2015 PUBLICATIONS
CURRENT WORLDWIDE NUCLEAR CARDIOLOGY PRACTICES AND RADIATION EXPOSURE: RESULTS FROM THE 65 COUNTRY IAEA NUCLEAR CARDIOLOGY PROTOCOLS CROSS-SECTIONAL STUDY (INCAPS)


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ABSTRACT

Aims To characterize patient radiation doses from nuclear myocardial perfusion imaging (MPI) and the use of radiation-optimizing ‘best practices’ worldwide, and to evaluate the relationship between laboratory use of best practices and patient radiation dose.

Methods and results We conducted an observational cross-sectional study of protocols used for all 7911 MPI studies performed in 308 nuclear cardiology laboratories in 65 countries for a single week in March–April 2013. Eight ‘best practices’ relating to radiation exposure were identified a priori by an expert committee, and a radiation-related quality index (QI) devised indicating the number of best practices used by a laboratory. Patient radiation effective dose (ED) ranged between 0.8 and 35.6 mSv (median 10.0 mSv). Average laboratory ED ranged from 2.2 to 24.4 mSv (median 10.4 mSv); only 91 (30%) laboratories achieved the median ED ≤ 9 mSv recommended by guidelines. Laboratory QIs ranged from 2 to 8 (median 5). Both ED and QI differed significantly between laboratories, countries, and world regions. The lowest median ED (8.0 mSv), in Europe, coincided with high best-practice adherence (mean laboratory QI 6.2). The highest doses (median 12.1 mSv) and low QI (4.9) occurred in Latin America. In hierarchical regression modelling, patients undergoing MPI at laboratories following more ‘best practices’ had lower EDs.

Conclusion Marked worldwide variation exists in radiation safety practices pertaining to MPI, with targeted EDs currently achieved in a minority of laboratories. The significant relationship between best-practice implementation and lower doses indicates numerous opportunities to reduce radiation exposure from MPI globally.
AN ASSESSMENT OF CHRONOTYPE AND SOCIAL JET LAG AMONG FILIPINOS

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ABSTRACT

Chronotype is a measure of an individual’s timing of sleep and wakefulness. It describes the relationship between an external time and a person’s internal biological time. The chronotype has been used to characterize human circadian trait. Differences in chronotypes are believed to be related to genetic variation, location, geographic and cultural factors. Determination of chronotype using quantitative approaches has been done in Europe for more than a decade now through the Munich Chronotype Questionnaire (MCTQ). In this approach, the chronotype is quantified by the midpoint time between the start and end of sleep during free days, corrected for sleep duration on work days. The calculated time classifies whether an individual has an early or late chronotype. In the Philippines, there is no existing data for chronotypes as well as social jet lag – the discrepancy between an individual’s internal time and social clock. In this study, we provide a quantitative description of chronotypes and social jet lag among Filipinos. We present preliminary results based on the 895 non-shift worker respondents of the PhilMCTQ, a language variant of the MCTQ for the Philippine population. Using this set of data, we determined the association of chronotype and social jet lag against certain factors, i.e., age, gender, age, self-assessed exposure to natural light, type of location (whether living in the urban or rural area), travel time to/from work, sleep duration, and body mass index. Observations concerning the relationship of chronotype and gender, age, and social jet lag that have been previously reported in other populations are also seen in our data. Increased social jet lag has been observed among people with late chronotypes among our respondents. There were also some differences in chronotypes between genders, age groups, dwelling locations and consumers of stimulants (i.e., beer, liquor and cigarettes). Both Metro City and Non-Metro City residents similarly experience social jet lag. The data show that as commuting time becomes longer, social jet lag slightly increases. Differences in social jet lag have been observed between age groups and certain stimulants (e.g., smoking, coffee drinking) have been shown to be associated with social jet lag. Other factors such as gender, dwelling location, time spent outdoors and body mass index did not show sufficient evidence of association or correlation with social jet lag among the study participants.

KEYWORDS

Filipinos, Philippines, chronotype, social jet lag, sleep duration, chronobiology, circadian system, PhilMCTQ, MCTQ
2014 PUBLICATIONS
PROSPECTIVE IAEA SENTINEL NODE TRIAL ON THE VALUE OF SPECT/CT VS PLANAR IMAGING IN VARIOUS MALIGNANCIES


Amelia Jimenez-Heffernan, Annare Ellmann, Heitor Sado, R. Parameswaran, Rossana Pruzzo, Francesco Giammarile, Paulo Almeida, Vincent Peter Magboo, Renato Valdés Olmos and Thomas NB Pascual

ABSTRACT No. 565

Objectives: This is a prospective multicentre IAEA Coordinated Research Project assessing additional impact of SPECT/CT over planar lymphoscintigraphy in sentinel node(SN) detection in malignancies with different lymphatic drainage (melanoma, breast and pelvic cancers).

Methods: From 2010 to 2013, 16 centers from 11 countries recruited 1525 patients: 1182 breast cancer, 262 melanoma and 76 pelvic malignancies (prostate, cervix, penis, vulva). Planar SN scintigraphy was followed by SPECT/CT 2-3 hours after injection of standard radiopharmaceuticals. Surgery was performed the same or next day. Gamma probe and/or portable gamma cameras were used to identify SNs in the operating room.

Results: Significantly more SNs were detected by SPECT/CT for breast cancer (2165 vs 1892), melanoma (602 vs 532) and pelvic cancer (195 vs 138), all p<0.001. Incremental values (% of extra SN detected by SPECT/CT in comparison to planar lymphoscintigraphy) were 13%, 11.5% and 29.2% respectively. The territory mismatch between planar and SPECT/CT was 17% for breast carcinoma, 11.2% for melanoma and 50% for pelvic cancers. Surgical adjustment guided by SPECT/CT was 16.9% for breast cancer, 37% for melanoma and 64.1% for pelvic cancer.

Conclusions: SPECT/CT detected significantly more SNs which led to surgical adjustments in a considerable number of patients in all malignancies studied. Mismatch in the number of SNs and lymphatic territories between planar and SPECT/CT images was higher for pelvic tumors probably due to their deep lymphatic drainage and SN location.

Research Support: IAEA CRP E13037
THE ADDED VALUE OF SPECT/CT IN SENTINEL NODE IDENTIFICATION IN MELANOMA PATIENTS - A PROSPECTIVE MULTICENTER IAEA STUDY


Drazen Huic, Paulo Almeida, Gabriela Oh, Rossana Pruzzo, Irena Kostadinova, Mariza Vorster, Alvaro Edmundo Calderon, Sonya Sergieva, Vincent Peter Magboo and Thomas NB Pascual

ABSTRACT No. 654

Objectives: To evaluate the added value of SPECT/CT in melanoma patients, examining whether SPECT/CT showed additional sentinel nodes (SN) in comparison with planar images, provided better localization of the sentinel nodes and if this additional information influenced surgical approach or patients' management.

Methods: 262 patients (female 145; male 117; mean age 53.9; range 18-90 y) with melanoma (T1-T3N0M0) were included in this prospective eleven-center study. They underwent dynamic and static SN scintigraphy followed by SPECT/CT two to three hours after injection of routinely used radiopharmaceuticals (mean volume 0.49 ml; mean activity 50.41 MBq, mostly 4 injection sites). The surgery was performed same or next day. Gamma probe and/or portable gamma cameras were used for identification of SNs. Local ethics committees approved study protocols.

Results: The mean number of SNs visualized per patient by planar scintigraphy was 2.04 + 1.27 and by using SPECT/CT 2.30 + 1.43 (p <0.0001). In 11.1% of patients SPECT/CT revealed SNs in localizations not correctly depicted by planar scintigraphy. The surgical procedure has been changed as a result of SPECT/CT findings in 37% of our patients. The surgeons declared positive impact of SPECT/CT in 49.2% of the patients.

Conclusions: SPECT/CT detected additional sentinel nodes and revealed more precise anatomical location of sentinel nodes in significant number of cases. The surgeons found positive impact of this methodology because it allowed better surgical planning.

Research Support: IAEA CRP No. E13037
A PROSPECTIVE IAEA MULTICENTER STUDY TO ASSESS THE INCREMENTAL VALUE OF SPECT/CT FOR SENTINEL LYMPH NODE (SN) DETECTION IN BREAST CANCER


Chandrasekhar Bal, Amelia Jimenez-Heffernan, Heitor Sado, Sanjay Gambhir, Drazen Huic, Irena Kostadinova, Jonas Santiago, Sonya Sergieva, Vincent Peter Magboo and Thomas NB Pascual

ABSTRACT No. 1546

Objectives: To assess the value of SPECT/CT over planar lymphoscintigraphy for SN mapping in breast cancer

Methods: The study was conducted from Sept 2010 to Nov 2013 after obtaining local ethics committee approval. Tracer administration and imaging protocols followed IAEA recommendations. Planar imaging followed by SPECT/CT was performed in all patients.

Results: Thirteen centers from 4 continents contributed 1182 cases (mean age was 55.2 ± 12.3 y); 7 were males and 13 patients had bilateral cancer. Small particles radiocolloids (<100 nm) were injected in 784 (66%) patients and medium to large particles (>100 nm) in 398 patients. Mean activity and volume were 61.4 ± 28.2 MBq and 0.4 ± 0.3 ml, respectively. Single site injection was done in 70% and two or more in remaining patients. Site of injection: areolar 58.2%, peri-tumoral 28.2% and both 13.6%. Injection was image-guided in 26.1%. Imaging and SN biopsy were done on same day in 23.7%. SN was detected in all except 121 (10.2%) patients. SPECT/CT detected 1.84 ± 1.46 SNs compared to planar imaging 1.6 ± 1.31 (p< 0.001). SPECT/CT accurately adjusted lymph node territories in 207 (17.5%) patients and altered surgical plan in 16.9% patients. However, overall change in patient management was noted in 4.5%. High-resolution CT as part of SPECT/CT was done in 788 (66.7%) patients and findings noted: "cold" but altered nodal architecture in 63 (8%) patients compared to "hot" altered nodes in 86 (10.9%) patients.

Conclusions: SPECT/CT detected more SN, provided accurate anatomical localization, and identified SN not visualized on planar imaging. This led to modification in surgical plan in one out of five patients.

Research Support: IAEA CRP E13037
ABSTRACT

Modern technologies such as DNA microarray have been developed to study the transcriptome of cancer cells. It has been used in many studies for tumor classification and of identification of marker genes associated with cancer. However, this technique often suffers the ‘curse of dimensionality’. A general approach to overcome this setback is to perform feature selection technique prior to classification. Biomarkers have long been used for the prognosis and diagnosis of different types of diseases. The need for new and more specific biomarkers for leukemia arises. In this study gene selection was approached first using gene filtering by determining the expressions inter-quartile ranges (IQR) of the genes and determining whether or not they are differentially expressed across the different sample types by using the Kruskal-Wallis analysis of variance (ANOVA). Filtered genes were then subjected to k-means clustering algorithm to identify candidate genes that can be used to discriminate the four main types of leukemia (ALL, AML, CLL, CML) and non-leukemia (NoL) bone marrow samples. The selected genes were then used to build classification models using Support Vector Machine (SVM) and Artificial Neural Network (ANN) learning algorithms. Forty samples were used to build the models and 20 samples were used to assess the models performance. A minimum of 9 genes was found to be needed to correctly classify all samples in the training dataset into the five categories and to classify the samples in the validation dataset with high accuracy.

KEYWORDS

microarray, Support Vector Machine, leukemia, biomarkers
LUNG CANCER CLASSIFICATION USING OPTIMIZED PREDICTION MODELS APPLIED TO GENE EXPRESSION DATA

IISA (IEEE) 2014 The Fifth International Conference on Information, Intelligence, Systems and Application, Crete, Greece, July 2014

Joey Mark Diaz, Raymond Christopher Pinon, Geoffrey Solano

ABSTRACT

Lung cancer is one of the most fatal types of cancer around the world. The World Cancer Research Fund International estimated that in 2012, 1.8 million new cases of this disease were diagnosed. Early diagnosis and classification of this condition prompts medical professionals on safer and more effective treatment of the patient. Availability of microarray technology has paved the way to exploring the genes and its association in various diseases like lung cancer. This study utilized genetic algorithm as a method of feature (genes) selection for the support vector machine and artificial neural network to classify lung cancer status of a patient. Genetic algorithm (GA) successfully identified genes that classify patient lung cancer status with a notable predictive performance.

KEYWORDS

lung cancer, microarray, support vector machine, artificial neural networks, genetic algorithm
ABSTRACT

Huge advances in experimental techniques have resulted in increasing amounts of biological network data being made available. Different kinds metabolic networks are just some of these. Analyzing the network topology of these metabolic networks across taxa can uncover important biological information that is independent of other currently available biological information. This study explores topological similarities between metabolic networks of different taxa to build phylogenetic trees. Using kgml files, each taxon's pathway were explored to obtain metabolic information, wherein reaction tags were used to construct reaction hypergraphs. A reaction hypergraph is a graph \( G: (V,E) \) where reactions serve as the vertices, an edge exists between any two vertices if and only if a directed path exists whenever the two reactions share a common metabolite. Similarities between reaction hypergraphs were determined using frequent subgraph mining techniques. Phylogenetic trees were then built based on the common subgraphs among reaction hypergraphs of different taxa. Experimental results show phylogenetic trees that bear a striking resemblance to those obtained from sequence comparisons.

KEYWORDS

phylogenetic tree, metabolic pathway, reaction hypergraph, frequent common subgraph, graph mining
2013 PUBLICATIONS
AN APPLICATION USING CANNY EDGE DETECTION AND MULTILAYER PERCEPTRON FOR RECOGNIZING LEAVES OF TROPICAL PLANTS

Proceedings of the 14th Int'l Conference on Mathematics and Computers in Biology and Chemistry (MCBC '13) Baltimore, Maryland, USA, September, 2013

Jeselle Petrine M. Sosa, Geoffrey A. Solano, Jasper A. Obico

ABSTRACT

Plants have been used for centuries for their innumerable benefits which include medicinal properties among others. Plant-based therapies are marked due to its low cost, easy availability based on generation to generation knowledge. Identification of plants is therefore a very necessary task for plant enthusiasts, herbal medicine researchers, etc.

Plant Leaf Recognition using Neural Networks (LeafRApp) is an application which recognizes a plant from an input image file using the plant leaf’s shape. A hybrid of two modelling techniques is used to extract features from the leaf. The Moment-Invariant method is used to extract the first four moments of the image while the Centroid-Radii method is used to extract 36 radii with respect to the image’s centroid. Canny Edge Detection technique is used in extracting the edges of the leaf images, which undergo a pattern recognition process using Multilayer Perceptron, a feedforward artificial neural network. A list of possible matches from the plant leaf database with percentage of match is then presented to the user sorted according to its nearness to the plant leaf image, which can be further filtered through an optional reduction feature. The system allows users to contribute to the database network, which a plant expert/administrator curates and maintains. The system runs offline which makes it useful even in fieldwork, but includes a facility for downloading the trained and updated leaf database network for updates.

KEYWORDS

plant leaf recognition, moment-invariant, centroid-radii, canny edge detection, multilayer perceptron, neural network
In this paper, we propose an alternative approach to forecasting seasonal long-memory stochastic volatility based on the generalized long-memory stochastic volatility (GLMSV) model. We investigate the predictive ability of the proposed method vis-à-vis another forecasting approach using real data – Microsoft stock intraday volatility.

AWARD

Won the International Publication Awards (IPA) for 2011-2013. The IPA awarding ceremony was held at the National Institute of Physics Auditorium in UP Diliman last November 27, 2013. The International Publication Award (IPA) is given by the UP System to UP faculty and students who were able to publish in ISI-listed and SCI, SSCI and AHCI indexed journals
SEASONAL LONG-MEMORY STOCHASTIC VOLATILITY


*Gonzaga, A.*

**ABSTRACT**

In this paper, we propose an alternative approach to estimation of seasonal long-memory stochastic volatility based on the generalized long-memory stochastic volatility (GLMSV) model. We show that the estimator is consistent. We investigate the small sample performance of the estimator by simulation. An application to actual data is also presented.
CLASSIFICATION OF CONGENITAL HYPOTHYROIDISM USING ARTIFICIAL NEURAL NETWORKS


Iris Ivy M. Gauran, Ma. Sofia Criselda A. Poblador

ABSTRACT

The Newborn Screening Reference Center (NSRC) of the National Institutes of Health in the University of the Philippines Manila collects measurements from five attributes to determine whether Congenital Hypothyroidism (CH) is present in a neonate. Detecting the CH cases is a major concern of medical practitioners because it provides richer information than the healthy ones. However, because of the rarity of this metabolic condition, existing classification algorithms oftentimes misclassify a newborn as “normal” even if it is not. This paper investigates the efficiency of Self-Organizing Kohonen Maps (SOM), a type of artificial neural network. Though it is a visualization and clustering tool, the researchers want to probe on its ability to detect outliers and properly classify a newborn as normal or not by coming up with a statistically computed threshold value. Instead of working directly with the original attributes of the data, a reduced set of SOM prototypes is utilized to represent the data in a space of smaller dimension, seeking to preserve the probability distribution and topology of the input space. Results showed a misclassification rate of 13.5%. Though it is found to be slightly less superior to the existing classification rules, the proposed methodology was able to address the problem of finding a statistical threshold value. Also, the methodology verifies that age has a major effect on misclassifying “Normal” as “Abnormal” since postponement of newborn screening to a later age causes the quantization error to boost drastically, hence, easily exceeding the value of the first decision threshold. Keywords: Self-Organizing Kohonen Maps (SOM), classification algorithm, outlier detection, newborn screening for congenital hypothyroidism

AWARD

3rd Placer in the 2013 ISI Jan Tinbergen Awards for Outstanding Young Statistician, a biennial competition for young statisticians (less than 31 years old) from developing countries based on research papers in the theory and applications of statistics. The paper bested over 1,000 papers submitted by young statisticians worldwide. The authors took home €2,500 in prize money. In addition, they obtained support for travel, accommodation and daily expenses to participate and present their paper in the Young Statistician’s Satellite Symposium from August 23 to 24 and the 59th ISI World Statistics Congress from August 25 to 30 to be both held in Hong Kong.
A METRIC FOR USER REQUIREMENTS TRACEABILITY IN SEQUENCE, CLASS DIAGRAMS, AND LINES-OF-CODE VIA ROBUSTNESS DIAGRAMS


J.A. Malinao, K. Tiu, L.M. Lozano, S. Pascua, R.B. Chua, Ma. S. Magboo, J.D.L. Caro;

ABSTRACT

In this work, we propose a metric based on the ICONIX paradigm to calibrate the consistency, completeness, and correctness of commonly used dynamic and static models of software design with a pre-specified set of user requirements expressed as Use Case Texts. A depth-first search-based algorithm is presented to extract scenarios and describe the temporal aspect of software development-related tasks embedded in the Robustness Diagram of ICONIX to derive results needed to perform further verification of these models. A procedure to perform a similar verification of a software’s set of Lines-of-Codes is also proposed. Finally, we perform empirical tests on real-world data and report the results.

KEYWORDS

ICONIX, Metric, Robustness Diagram, UML
2012 PUBLICATIONS
PULMONARY CALCIFICATION DETECTED BY BONE SCINTIGRAPHY IN A PEDIATRIC CASE OF ACUTE LYMPHOBLASTIC LEUKEMIA

The Philippine Journal of Nuclear Medicine 2012; 7(1) : 30-32

K.M.C. Dela Cruz, T.N.B. Pascual, R.A.O. Conlu, V.P.C. Magboo.

ABSTRACT

This is a case report of a pediatric patient with acute lymphoblastic leukemia and presenting with a rare finding of bilateral pulmonary calcification. The patient's pulmonary calcification was detected as an incidental finding during a routine bone scan performed to evaluate the patient’s bone pains. Bone scintigraphy is one of the most sensitive and efficient modalities for detecting extra-osseous calcification.
SEARCH FOR A STAR: APPROXIMATE GENE CLUSTER DISCOVERY PROBLEM (AGCDP) AS MINIMIZATION PROBLEM ON GRAPH

PHILIPPINE COMPUTING JOURNAL, December 2012

Jeffrey A Aborot, Henry Adorna, Jhoirene B Clemente, Brian Kenneth De Jesus, Geoffrey Solano

ABSTRACT

Finding gene clusters in genomes is an essential process in establishing relationship among organisms. Gene clusters may express functional dependencies among genes and may give insight into expression of specific traits. The problem of finding gene clusters among several genomes is referred to as Gene Cluster Discovery and several models has already been formulated for its definition. One formulation of this problem is the Approximate Gene Cluster Discovery Problem (AGCDP) which is modelled as a combinatorial optimization problem in some works. In this paper we propose an approach which produces a transformation of AGCDP into a minimum-weight star finding problem in graph. Detailed examples are also presented to further clarify the notion of the transformation. Proof of equivalence is also presented in the paper to show the equivalence of input parameters of AGCDP and the construction of the graph representing the input parameters to the problem.

KEYWORDS

Gene, genome, gene cluster, gene content, linear interval minimization, minimum-weight star, combinatorial optimization
MODELING PETRI NETS USING ALLOY

TENCON 2012, IEEE Conference, November 2012

Jonathan A. Robles, Geoffrey A. Solano

ABSTRACT

Petri net is a computational tool that is well-known in modelling various processes. Its formal semantics, graphical nature and expressiveness lend itself as a convenient model of computation for a wide-range of applications. On the other hand, Alloy is a declarative specification language used for expressing structural constraints and behavior in a software system. Alloy is heavily influenced by the Z notation on its mathematical aspects and Object Constraint Language on its syntax. An advantage of Alloy, however, is that its semantics bridges the gap between Z and object models, and shows how to give simple and robust meaning to widely used forms, such as navigation expressions and object model diagrams. This paper demonstrates how Petri nets and its properties and behavior can be specified using Alloy.

KEYWORDS

Alloy, Formal methods, Petri nets
VISUALIZATION OF MULTIVARIATE HEALTH DATA USING SELF-ORGANIZING MAPS

International Conference on Mathematical Methods, Computational Techniques and Intelligent Systems, Porto, Portugal, July, 2012

Mark Lester Ghany, Geoffrey Solano

ABSTRACT

Multivariate data may contain subtle patterns. However, the discovery of such subtle patterns and relationships among variables is not an easy task. Most of the time, it considered to be a dilemma in research since classical statistics may find it encumbering to analyze. Furthermore, after data analysis, there must be a way to provide humans with an understandable representation of the knowledge that has been derived. Computational statistics, a collaboration between computer science and statistics, offers a suite of algorithms that may be used to surpass such obstacles. The Self-Organizing Map and Data Visualization are examples of these. The Self-Organizing Map is a tool used in knowledge discovery and data mining as it searches large datasets for patterns that may be considered knowledge about the data. It is an artificial neural network that employs a process to reduce multidimensional data into a low-dimensional representation, thus providing knowledge that is helpful in implementing classic statistical methods. Data Visualization on the other hand offers a number of approaches to give the human brain a visual representation of knowledge on a given data. This paper presents an application of the self-organizing map in the extraction of patterns and relationships among variables in a large data set on the Philippines Regional Health Data, which includes thirty health and demographic data. It then uses k-means algorithm in clustering the data set. The application also includes a tool to provide visualizations for the patterns on the data set such as clusters and associations, as well as representation on the Philippine geographical map, where it is clearly seen that certain regions of the country are very far behind when it comes to health.

KEYWORDS

clustering, visualization, self-organising maps, health data
A WORKFLOW NET FOR PROCESSING ADMINISTRATIVE COMPLAINTS

Philippine Computing Science Congress, March 2012

Geoffrey A. Solano, Henry Adorna

ABSTRACT

Workflow management has shown to be a promising solution to the ageold problem of controlling, monitoring, optimizing and supporting business processes. An advantage it presents is the explicit representation of the business process logic which allows for computerized support.[3] This paper introduces WF-netPAC which is a workflow net applied to the workflow of processing administrative complaints. It further shows how WF-netPAC exhibits important workflow net properties, such as soundness, free-choice, well-structured property and S-coverability. This paper also discusses the use of Petri nets in the context of workflow management. It discusses Petri nets as an established tool for modelling and analyzing processes along with a number of powerful analysis techniques which can be used to verify the correctness of workflow procedures.

KEYWORDS

formal models, workflow process, Petri nets
CLASSIFICATION OF CONGENITAL HYPOTHYROIDISM IN NEWBORN SCREENING USING SELF-ORGANIZING MAPS

The Philippine Statistician 2012; 61:55-68

Gauran IIM, Poblador MSCA

ABSTRACT

The Newborn Screening Reference Center (NSRC) of the National Institutes of Health in University of the Philippines Manila collects measurements from five attributes to determine whether Congenital Hypothyroidism (CH) is present in a neonate. Detecting the CH cases is a major concern of medical practitioners because it provides richer information than the healthy ones. However, because of the rarity of this metabolic condition, existing classification algorithms oftentimes misclassify a newborn as “normal.” We investigate the efficiency of Self-Organizing Kohonen Maps (SOM)—a type of artificial neural network—as a tool for classification, particularly in detecting outliers.

A SOM with higher learning rate and larger training sample size yield low misclassification rate. A bootstrap estimate of the variability of the misclassification error rate is approximately 5%. The misclassification error rate is lower when the original validation sample is used, compared to the average misclassification error rate computed from the bootstrap validation samples. Particularly, for a learning rate of 0.8 and a ratio of 2:1 training to validation sample, a 2.04% misclassification against 7

KEYWORDS

Self-Organizing Kohonen Maps (SOM), Classification Algorithm, Outlier Detection, Newborn Screening for Congenital Hypothyroidism
ABSTRACT

Cereal and root crop production are of primary interest to the country’s agricultural industry. The need to obtain reliable estimates of total area of production is therefore crucial. This paper examines the Sampling with Probability Proportional to Aggregate Size (PPAS) in terms of unbiasedness and precision of estimates as compared to two known sampling designs, Simple Random Sampling without Replacement (SRSWOR) and Sampling with Probability Proportional to Size Without Replacement (PPSWOR).

Crop area, is used as auxiliary information. Estimates of total production area are obtained at 1%, 5% and 10% sampling rates. To be able to evaluate precision of PPAS estimates, nonparametric bootstrap variance estimation is performed.

PPAS estimates are generally better than the two other sampling designs when it comes to precision but almost at par when it comes to unbiasedness.

KEYWORDS

Probability Proportional to Aggregate Size Sampling, Probability Proportional to Size Sampling, Simple Random Sampling, Nonparametric Bootstrap Estimation
ABSTRACT
Shift work has been reported to affect the worker’s health and well-being. However, the many interacting factors involved in shift work make it difficult to understand the mechanism underlying its effects. The currently rising demand for shift workers in the Philippine business process outsourcing (BPO) industry, particularly in the contact center sector, has spurred increased interest in research on the effects of shift work on Filipino workers. The fact that shift work affects employees’ health and well-being, and in turn affects economic productivity, gives enough reason for doing shift work studies. In this paper, we review research publications, project reports and theses (graduate and undergraduate) to determine the current state of knowledge on shift work in the Philippines and to define future research directions. Results of this review indicate that many aspects of shift work have been explored in studies in the Philippines, but there is still a big gap in knowledge that needs to be addressed. While there are studies that investigated health effects, job satisfaction, job performance, lifestyle, risk behaviors and other topics, the number of studies done in the country is still quite limited and the variables investigated do not allow comparison with situations in other countries. There is still a need for more detailed studies to be able to provide empirical evidence on shift work’s effects on Filipino workers and to be able to make relevant interventions to improve the workers’ health and well-being. In terms of research questions, there are no local studies that looked into chronic diseases such as cardiovascular diseases and cancer. There are also no published studies yet that investigated the Filipino chronotype in relation to shift work. The chronotype characterizes how an individual’s internal biological clock synchronizes to the external clock. The importance of chronotype in shift work research has been shown in studies in other countries. However, the chronotype variation among Filipinos is not yet known. Other untapped topics on shift work research in the Philippines include light and shift work, speech ability and shift work, actual physical work load and time pressure, exposure to heat, dust or other hazards during shift work, dermatological problems related to shift work, genes and shift work, social and psychological aspects of shift work and long term effects of shift work. We also included here a framework of research approaches on how to thoroughly investigate the effects of shift work on the worker’s health and well-being. The framework was adopted from the European project consortium called ClockWORK which aimed to optimize the individual’s structure of work, free time and sleep. An offshoot of the ClockWORK project is the PhilSHIFT initiative. PhilSHIFT is an interdisciplinary group of researchers from the University of the Philippines and the Ludwig-Maximilians-Universität München studying chronotype variation among Filipinos and shift work in the Philippines.

AWARD
Won the International Publication Awards (IPA) for 2011-2013. The IPA awarding ceremony was held at the National Institute of Physics Auditorium in UP Diliman last November 27, 2013. The International Publication Award (IPA) is given by the UP System to UP faculty and students who were able to publish in ISI-listed and SCI, SSCI and AHCI indexed journals.
ABSTRACT

In this paper, we have shown a parallel algorithm for motif finding using genetic algorithm on membranes (GAMA motif finder). We exploit the capability of membrane algorithm in providing a representation of hybrid algorithms with communications. We tested GAMA motif finder using planted $(l,d)$-motif instances and achieved higher accuracy compared to an existing motif finding algorithm called Projection. We also show that the reproduction operation that is similar to the refinement step in SP-STAR provides a good convergence rate.

KEYWORDS

Motif Finding, Genetic Algorithm, Membrane Algorithm
AN INFORMATION SYSTEM FOR PLANT-INSECT INTERACTIONS IN FOUR SUBCATCHMENTS OF MT. ISAROG NATURAL PARK

Pandiwa, Vol. 1 Issue 1 July 2012

Avegail David Carpio, Marilou G. Nicolas

ABSTRACT

Mount Isarog Natural Park (MINP) which is 10,112 hectares wide has an abounding diversity of fauna and flora. The information that can be extracted from the natural resources in Mt. Isarog starting with the species behavior and interdependence, to profiling its gene sequences and determining plant compound content, globally renews the present Biology. These data must be converted into knowledge leading to a discovery of novel products and facts about the ecosystem that would benefit humans and the ecosystem itself.

The Mt. Isarog’s Flora and Associated Arthropods’ Basic, Genomic and Spectroscopic Profile, Biological Behavior and Interdependence: An Information System (MIFAABGSBBI) basically documents the information obtained from MINP’s flora and associated arthropods through an efficient database management system encapsulated in an effectual web-based information system. Presently there is no online information system about Mt. Isarog species particularly flora and associated arthropods that records and provides detailed information about their biological features and behaviors. The information system will serve as an avenue for advanced researches about species interdependence, for food web diagrams are generated. Upon discovering an exceptional trait of species which depends on another particular species, their genomic and spectroscopic profile can be analyzed for comparative analysis.
2011 PUBLICATIONS
A WAVELET WHITTLE ESTIMATOR OF GENERALIZED LONG-MEMORY STOCHASTIC VOLATILITY


Gonzaga, A. and Hauser M.

ABSTRACT

We consider a \(k\)-GARMA generalization of the long-memory stochastic volatility model, discuss the properties of the model and propose a wavelet-based Whittle estimator for its parameters. Its consistency is shown. Monte Carlo experiments show that the small sample properties are essentially indistinguishable from those of the Whittle estimator, but are favorable with respect to a wavelet-based approximate maximum likelihood estimator. An application is given for the Microsoft Corporation stock, modeling the intraday seasonal patterns of its realized volatility.

KEYWORDS

Long-memory, \(k\)-GARMA, Stochastic volatility, Whittle estimator, Wavelets

AWARD

Won the International Publication Awards (IPA) for 2011-2013. The IPA awarding ceremony was held at the National Institute of Physics Auditorium in UP Diliman last November 27, 2013. The International Publication Award (IPA) is given by the UP System to UP faculty and students who were able to publish in ISI-listed and SCI, SSCI and AHCI indexed journals.
TEMPORAL EFFECT OF VARYING DOSES OF CLONIDINE ON THE FASTING BLOOD GLUCOSE LEVELS OF SPRAGUE DAWLEY RATS

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ABSTRACT

Background Primarily used as a centrally-acting anti-hypertensive drug, clonidine has also been shown to affect blood glucose determinants by acting on peripheral α-2 adrenoreceptors. However, the studies which investigate the effect of clonidine on blood glucose levels yielded conflicting results depending on conditions applied. Methods Thirty-five (35) adult male Sprague-Dawley rats weighing 140-330 grams were randomly and equally assigned to five treatment groups of varying clonidine doses: 1, 2, 4, 7µg/kg and 0.9% NaCl (control). The doses were administered intra-peritoneally after fasting the rats for 18 hours. Whole blood samples (at least 1 µl) were obtained via tail pricking/tail lancing and measured for glucose levels using a commercially available glucometer (One-touch Ultra ®) 1 hour before injection to get baseline blood glucose levels and every hour for 8 hours after injection to measure changes in blood glucose levels. The rats remained fasted until after the 8-hour monitoring period. Data were analyzed using t-test, Analysis of Variance(ANOVA) and Tukey LSD at 95% confidence interval (α=0.05). Area under the curve (AUC) reflecting the cumulative blood glucose level within the first 8-hour monitoring period for each dosage was computed. Results Significant differences among fasting blood glucose levels of 2, 4, 7 µg/kg and control groups were observed at the 1st to 4th hour after injection, with the treatment groups having higher glucose levels than the control group. No significant difference was observed between the 1 µg/kg group and control group. At the 5th hour onwards, no significant difference was noted among treatment means. Cumulative dose effect of clonidine (AUC) showed a significant rise in glucose at 4 and 7 µg/kg with apparent saturation at 4 µg/kg when plotted in a dose-response curve. Conclusions Intra-peritoneal administration of clonidine significantly increases blood glucose levels when administered at 2, 4 and 7 µg/kg with peak effect at 1st to 3rd hour post injection and no significant difference starting at 5th hour post-injection onwards. Optimal dosage is found to be at 4 µg/kg.
ABSTRACT

This is a case of a two-year old male with an eight-week history of generalized bone pains, reluctance to move and inability to ambulate. Patient was initially diagnosed with Juvenile Rheumatoid Arthritis. Progression of symptoms prompted consultation and subsequent admission. As part of initial work-up of unexplained bone pains, three phase bone scintigraphy study using Tc-99m HDP, showed patchy areas with poor tracer uptake in the growth plates of both proximal and distal tibiae, proximal shaft of both femora and distal forearms. Focal photopenic areas adjacent to the plates in the distal femora and in the talus bilaterally are also noted. Incidentally, prominent diffuse bilateral lung and renal parenchymal tracer retention was seen in the delayed phase. Chest X-ray showed interstitial infiltrates and chest CT showed interstitial pneumonia in both lungs with bilateral pleural effusion, multiple lytic bone changes and enlarged kidneys. Subsequent bone marrow biopsy confirmed Acute Lymphoblastic Leukaemia (ALL). Patient underwent chemotherapy and was able to stand alone unsupported with a wobbly gait after more than a month. Acute Lymphoblastic Leukaemia accounts for 80% of the cases seen in children. The first clinical manifestation of leukaemia may be musculoskeletal symptoms that may be difficult to differentiate with arthritis and other orthopaedic pathologies. Patients may be referred for bone scans before diagnosis is made. Abnormal bone scintigraphic findings may be due to leukemic infiltration, which are usually symmetrical, resulting in diffuse reactivity in cortical bones most commonly in the metaphysical regions of the lower limbs. Diffuse involvement of long and flat bones may also occur. Photopenic areas may also result from vascular compromise with avascular necrosis or osteonecrosis. Atypical findings in ALL on bone scintigraphy can also be observed. Diffuse tracer retention within the renal parenchyma on delayed images can suggest leukemic infiltration. The same tracer retention pattern in the lungs can be seen in cases of pulmonary calcinosis. This patient represents a case of severe ALL with bilateral pulmonary calcinosis and diffuse leukemic infiltration of the renal parenchyma on top of abnormal skeletal findings. Knowledge of reported skeletal scintigraphic patterns seen in leukemic patients can facilitate early diagnosis and therefore treatment. Another importance of bone scan is its capability to suggest the disease earlier than the blood examinations. Blood examinations such as peripheral blood smears may also be negative for acute lymphoblastic leukaemia in aleukaemic forms. Attention is drawn to the importance of bone scintigraphy as part of the initial work-up for paediatric patients who present unexplained musculoskeletal complaints in order to consider the possibility of leukaemia, its complications or other pathologies.
VALUE OF RADIOLOGIC CORRELATION AND FOLLOW-UP SCINTIGRAPHY IN DETECTING OSSEOUS METASTASIS IN PATIENTS WITH NON-SPECIFIC BONE SCINTIGRAPHY LESIONS

The Philippine Journal of Nuclear Medicine 2011; 6(1) : 6-10

Domingo Allan Jay C; Magboo Vincent Peter C; Santiago Jonas FY

ABSTRACT

Bone scintigraphy is highly sensitive in detecting bone metastasis but specificity is only about 50-60%. The aim of this study is to evaluate the value of radiologic correlation and follow-up scintigraphy in detecting osseous metastasis in patients with equivocal bone scans. Bone scan results with non-specific interpretation of bone lesions from January to December 2007 were included. Results with no evidence of bone metastasis or metastatic bone disease were excluded from the study. Correlation with radiographs [X-ray, CT-scan, MRI] and follow-up bone scan within 6 months from the initial bone scan were reviewed. Of the 2322 bone scans, 435 have non-specific findings of bone lesions. From 435, only 228 patients have records of radiograph correlation and scintigraphic follow-up. Twenty two percent of the total population showed positive findings of bone metastasis in radiographs. The percentages of the non-specific findings determined to be negative from bone metastasis on correlation with X-ray, CT-scan, MRI and follow-up bone scan were 84%, 70%, 73%, and 85%, respectively, whereas osseous metastasis revealed on radiologic correlation and follow-up scan were 76%, 30%, 27%, and 75%, respectively. In conclusion, the finding of osseous metastasis in bone scan is increased when correlated with radiographs and scintigraphic follow-up

KEYWORDS

neoplasm metastasis
RIGHT-TO-LEFT SHUNTING SECONDARY TO MICROVASCULAR PULMONARY ARTERIOVENOUS MALFORMATION DEMONSTRATED BY LUNG PERFUSION SCINTIGRAPHY.

The Philippine Journal of Nuclear Medicine 2011; 6(1) : 24-26

Elyzel B. Puguon, Gerard F. Goco, Vincent Peter C. Magboo, Emerita A. Barrenechea

ABSTRACT

Right-to-left shunting is usually associated with congenital conditions involving the heart, lungs, and the blood vessels that connect both organs. It is demonstrated by echocardiography, transesophageal ultrasound, CT scan, MRI and more definitively by conventional angiography. In this paper, we present a 16-year old female who manifested with progressive dyspnea, persistent cyanosis and decreased arterial oxygen saturation. Clinical assessment and arterial blood gas parameters suggested the presence of significant shunting. However, cardiac evaluation showed no intracardiac defects. High resolution CT scan of the chest with CT angiography of the pulmonary artery also showed no evidence of pulmonary vascular malformation or shunt anomaly. Lung perfusion scintigraphy performed after intravenous administration Tc99m-MAA showed tracer uptake in the brain, spleen and kidneys signifying the presence of a right-to-left shunt in the lungs. Cardiac catheterization later demonstrated the presence of primary pulmonary telangiectasia.
2010 PUBLICATIONS
ON THE $i$TH GRAPHS OF THE JOHNSON SCHEME


Geoffrey A. Solano, Jaime D.L. Caro

ABSTRACT

Let $n$ and $k$ be fixed positive integers.

The **Johnson Graph** $G(n,k)$, also known as the slice of the cube, or the graph of the Johnson Scheme of the first order is the undirected graph where the vertices are all the $k$-subsets of a fixed $n$-set. Two vertices $A$ and $B$ are adjacent if and only if $|A \cap B| = k-1$ [5]. The order of $G(n,k)$ is $\binom{n}{k}$ and that each vertex is $k(n-k)$ regular.

The $i$th **Johnson Graph** $G_i(n,k)$ is the undirected graph where the vertices are also all the $k$-subsets of a fixed $n$-set. Here two vertices $A$ and $B$ are adjacent if and only if $|A \cap B| = k-i$. Two vertices $A$ and $B$ are $i$-related if $|A \cap B| = k-i$, and $i$ is referred to as the **Johnson distance**. This scheme has $k$ classes. [5]

The graph $G(n,k)$ of the Johnson Scheme has shown very promising properties as a static interconnection network topology. This paper shows some properties of the said graph, among them the following degree properties:

$$\sum_{i=0}^{n} \deg(G(n,k)) = |V(G(n+1,3))|$$
$$\sum_{i=0}^{n} \deg(G_i(n,k)) = |V(G_i(n+1,2i+1))|$$
$$\sum_{i=0}^{k} \deg(G_i(n,k)) = \binom{n}{k} - 1.$$

KEYWORDS

graphs, johnson graphs, degree properties, interconnection networks, Johnson scheme
ABSTRACT

A treatment option for early stage breast cancer is nodal evaluation by axillary lymph node dissection (ALND). An alternative to ALND is sentinel lymph node (SLN) biopsy employing radionuclide SLN mapping. This study was designed to investigate the relationship between malignancy spread to the SLN and primary tumor size by reviewing the clinical profile of 20 female breast cancer patients who underwent radionuclide SLN mapping procedure, sentinel lymph node and primary tumor biopsy, as well as axillary lymph node dissection. The accuracy of radionuclide mapping in identifying the sentinel node and determining the status of the axillary lymph nodes was reviewed. Among the mapped sentinel nodes, 15% were positive for metastatic lymphadenopathy and 85% without malignant spread. The malignant sentinel nodes had a mean size of 5.5 +/- 0.87 cm and the negative sentinel nodes had a mean size of 2.95 +/- 2.2 cm. The SLN identified by radionuclide mapping truly represented the status of the rest of the axillary nodes for the presence or absence of metastatic lymphadenopathy. Primary tumor size is a prognostic factor for cancer spread to the sentinel node. However, the combination of primary tumor histology and tumor size may prove to be a stronger prognostic indicator malignancy spread to the sentinel lymph node.

KEYWORDS

sentinel lymph node, radionuclide, axillary lymph node dissection
WAVELET-BASED ALGORITHM FOR ATTENUATION OF SPATIALLY CORRELATED NOISE


Gonzaga, A.

ABSTRACT

This paper presents a wavelet-based algorithm to attenuate spatially correlated noise represented by a fractional Brownian motion. It generalizes the usual independence assumption by making the spatial relationship depend not only on the variance, but also on a long-memory parameter associated with the decay of autocorrelations. Wiener filtering in the wavelet domain obtains estimates of gray levels of the original signal. This provides a simple, fast and feasible solution for a denoising problem involving uncorrelated or spatially correlated noise.

KEYWORDS

fractional Brownian motion, Wiener filtering, image denoising, wavelet transform
2009 PUBLICATIONS
EVALUATION OF SPECT LUNG PERFUSION SCINTIGRAPHY IN PATIENTS WITH SUSPECTED PULMONARY EMBOLISM.


G.F. Goco, E. L. P. Ote, V.P. C. Magboo, et. al.

ABSTRACT

Imaging studies are essential to arrive at an accurate diagnosis of pulmonary embolism (PE). Computed tomography pulmonary angiogram (CTPA) is increasingly becoming the diagnostic tool of choice while the lung perfusion-ventilation scan (VQ) is the standard nuclear medicine procedure for PE. Single photon emission computed tomography (SPECT) lung perfusion scan can be an alternative since it has lower radiation exposure to the patient compared to CTPA and is a shorter procedure compared to the VQ scan. This study aims to determine if SPECT lung perfusion scan interpreted using the PISAPED criteria yields the same results as a pre-test clinical score (Wells score), a VQ scan and CTPA. This is a prospective study wherein thirteen patients were clinically evaluated using the Wells score before they underwent VQ scanning, SPECT perfusion scan and CTPA. The agreement between the results of the SPECT scan and the Wells score, the VQ scans, and CTPA were determined using Kappa statistics. There is poor agreement between the SPECT and the Wells score. Agreement between SPECT and VQ scan is significant (p=0.000). Agreement between SPECT and CTPA is likewise significant (p=0.002). We conclude that SPECT perfusion scan is a viable alternative to the VQ scans and CTPA. It can also be used for correlation with the Wells score.

KEYWORDS

lung perfusion scan, SPECT, pulmonary embolism
CLINICAL UTILITY OF DACRYOSCINTIGRAPHY IN THE ASSESSMENT OF NASOLACRIMAL DUCT OBSTRUCTION

Philippine Journal of Nuclear Medicine, 2009;4:14-17

M.S. Elgadafi, V.P. C. Magboo, H.L. Cruz.

ABSTRACT

Epiphora, or pathological overflow of tear due to obstruction in the nasolacrimal drainage system, is a common problem encountered in ophthalmology. The ophthalmologist relies mainly on symptoms to guide further diagnosis and therapy. However, there appears to be discrepancy between the degree of discomfort experienced by the patient and the severity of pathological finding. The purpose of this study was to determine the clinical utility of dacryoscintigraphy in the assessment of nasolacrimal duct (NLD) obstruction. We retrospectively reviewed the records of 27 patients who underwent dacryoscintigraphy between July-January 2007. Thirty-six eyes in these patients had epiphora. Three eyes (8%) showed partial obstruction. On the other hand, 33/36 eyes (92%) had complete obstruction in different areas of the NLD system. Patients with complete obstruction were treated by dacryocystorhinostomy and silicon tube insertion. Patients with partial nasolacrimal duct obstruction were treated medically. Dacryoscintigraphy is a simple, non-invasive, safe and non-traumatic procedure in assessing NLD obstruction. It demonstrates anatomical pathway of tear by physiological drainage. This can aid the surgeon in localizing the site of obstruction and guide him in choosing the appropriate treatment (Auth)

KEYWORDS

lacrimal apparatus diseases, scintigraphy, nasolacrimal duct, dacryoscintigraphy
THE USEFULNESS OF DUAL PHASE TC99M SESTAMIBI PARATHYROID SCINTIGRAPHY IN PRE-OPERATIVE LOCALIZATION OF PARATHYROID ADENOMAS

Philippine Journal of Nuclear Medicine, 2009; 4:18-22

M.S. Elgadafi, V.P. C. Magboo, J.P. Domino.

ABSTRACT

Pre-operative localization of abnormal parathyroid tissue helps in deciding whether surgery begins with a neck or mediastinal exploration. In this study we aimed to evaluate the usefulness of parathyroid scintigraphy in pre-operative localization of parathyroid adenomas and treatment. From February 2006 to October 2008, patients with signs and symptoms of hyperparathyroidism were recruited to join the study. The study group consisted of 3 males and 8 females. All subjects had a pre-operative parathyroid scintigraphy with Tc99m Sestamibi followed by parathyroidectomy. Ten patients had a positive scintigraphic finding which correlated to the actual location of the adenoma determined during the operation. Almost all patients (10 out of 11) underwent minimally invasive parathyroidectomy (MIP) while only one patient underwent bilateral neck dissection. The average incision length was 3.73 ± 0.65 cm. Only one patient had an adverse event (transient hypocalcemia and bleeding necessitating a drain) which resolved later. The average hospital stay was 2.5 ± 0.7 days. Parathyroid Tc99m-sestamibi scan is a reliable, non-invasive, and cost effective imaging modality in pre-operative localization of parathyroid adenomas for first time parathyroidectomy. This can help and guide surgeons to perform focused parathyroid surgery with minimal incision, successful localization, less complications, and shorter hospital stays.

KEYWORDS

parathyroid neoplasms, Tc99 Sestamibi
2008 PUBLICATIONS
ON THE K-SUBGRAPHS OF THE GENERALIZED N-CUBES

Solano, G.A., Caro, J.D.L.

ABSTRACT

Abstract: - Graphs are used in modeling interconnections networks and measuring their properties. Knowing and understanding the graph theoretical/combinatorial properties of the underlying networks are necessary in developing more efficient parallel algorithms as well as fault-tolerant communication/routing algorithms [1].

The hypercube is one of the most versatile and efficient networks yet discovered for parallel computation. One generalization of the hypercube is the n-cube $Q(n,m)$ which is a graph whose vertices are all the binary $n$-tuples, such that two vertices are adjacent whenever they differ in exactly $m$ coordinates. The $k$-subgraph of the Generalized $n$-cube $Q_k(n,m)$ is the induced subgraph of the $n$-cube $Q(n,m)$ where $q=2$, such that a vertex $v \in V(Q(n,m))$ if and only if $v \in V(Q(n,m))$ and $v$ is of parity $k$.

This paper presents some degree properties of $Q_k(n,m)$ as well as some isomorphisms it has with other graphs, namely:

1) $Q_{n-1}(n,2)$ is isomorphic to $K_n$
2) $Q_{n}(n,2f)$ is isomorphic to $G_r(n,k)$
3) $Q_{n}(n,2f)$ is isomorphic to $SG(n)$

KEYWORDS

n-cubes, graphs, Johnson graphs, hypercube
COMPETITIVE ONLINE SCHEDULING WITH FIXED NUMBER OF QUEUES


Chua R.B., Caro J.D.L.

ABSTRACT

One of the complex parts of an operating system design is CPU scheduling, where the OS schedules a sequence of arriving jobs to use the CPU, without knowledge of the time and number of arriving jobs and their execution times. One of the measures of performance of a scheduling algorithm is the average flow time. For a long time, most operating systems, like Windows and UNIX used a scheduling algorithm based on the Multilevel Feedback scheduling algorithm. In this research, we present the Randomized Multilevel Feedback 2 (RMLF2) scheduling algorithm, which is a version of the RMLF algorithm proposed by Kalyanasundaram and Pruhs, and show that it has a competitive ratio of $O(\ln n)$ in terms of minimizing flow time against an online adaptive adversary. Since this obtains the $\Omega(\log n)$ lower bound for randomized algorithm, it has a tight competitive ratio of $\Theta(\ln n)$.

KEYWORDS

randomized multilevel feedback, scheduling, competitive analysis, online algorithm, randomized algorithm
CLINICAL UTILITY OF SPECT-CT CO-REGISTRATION IMAGING


V.P. C. Magboo, G.F. L. Goco.

ABSTRACT

The interpretation of nuclear medicine studies is largely based on function. However, this interpretation becomes more accurate and reliable when there is a corresponding precise anatomical localization. Hybrid systems are opening up a new era in SPECT imaging. A tertiary hospital in the Philippines has acquired the country's first hybrid imaging device combining a dual-detector, variable angle gamma camera with a low dose X-ray tube attached to the same gantry. This study evaluates the clinical utility of a hybrid imaging system, SPECT/CT for functional mapping with selected radiotracers. SPECT data were first interpreted alone and then re-assessed with the addition of SPECT/CT co-registered images. Patients referred for various nuclear medicine procedures with SPECT components in the first six months of operation studied for various clinical situations were evaluated in the study. Our study included sixty-four (64) patients in the first year of operation of SPECT/CT co-registered imaging systems. This included 23 with I-131, six with sulfur colloid, four with Gallium 67, five with Tc99m Sestamibi and 26 with Tc99m HOP. The pathologic sites in 28 out of 64 (44 percent) patients were noted in both SPECT and SPECT/CT co-registered images. Additionally, SPECT/CT co-registered images provided the precise anatomical localization in 12 (19 percent) patients not clearly evident in SPECT images alone and enabled the exclusion of disease in sites of physiologic tracer deposition in 16 (25 percent) patients found suspicious in SPECT alone leading to a change in the therapeutic approach. SPECT/CT allows a more precise interpretation of scintigraphic studies using selected radiotracers for various clinical situations. It provides additional information that improves diagnostic accuracy of SPECT and impacts on patient management indicating that SPECT/CT co-registered systems are suited for routine use in clinical practice.

KEYWORDS

Positron-Emission Tomography and Computed Tomography, Computer-Assisted Tomography
THE VALUE OF THREE-PHASE BONE SCINTIGRAPHY IN THE ASSESSMENT OF STRESS FRACTURES

Philippine Journal of Nuclear Medicine, 2008; 3:9-13

M. V. Fetalvo, V.P. C. Magboo

ABSTRACT

Stress fractures are overuse injuries of the bones resulting from repetitive stresses. Since symptoms are non-specific, an imaging modality is mandatory for accurate diagnosis. Bone scintigraphy used to be the gold standard in evaluating stress fracture, but the advent of MRI led to its underutilization. This study aims to determine the role of three-phase bone scintigraphy in the assessment of stress fracture, and to determine the sensitivity, specificity, positive and negative predictive values and the accuracy rate of bone scan. In a tertiary hospital in Metro Manila, 15 patients referred for three-phase bone scintigraphy to assess for stress fracture from 2004 to 2006 were included in the study. Of these 15 patients, 12 also underwent MRI. Sensitivity, specificity, positive and negative predictive values, and the accuracy rate were computed with MRI as the gold standard. The sensitivity of bone scan approach 100%. However, its specificity is low due to other conditions that can produce a positive scan. Because of the limitations inherent to scintigraphy, MRI could be a valid first-line imaging technique in diagnosing stress fracture. MRI provides a greater anatomic detail of the area in question. It may secure an accurate diagnosis if the fracture line is demonstrated. However, extensive marrow edema precludes the visualization of the fracture line in some cases. Bone scintigraphy together with an accurate history is still a very useful tool in diagnosing stress fracture. MRI should be reversed for cases where the radiographic and scintigraphic findings are indeterminate. (Auth)

KEYWORDS

three-phase bone scintigraphy, stress fractures
PARATHYROID SCINTIGRAPHY AND GAMMA PROBE-GUIDED SURGERY IN THE MANAGEMENT OF PARATHYROID CARCINOMA

Philippine Journal of Nuclear Medicine, 2008; 3:25-31

S. G. Camomot, G.F. L. Goco, V.P. C. Magboo, J.Y. Santiago

ABSTRACT

This paper aims to present one of the rarest types of malignancies, parathyroid carcinoma. Parathyroid carcinoma is an important cause of primary hyperparathyroidism. Diagnostic evaluation of patients presenting with signs and symptoms of hyperparathyroidism consists of serum calcium and parathyroid hormone determination, parathyroid imaging using ultrasound, computed tomography, magnetic resonance imaging, or Tc-99m sestamibi scintigraphy, and histopathologic evaluation of tissues after surgical intervention. Therapeutic management of an identified parathyroid tumor is by parathyroidectomy during neck exploration or radioisotope-guided with the use of a gamma probe. The histology of a resected tumor determines if the initial surgery completes the management, or, in cases of parathyroid carcinoma, if another completion surgical intervention is to be made. This paper will present a patient who has been initially diagnosed with primary hyperparathyroidism and was referred to our nuclear medicine department for parathyroid scintigraphy. The patient underwent MIRP and rapid intraoperative PTH determination. Histopathologic report on the tissues revealed parathyroid carcinoma. The patient underwent a second surgery for definitive treatment. This paper will discuss the clinical role of nuclear medicine in the diagnosis and surgical management of parathyroid carcinoma.

KEYWORDS

parathyroid neoplasms, hyperparathyroidism, scintigraphy