propagation algorithm, we can use the mean squared error (MSE)in the form of the equation(2):

$$MSE = \sum_{i=1}^{0}(ti - aL(Pi))2/Q \quad (2)$$

The important point in the neural network is the sound choice of the weights and if necessary, the network's bias quantities. The method of weights selection is called learning algorithm training and a significant part of the network differences with one another lies in the method by which the parameters are set up[17-20].

e) Classification methods

Four classification algorithms were used for this study, namely, Perceptron artificial neural network method, Kohonen, fuzzy Artmap, and tree classification.

f) Artificial neural network classification

The artificial neural network concept was adopted from the human nervous system. These networks classify input patterns based on two unsupervised and supervised methods. In the unsupervised method, the output patterns are not introduced and the system itself classifies them on the basis of the similarity of the input patterns. But in the supervised method, the input is fed to the system and the difference between the desired output and the output of the network is used to change and adapt the weights. The training phase is the precursor of the classification phase in which the network carries out the training process by changing and adjusting the linking weights between the layers. In this study, we have used the Perceptron, Kohonen, and fuzzy Artmap artificial neural networks.

g) Perceptron artificial neural network

The Perceptron neural network is the first applied network in the artificial neural network history and a symbol of supervised pre-fed neural network and its design consists of one input layer, at least one hidden layer, and an output layer. Each layer is made up of nonlinear processing units called neurons (the nerves) and the connections between neurons in the successive layers carry the associated weights.

The connections are directional and are only in the forward direction. The method of learning in the supervised algorithm is the post-error-propagation method. In this method, the network weight is adjusted according to the gradient technique. So that after the desired output value is compared with the actual network output, the network searches for the maximum descending gradient and in the next iterations, the network parameters can be set up based on the guideline of the descending error gradient. The parameters' set up is repeated throughout this process until the amount of network error reaches an acceptable value [21].

h) Kohonen neural network

Kohonen network is dual-layer network with unsupervised training. The Kohonen network, is a self-organizing network that learns a mapping of samples introduced for learning [22]. The structure of a Kohonen network (similar to a single-layer Perceptron network) has one input layer and some output neurons.

Kohonen Network training with n inputs and m outputs is described as follows:

1. First, the initial values of the network weights are selected at random.
2. The training samples are introduced to the network.
3. The following values are calculated for each of the output layer neurons.

$$d_{min} = min\{d_1 = \sum_{i=1}^{n}(X_i - W_{ij})^2, j = 1, \dots, m\} \quad (3)$$

4. The winning output neuron is identified and the weights are correct by using a neighborhood function.

$$W_{ij}(t+1) = W_{ij}(t) + \eta(t)N(t)\left(X_i - W_{ij}(t)\right) \quad (4)$$

In the above equation, $\eta(t)$is the training parameter and $N(t)$is the neighborhood function.

5. The value of t is added.
6. The algorithm is repeated from step 2. The number of iterations can be considered fixed or the iterations continue until the network is trained, i.e. the weight values change slightly [23].After the network was trained, it is necessary to introduce the samples to the network. The output of the network is based on the closest distance.

Among the output neurons, the winner (of the network output) is the neuron that has the least Euclidean distance with the input sample [23].

The output of the Kohonen map is the topological mapping corresponding to the network input.

i) Fuzzy Artmap artificial neural network

This network was introduced in 1992 by Hansen et al. [24]. Fuzzy Artmp is a supervised network that combines two fuzzy Art networks: ARTa and ARTb.

In the following, the parameters of these two networks are defined. These two networks connect to each other by a series of connections between the F2

layers of the two networks that are called Map Fields abbreviated as Fab. Each of these connections has a weight Wij with a value between 0 and 1. The Map Fieldh as two parameters β_{ab} and ρ_{ab} and the output vector X^{ab}. The input vector into ARTa is converted into vector A under the supplemental coding.

In the training phase of the fuzzy Artmap network, the input pattern vector into the ART a network and the desired output (B) associated with the input pattern A are presented to the ARTb network. ARTb, the care parameter (ρ_b), is set to 1 to distinguish the desired output vectors. After the presentation of the vectors B and A, the ARTa and ARTb networks enter the resonance phase.

At this stage, another care criteria defined according to the equation (3) is calculated to assess whether the winning neuron in ARTa is associated with the desired output vector in ARTb.

$$\frac{\left|y^b \Lambda W_j^{ab}\right|}{\left|y^b\right|} \supseteq \rho_{ab} \qquad (5)$$

In equation (3), y^b is the output vector in ARTb (pattern in F_2^b) ,J is the subscript of the winner neuron in F_2^a , W_J^{ab} is the weights of Map Field connections with the Jth neuron in $[\in[0,1\rho_{ab}F_2^a$ and the care parameter in the Map Field.If the above criterion is not met, the care parameter in ARTa is increased a certain amount until the fuzzy Artmap network selects another winning neuron.

The vector A will be entered into the network again and the process will be repeated until the care criterion is satisfied. At this time the weights of the Map Field connections are updated according to the following equation:

$$W_J^{ab} = \beta_{ab} X^{ab} + (1 - \beta_{ab}) W_J^{ab} \qquad (6)$$

The initial value of the ρ_a is set by the basic care paramete ($\overline{\rho_a}$). After updating the weights, the basic care parameter in ARTa is set to this initial value again. After completion of the training phase, parameters ρ_a and β_a are initialized to a zero value. The Map Field output vector is defined as follows:

$$X^{ab} = W_J^{ab} \qquad (7)$$

So that J is the subscript of the winning neuron in F_2^a. This equationshows that the Map Field assigns a classifying number to each neuron in the F_2^a layer.

j) Tree classification

In the IDRISI software, the tree classification is based on the algorithm [25]. In practice, this algorithm selects an attribute (such as the reflective band) by iteration, divides the samples that can be split into two groups, and minimizes the difference within each subgroup while maximizes the difference between the groups. The tree classification progresses by consecutive breakdown of the data within new middle nodes containing more homogeneous subsets of the training pixels. A newly created middle node, in a situation that the training pixel has only one class or one class predominates the pixels, may generate a leaf.

When there is not any middle nodes left for splitting, the final tree classification rules take shape. The IDRISI software makes use of 3 splitting algorithms: entropy, gain ratio, and Gini.

k) Data mining

The processing models described in this work are as follows:

Neural networks, Bayesian network, K-nearest neighbor, C5.0 tree, and CART tree. This section presents a brief introduction of these models [26].

Suppose you have a series of data in the set S. The C4.5 algorithm works as such: if all the items in S are for a collection or S is sufficiently small, a leaf with maximum collection in S is added to the tree.

Otherwise, a test is selected based on a single distribution with one or two outputs. This experiment as the root of a tree is considered as a test by placing each of the outputs.

The S set is divided into S1, S2, etc. subsets based on the corresponding output. This process is applied to all subsets.

In 1997, The C 4.5 algorithm was replaced with a business system entitled See5/c 5.0. The applied changes resulted in remarkable capabilities that include:

- Variation of the boosting process which is a collection of classifiers that will be considered the final classification at a later stage. The boosting process usually achieves significant prediction accuracy.
- New data types, irrelevant values, cost of incorrectly classified variables, and the methods used to pre-filter the domain.
- Set of the chaotic rules when a class is classified, all the relevant rules are pinpointed and voted thereto. This enhances the interpretation of the set of rules. Moreover, it increases the precision of their prediction rate.

The decision tree and the set of rules have progressed in an ascending fashion. The rate of climbing increases through segmentation. C 5.0 can run on multi-processor computers as well [7].

The CART decision tree is a binary recursive segmentation method. The Data are randomly selected. Throwing away is not necessary and not recommended. The trees grow to their maximum size without the use of the stop law. Then the regressive pruning phase back to the root commences (part by part isolation).

The next section which to be pruned is the part that has the lowest performance relative to the whole in the training data tree (it should be pointed out that more than one section can be removed at any stage). This

process creates trees that are fixed under any order of arrangement.

In fact, the CART algorithm mechanism is intended to generate not one, but a consecutive collection of pruned trees which are all optimal candidate trees. The right size tree is identified and selected by evaluating the performance of each tree in the pruning stage [27].

Rote is one of the easiest and almost insignificant classifications which saves all the conducted training data.

It runs the classification operation only when the test exactly matches a training example. A clear objection to this method is that a lot of test data will not be classified because they do not exactly match with any of the recorded training data.

A more advanced method in this regard is the k-nearest neighbor method. According to this algorithm, a group is pinpointed with k samples in the training dataset that are closest to the test data and the desired tag is selected based on the superiority of a specific class in its neighborhood [28].Based on the given dataset, each belongs to a class. Each of these classes has a vector. Our goal is to create a rule to assign each of the samples to a class in the future.

This is carried out only through the vectors intended for the variables. Many ways have been introduced to create such rules. One of the most important methods is Bayes method. This algorithm is important for many reasons. This algorithm can be made very easily because it does not require complex iterative parameters.

This means the algorithm can be used in some cases that the there is a high volume of data. Neural networks are new systems and computational methods for machine learning and display of knowledge.

Also, its ultimate goal is the application of gained knowledge to predict output response of the complex systems [29, 30].

The main idea of this kind of network is (partly) inspired by biological nervous system functions. The key element of this idea is the formation of new structures for the information processing system. This system consists of many interconnected processing elements called neurons.

They collaborate together to solve a problem and pass on the information through synapses. In these networks, if a cell is damaged, the rest of the cells may compensate for the lack of it and also contribute to its reconstruction.

l) Introduction of data

The data used in this academic study are a courtesy of the UCI in California. The title of this database is The Wisconsin Breast Cancer datasets[2] and includes 699 data items. The data are divided into two benign and malignant classes. Ten properties were attributed to each datum. These properties are presented in the table 1.

Table 1 : Introduction of the data and the properties

ID	Attribute	Domain
1	Sample code number	10-1
2	Clump Thickness	1-10
3	Uniformity of Cell Size	1-10
4	Uniformity of Cell Shape	1-10
5	Marginal Adhesion	1-10
6	Single Epithelial Cell Size	1-10
7	Bare Nuclei	1-10
8	Bland Chromatin	1-10
9	Normal Nucleoli	1-10
10	Mitose	1-10
11	Class	2 for benign and 4 malignant classes

The data properties were chosen with an eye to medical considerations. The thickness of malignant cells' masses is usually classified in single-layer groups while the cancer cells are usually placed in multi-layered groups.

There are various sizes and apparent abnormal shapes of the cancer cells. This is why these parameters are useful in diagnosis and detection of cancerous and non-cancerous cells. With regard to the rate of cell adhesion, normal and healthy cells usually get close to each other while the cancer cells do not show such solidarity among them.

As a result, lowered adherence also can be used to detect cancer cells. With regard to the single biological cell size, its size may vary as we explained earlier.

Biological cells that grow big can be considered as cancer cells. A bare nucleus is in fact a nucleus without any cytoplasm surrounding it.

Usually, these nuclei are observed in malignant tumors. In fact, chromatin is the expression of non-uniform nuclear material that is observed in malignant cancer cells. In the cancer cells, Chromatin is observed as follows.

Typical nuclei with tiny structures have been observed in healthy tissues. In cancer cells, the nuclei gradually swell and their number increase over time. Mitosis is a part of the nucleus that generates two identical daughter cells during prophase. Cell division takes place during this process. The pathologists can estimate the amount of cancer by counting the mitoses.

m) Preprocessing

Data preprocessing is the first step in performing the task. According to the information that the database put in our disposal, there are 16 forgotten data in its 7th column. To fix this problem, a data

[2] http://www1.ics.uci.edu/~mlearn/MLSummary.html [breast-cancerwisconsin]

histogram was plotted to be used in the preprocessing. Because the properties are disconnected, the Mod was used for the forgotten data. Other values except 10 are very few versus the value of 1. Only one-fourth of the data have attained the value of 10. That's why the forgotten values are shown with the value of 1.

The outlying data are the next problem that will be dealt with during the statistical tasks. Of course, the data used in this study had been previously checked by the related center and the outlying data have been removed from them. In other words, the database has presented the users with neat data. However, some processes were carried out to ensure there are no outlying data around.

n) Selection of the properties

One of the most important steps that can greatly help the processing to get better results is selecting the right features. If these properties are not selected correctly, there is a high potential for synergy.

Synergy means trouble at the prediction stage. The large number of features can drastically increase the number of calculations in the event that it does not appreciably change the authenticity. So, a good choice of the right properties can increase the processing efficiency.

To do this, the property correlation matrix was calculated. Since the correlation threshold of 0.95 was selected, no property correlation was observed. Therefore, all of the properties can be used in the prediction process.

We used the random selection procedure to do justice to the training data sample selection and testing and to eliminate the dependence of the training on a particular order of data. The highlight of performance assessment of the models presented in this research is this same point that the evaluation results are not dependent on the particular order of data and each model that runs using a random selection from the dataset, 70 percent are allocated to training and 30 percent to testing. So, the results are not dependent on a particular order of the data.

III. Results

To carry out the modeling based on the artificial neural network, first we fed the data (dataset) to the Excel software. The dataset is randomly (MATLAB software's Rand function) divided into two parts: training (learning) dataset and testing dataset.

In order to do this, about 30 percent of the data was used for validation and testing, and 70 percent of the data was used for training. Then by scripting and the use of existing neural network Toolbox in MATLAB software (Neural network tool), we selected the data (input and output variables), and determined the type of network (Feed-forward back prop), type of training function (trainlm), number of layers, number of neurons, type of transfer function (tansig), function error (mse) and so on, as well as the number of iterations (epoch), maximum error, time, weight, etc.; and next we found out the best option by trial and error (fig 1and Fig 2).

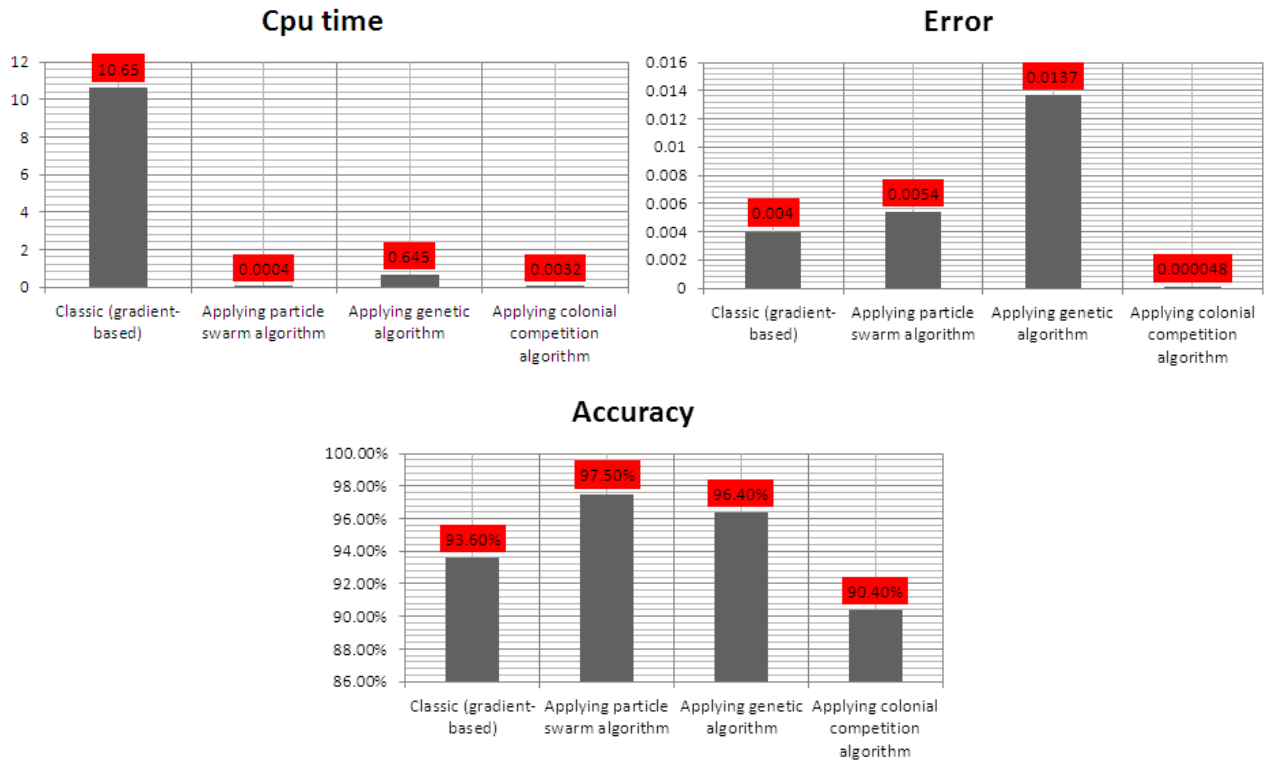


Figure 1 : Comparing the results obtained from simulation after applying three optimizing algorithms

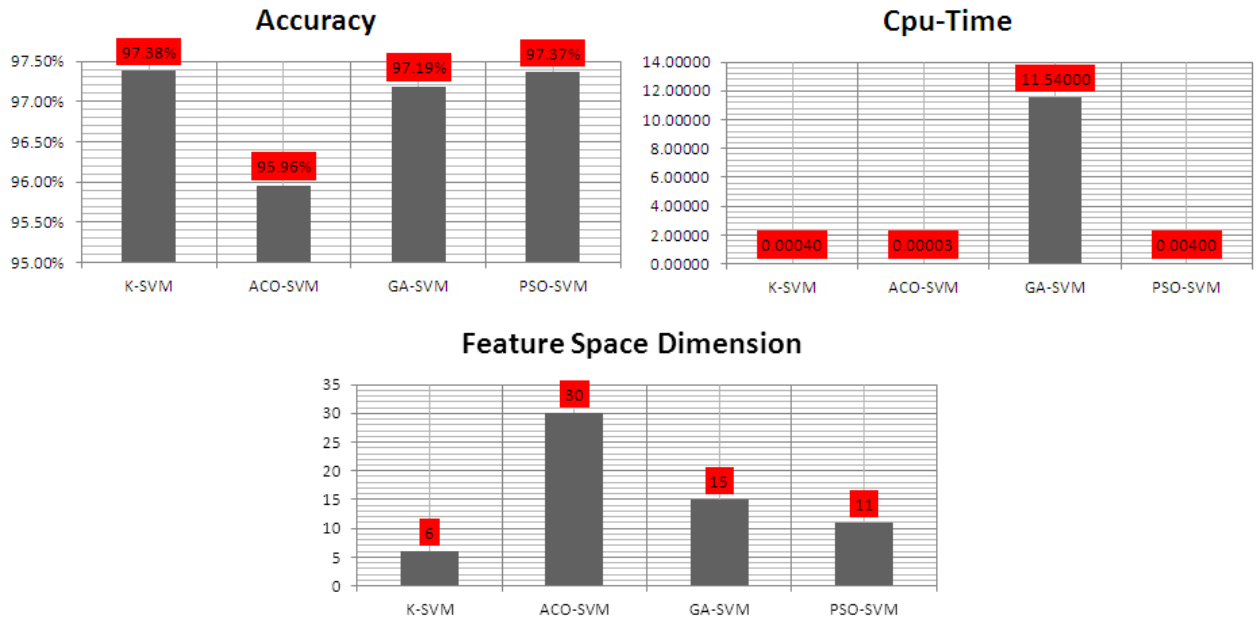


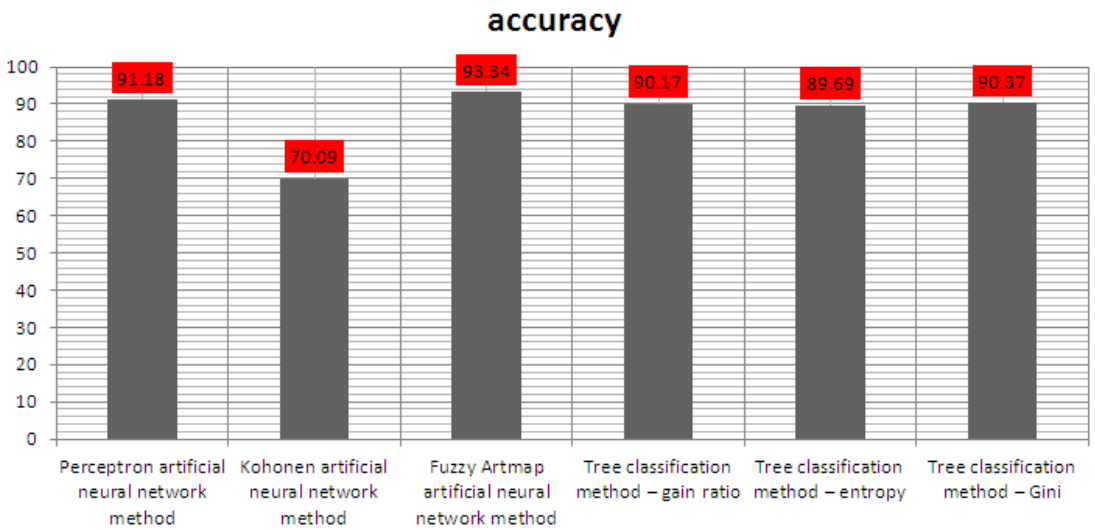
Figure 2 : Comparing the results of some of SVM algorithms

With regard to computation time, SMV method drastically reduces the training by reducing the number of input properties. The computation time is also compared to the main SVM algorithm in Fig. 2 which depicts the importance of the choice and extraction of the property.

According to the final results, their recommended k-SVM procedure is more accurate than SVM for the diagnosis of benign and malignant tumors and the new input structures and patterns with the membership of new patterns based on the main data.

The results of the classification using methods such as artificial neural network (Perceptron neural networks, Kohonen, and fuzzy Artmap) and the tree classification are presented in the figure. According to the figure, the tree classification method with three branching techniques(gain ratio, entropy, and Gini) has obtained the average total accuracy of 90 and Kappa coefficient 0.88, respectively; while the neural network methods had an accuracy of 92 and the Kappa coefficient of 0.90, respectively (except the Kohonen method).Thus, the neural networks classification methods (with the average total accuracy of 2 and the average Kappa coefficient of 2%) were more accurate than the tree classification method (with three branching methods) for the series of data used in the study.

In addition, when the different methods of the neural network were analyzed, it was clear that the fuzzy Artmap neural network method was more accurate than Perceptron and Kohonen methods (with the total accuracy enhancement of 2% and 22% and the Kappa coefficient enhancement of 3% and 24%).Finally, it can be said that there was no significant difference among the three branching methods employed in this study (fig 3).



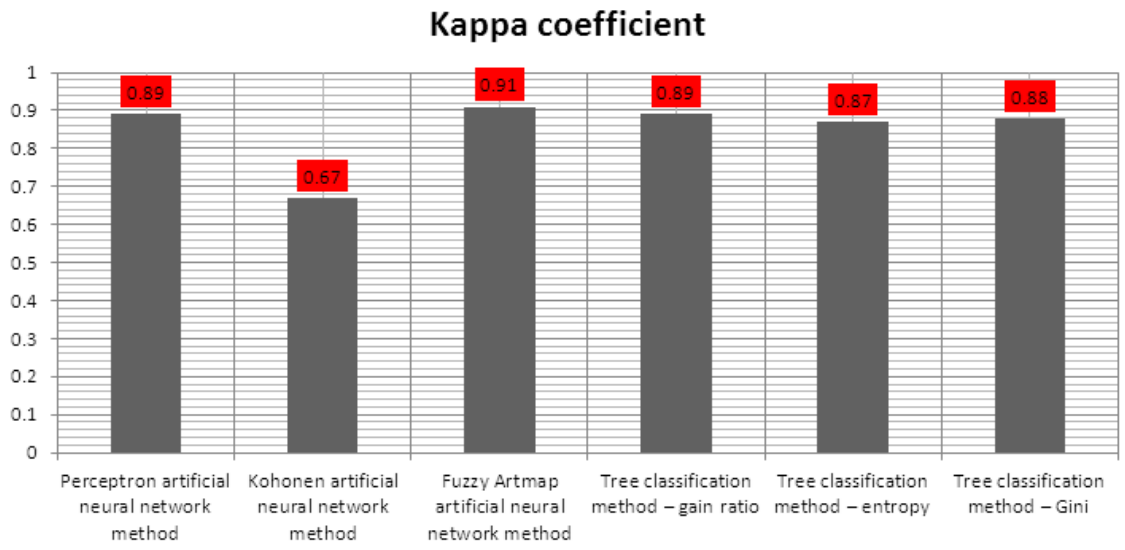


Figure 3 : Evaluation of the classification accuracy

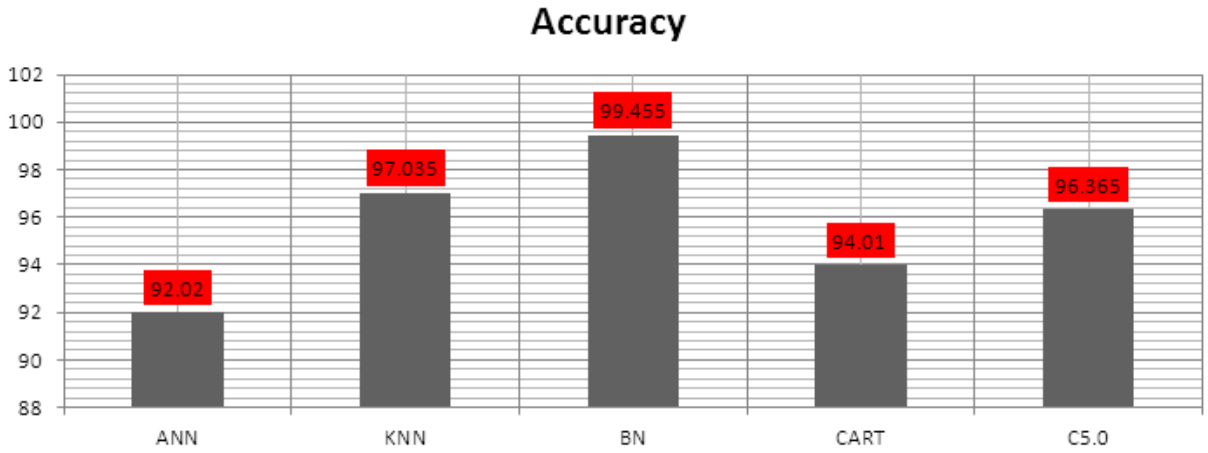


Figure 4 : Statistical information of the authenticity of the models after the evaluation

According to the fig 4, clearly the Bayesian network has predicted the classes more accurately and can be used with more confidence for predictions. Also, its distribution authenticity is much less than other models. But these cases are quite the reverse in the neural network, i.e. its distribution is much more and its mean authenticity is lower than all other models.

IV. Conclusion

In the case of diagnosis by SVM from the K-SVM algorithm based on the properties it can be competitively compared with any of the old data mining methods of cancer detection. In the property extraction phase, the older methods are not used for extracting useful information. Properties with below 50% accuracy may not be appropriate for classification purposes. No single property is highly effective for mass classification applications. The properties must be combined to achieve a better performance. After evaluating each property individually, it is advisable to check a combination of these properties. Both geometry and texture properties are useful for detection of mass. The selection of a classification property that may be able to improve the accuracy will prove useful. In the case of diagnosis by neural network, the algorithm based on gradient that considers the Levenberg–Marquardt algorithm and post-error-propagation method. One of its disadvantages is late convergence and stopping at optimal local points, as well as the optimal choice of number of layers, the number of neurons in each layer, and the type of stimulation function of each neuron in the data with high complexity which is not a simple task. Therefore, the smart optimization algorithms such as mass particles algorithm, genetic algorithm, imperialist competitive algorithm, etc. that we used three types of them for network modeling in this study. The results showed that the imperialist competitive method is significantly capable of correct determination of neural network weights for its training and error elimination.

With regard to classification methods, all pixels could correctly identify the agricultural lands. The high classification accuracy of agricultural lands classes may

be a result of its distinctive spectroscopic characteristics in comparison with other types of coating. When different methods of artificial neural networks were analyzed, it was clear that the fuzzy Artmap artificial neural network provides more accurate results relative to Perceptron and Kohonen artificial neural networks (with an overall accuracy enhancement of 2% and 22% and the Kappa coefficient enhancement of 3% and 24%).

In this research, the fuzzy Artmap artificial neural network had the highest classification accuracy.

In the case of data mining techniques, it is clear in accordance with the table 3-6 that the Bayesian network predicted the classes more accurately in and can be used with more confidence in the predictions. Moreover, its distribution authenticity is much less than other models. But these cases are quite reversed in the neural network, i.e. its distribution authenticity is much more and its average accuracy is much lower than the other models. Among all models created by different training and testing data, only the neural network models were unable to provide a prediction in some cases. That is, they presented some data without any comments there to.

References Références Referencias

1. http://www.bcaction.org/Pages/GetInformed/Top10Myths.html
2. Media Centre for World Health Organization. Fact sheet No. 297: Cancer, WHO: 2007.
3. Zhaohui L, Xiaoming W, Shengwen G, Binggang Y. Diagnosis of breast cancer tumor based on manifold learning and support vector machine. Proc. IEEE Int. Conf. Information and Automation 2008: 703-7.
4. Litigate J. Predictive models for breast cancer susceptibility from multiple single nucleotidepolymorphisms. J Clin Cancer Res 2004; 10:2725-37.
5. Anderson WF, Pfeiffer RM, Dores GM, Sherman ME. Comparison of age distribution patterns for different histopathologic types of breast carcinoma. Cancer Epidemiol Biomarkers Prev. 2006;15(10):1899-1905.
6. Mangasarian O, Nick Street W, Wolberg W. Breast cancer diagnosis and prognosis via linear programming. J Operations Res 1995; 43: 570-7.
7. Lawrence D. Handbook of genetic algorithms, 1991; Chapman and Hall, NY, 1991, pp. 7-12.
8. D. E. Rumelhart, G. E. Hinton, and R. J. Williams, "Learning internal representations by error propagation," in Parallel Distributed Processing: Explorations in the Microstructure of Cognition. Vol. 1: Foundations, D. E. Rumelhart and J. L. McClelland, Eds. Cambridge, MA: MIT Press, 1986.
9. Kawsar Ahmed, Abdullah Al Emran, Tasnuba Jesmin, Roushney Fatima Mukti, Md Zamilur Rahman, Farzana Ahmed," Early Detection of Lung Cancer Risk Using Data Mining", Asian Pacific Journal of Cancer Prevention, Vol. 14,pp. 595-598,2013.
10. V. Krishnaiah "Diagnosis of Lung Cancer Prediction System Using Data Mining Classification Techniques", International Journal of Computer Science and Information Technologies (IJCSIT), Vol. 4, No. 1, pp. 39 –45, 2013.
11. Bichen Zheng, Sang Won Yoon, Sarah S. Lam, "Breast cancer diagnosis based on feature extraction using a hybrid of K-means and support vector machine algorithms", Expert Systems with Applications 41 (2014) 1476–1482.
12. Hui-Ling Chena, Bo Yanga, Jie Liua, Da-You Liu "A support vector machine classifier with rough set-based feature selection for breast cancer diagnosis" Expert Systems with Applications 38 (2011) 9014–9022.
13. Jiawei Han, Micheline Kamber, and Jian Pei. Data Mining: Concepts and Techniques, Second Edition (The Morgan Kaufmann Series in Data Management Systems). Morgan Kaufmann, second edition, January 2006.
14. Li Ke, Nannan Mu, Yan Kang Mass computer-aided diagnosis method in mammogram based on texture features, Biomedical Engineering and Informatics (BMEI), 3rd International Conference, IEEE Explore, pp.146 – 149, 2010.
15. Nadia Smaoui, Souhir Bessassi," A developed system for melanoma diagnosis", 2013, International Journal of Computer Vision and Signal Processing, 3(1), 10-17(2013).
16. Hybrid Multi-layered GMDH-type Neural Network Using Principal Component Regression Analysis and Its Application to Medical Image Diagnosis of Liver Cancer, Tadashi Kondo*, Junji Ueno, Shoichiro Takao, 17th International Conference in Knowledge Based and Intelligent Information and Engineering Systems -KES2013
17. Reduced feature based efficient cancer classification using single layer neural network, Rosalin Mahapatraa, Babita Majhib, Minakhi Routa, 2nd International Conference on Communication, Computing & Security [ICCCS-2012]
18. Lung cancer classification using neural networksfor CT images, images Jinsa Kuruvilla, K. Gunavathi, (2013)
19. Artificial neural networks in medical diagnosis , Filippo Amato, Alberto López, Eladia María Peña-Méndez, Petr Vaňhara 3, Aleš Hampl, Josef Havel, Journal of APPLIED BIOMEDICINE (2013)
20. Importance of Artificial Neural Network in Medical Diagnosis disease like acute nephritis disease and heart disease, Irfan Y. Khan, P.H. Zope, S.R. Suralkar, International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 2, March 2013, ISSN: 2319-5967

21. Bishop, C.M., (1995), "Neural networks for pattern recognition". Oxford University Press, New York.
22. Kohonen, T., (1996), "Self-organization and Associative Memory", Springer-Velag, 3rd Edition. 312pp.
23. Miklos, H., (2000), "Numerical control of kohonen neural network for scattered data approximation", Mathematics Subject Classification.
24. Hansen, M.C., De Fries, R.S., Townshend, J.R.G., Sohlberg, R., (2000), "Global land cover classification at 1 km spatial resolution using a classification tree approach", International Journal of Remote Sensing, 21: 1331-1364.
25. G. Ravi Kumar, Dr. G. A. Ramachandra, K. Nagamani," An Efficient Prediction of Breast Cancer Data using Data Mining Techniques", International Journal of Innovations in Engineering and Technology (IJIET),Vol. 2 ,No. 4, pp139- 144, August 2013.
26. Bellaachia, A. and E. Guven, Predicting breast cancer survivability using data mining techniques. Age, 2006. 58(13): p. 110.
27. Eduardo López-Caneda, Socorro Rodríguez Holguín, Montserrat Corral, Sonia Doallo, Fernando Cadaveira, Evolution of the binge drinking pattern in college students: Neurophysiological correlates, Alcohol (Elsevier) Vol. 48, 2014.
28. Salama, G.I., M. Abdelhalim, and M.A.-e. Zeid, Breast cancer diagnosis on three different datasets using multi-classifiers. Breast Cancer (WDBC), 2012. 32(569): p. 2.
29. Delen, D., G. Walker, and A. Kadam, Predicting breast cancer survivability: a comparison of three data mining methods. Artificial intelligence in medicine, 2005. 34(2): p. 113-127.
30. Messadi M, Ammar M, Cherifi H, Chikh MA and Bessaid A," Interpretable Aide Diagnosis System for Melanoma Recognition", 2014, Bioengineering & Biomedical Science.

Global Journals Inc. (US) Guidelines Handbook 2016

www.GlobalJournals.org

FELLOWS

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN MEDICAL (FARSM)

Global Journals Incorporate (USA) is accredited by Open Association of Research Society (OARS), U.S.A and in turn, awards "FARSM" title to individuals.The 'FARSM' title is accorded to a selected professional after the approval of the Editor-in-Chief/Editorial Board Members/Dean.

- The "FARSM" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall,Ph.D., FARSS or William Walldroff, M.S., FARSM.

FARSM accrediting is an honor. It authenticates your research activities. After recognition as FARSM, you can add 'FARSM' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

The following benefits can be availed by you only for next three years from the date of certification:

FARSM designated members are entitled to avail a 40% discount while publishing their research papers (of a single author) with Global Journals Incorporation (USA), if the same is accepted by Editorial Board/Peer Reviewers. If you are a main author or co-author in case of multiple authors, you will be entitled to avail discount of 10%.

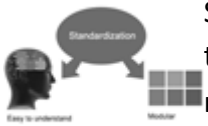
Once FARSM title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA). The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent.

You may join as member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. In addition, it is also desirable that you should organize seminar/symposium/conference at least once.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The FARSM can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

As FARSM, you will be given a renowned, secure and free professional email addres with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.



The FARSM will be eligible for a free application of standardization of their researches. Standardization of research will be subject to acceptability within stipulated norms as the next step after publishing in a journal. We shall depute a team of specialized research professionals who will render their services for elevating your researches to next higher level, which is worldwide open standardization.

The FARSM member can apply for grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A. Once you are designated as FARSM, you may send us a scanned copy of all of you credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria. After certification of all your credentials by OARS, they will be published on your Fellow Profile link on website https://associationofresearch.org which will be helpful to upgrade the dignity.

The FARSM members can avail the benefits of free research podcasting in Global Research Radio with their research documents. After publishing the work, (including published elsewhere worldwide with proper authorization) you can upload your research paper with your recorded voice or you can utilize chargeable services of our professional RJs to record your paper in their voice on request.

The FARSM member also entitled to get the benefits of free research podcasting of their research documents through video clips. We can also streamline your conference videos and display your slides/ online slides and online research video clips at reasonable charges, on request.

The FARSM is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSS can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSM member can decide its price and we can help in making the right decision.

The FARSM member is eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get remuneration of 15% of author fees, taken from the author of a respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account.

MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN MEDICAL (MARSM)

The ' MARSM ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The "MARSM" is a dignified ornament which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., MARSM or William Walldroff, M.S., MARSM.

MARSM accrediting is an honor. It authenticates your research activities. Afterbecoming MARSM,you can add 'MARSM' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

The following benefitscan be availed by you only for next three years from the date of certification.

MARSM designated members are entitled to avail a 25% discount while publishing their research papers (of a single author) in Global Journals Inc., if the same is accepted by our Editorial Board and Peer Reviewers. If you are a main author or co-author of a group of authors, you will get discount of 10%.

As MARSM, you willbe given a renowned, secure and free professional email address with 30 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSM member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSM, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.

AUXILIARY MEMBERSHIPS

Institutional Fellow of Open Association of Research Society (USA) - OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as "Institutional Fellow of Open Association of Research Society" (IFOARS).

The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.
The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

Other:

The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

"

- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.

"

Process of submission of Research Paper

The Area or field of specialization may or may not be of any category as mentioned in 'Scope of Journal' menu of the GlobalJournals.org website. There are 37 Research Journal categorized with Six parental Journals GJCST, GJMR, GJRE, GJMBR, GJSFR, GJHSS. For Authors should prefer the mentioned categories. There are three widely used systems UDC, DDC and LCC. The details are available as 'Knowledge Abstract' at Home page. The major advantage of this coding is that, the research work will be exposed to and shared with all over the world as we are being abstracted and indexed worldwide.

The paper should be in proper format. The format can be downloaded from first page of 'Author Guideline' Menu. The Author is expected to follow the general rules as mentioned in this menu. The paper should be written in MS-Word Format (*.DOC,*.DOCX).

The Author can submit the paper either online or offline. The authors should prefer online submission.Online Submission: There are three ways to submit your paper:

(A) (I) First, register yourself using top right corner of Home page then Login. If you are already registered, then login using your username and password.

(II) Choose corresponding Journal.

(III) Click 'Submit Manuscript'. Fill required information and Upload the paper.

(B) If you are using Internet Explorer, then Direct Submission through Homepage is also available.

(C) If these two are not conveninet , and then email the paper directly to dean@globaljournals.org.

Offline Submission: Author can send the typed form of paper by Post. However, online submission should be preferred.

Preferred Author Guidelines

MANUSCRIPT STYLE INSTRUCTION (Must be strictly followed)

Page Size: 8.27" X 11'"

- Left Margin: 0.65
- Right Margin: 0.65
- Top Margin: 0.75
- Bottom Margin: 0.75
- Font type of all text should be Swis 721 Lt BT.
- Paper Title should be of Font Size 24 with one Column section.
- Author Name in Font Size of 11 with one column as of Title.
- Abstract Font size of 9 Bold, "Abstract" word in Italic Bold.
- Main Text: Font size 10 with justified two columns section
- Two Column with Equal Column with of 3.38 and Gaping of .2
- First Character must be three lines Drop capped.
- Paragraph before Spacing of 1 pt and After of 0 pt.
- Line Spacing of 1 pt
- Large Images must be in One Column
- Numbering of First Main Headings (Heading 1) must be in Roman Letters, Capital Letter, and Font Size of 10.
- Numbering of Second Main Headings (Heading 2) must be in Alphabets, Italic, and Font Size of 10.

You can use your own standard format also.
Author Guidelines:

1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

1. GENERAL

Before submitting your research paper, one is advised to go through the details as mentioned in following heads. It will be beneficial, while peer reviewer justify your paper for publication.

Scope

The Global Journals Inc. (US) welcome the submission of original paper, review paper, survey article relevant to the all the streams of Philosophy and knowledge. The Global Journals Inc. (US) is parental platform for Global Journal of Computer Science and Technology, Researches in Engineering, Medical Research, Science Frontier Research, Human Social Science, Management, and Business organization. The choice of specific field can be done otherwise as following in Abstracting and Indexing Page on this Website. As the all Global

Journals Inc. (US) are being abstracted and indexed (in process) by most of the reputed organizations. Topics of only narrow interest will not be accepted unless they have wider potential or consequences.

2. ETHICAL GUIDELINES

Authors should follow the ethical guidelines as mentioned below for publication of research paper and research activities.

Papers are accepted on strict understanding that the material in whole or in part has not been, nor is being, considered for publication elsewhere. If the paper once accepted by Global Journals Inc. (US) and Editorial Board, will become the copyright of the Global Journals Inc. (US).

Authorship: The authors and coauthors should have active contribution to conception design, analysis and interpretation of findings. They should critically review the contents and drafting of the paper. All should approve the final version of the paper before submission

The Global Journals Inc. (US) follows the definition of authorship set up by the Global Academy of Research and Development. According to the Global Academy of R&D authorship, criteria must be based on:

1) Substantial contributions to conception and acquisition of data, analysis and interpretation of the findings.

2) Drafting the paper and revising it critically regarding important academic content.

3) Final approval of the version of the paper to be published.

All authors should have been credited according to their appropriate contribution in research activity and preparing paper. Contributors who do not match the criteria as authors may be mentioned under Acknowledgement.

Acknowledgements: Contributors to the research other than authors credited should be mentioned under acknowledgement. The specifications of the source of funding for the research if appropriate can be included. Suppliers of resources may be mentioned along with address.

Appeal of Decision: The Editorial Board's decision on publication of the paper is final and cannot be appealed elsewhere.

Permissions: It is the author's responsibility to have prior permission if all or parts of earlier published illustrations are used in this paper.

Please mention proper reference and appropriate acknowledgements wherever expected.

If all or parts of previously published illustrations are used, permission must be taken from the copyright holder concerned. It is the author's responsibility to take these in writing.

Approval for reproduction/modification of any information (including figures and tables) published elsewhere must be obtained by the authors/copyright holders before submission of the manuscript. Contributors (Authors) are responsible for any copyright fee involved.

3. SUBMISSION OF MANUSCRIPTS

Manuscripts should be uploaded via this online submission page. The online submission is most efficient method for submission of papers, as it enables rapid distribution of manuscripts and consequently speeds up the review procedure. It also enables authors to know the status of their own manuscripts by emailing us. Complete instructions for submitting a paper is available below.

Manuscript submission is a systematic procedure and little preparation is required beyond having all parts of your manuscript in a given format and a computer with an Internet connection and a Web browser. Full help and instructions are provided on-screen. As an author, you will be prompted for login and manuscript details as Field of Paper and then to upload your manuscript file(s) according to the instructions.

To avoid postal delays, all transaction is preferred by e-mail. A finished manuscript submission is confirmed by e-mail immediately and your paper enters the editorial process with no postal delays. When a conclusion is made about the publication of your paper by our Editorial Board, revisions can be submitted online with the same procedure, with an occasion to view and respond to all comments.

Complete support for both authors and co-author is provided.

4. MANUSCRIPT'S CATEGORY

Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

5.STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also.Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

Papers: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a)Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.

(c) Up to ten keywords, that precisely identifies the paper's subject, purpose, and focus.

(d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.

(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and to make suggestions to improve briefness.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

Format

Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

Structure

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

6.2 Early View of Global Journals Inc. (US) (Publication Prior to Print)

The Global Journals Inc. (US) are enclosed by our publishing's Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

6.3 Author Services

Online production tracking is available for your article through Author Services. Author Services enables authors to track their article - once it has been accepted - through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The authors will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript.

6.4 Author Material Archive Policy

Please note that if not specifically requested, publisher will dispose off hardcopy & electronic information submitted, after the two months of publication. If you require the return of any information submitted, please inform the Editorial Board or dean as soon as possible.

6.5 Offprint and Extra Copies

A PDF offprint of the online-published article will be provided free of charge to the related author, and may be distributed according to the Publisher's terms and conditions. Additional paper offprint may be ordered by emailing us at: editor@globaljournals.org .

Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

INDEX

Global Journal of Medical Research

Visit us on the Web at www.GlobalJournals.org | www.MedicalResearchJournal.org
or email us at helpdesk@globaljournals.org

ISSN 9755896