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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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BETTER DIAGNOSIS OF STROKE USING DIFFERENT B-VALUES IN MAGNETIC RESONANCE IMAGING

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Abstract.

Background: Magnetic resonance imaging is an important technique to provide useful information for the diagnosis of different kinds of diseases, Magnetic resonance imaging provides important information for intracranial hemorrhage, limitation of the treatment window prior to perfusion imaging by defining the existence of pre-existing infarct, and an increase in the differentiation of the acute area from edema.

Objectives: Our objective is to find out sought to ascertain the appearance of the acute stroke on DWI MRI as the diffusion gradient strength ("b value") increased from 0 to 10^3 s/mm2. Axial Diffusion-weighted Imaging (DWI) without contrast is used for echo planar imaging.

Method: Acute stroke MRI pleasant discrimination has been examined using routine brain MRI with various b-values.

Result: Different B- Values were tested for diagnosis of acute stroke. Best result was when the b Value Between 200 to 1000 s/mm^2. Assume that acute stroke is evaluated using just one b variable. Then, instead of raising the b value to 1500 s/mm^2, it is better to maintain the overall performance of the b factor at 1000 s/mm^2.

Conclusion: To get a better understanding of acute stroke, several b-values have been employed. The range between 300 and 1000 s/mm^2 has been shown to have the best b value.

Key words. Magnetic resonance imaging, b Values, Echo-Planar Imaging, perfusion Imaging.

Introduction.

Magnetic resonance imaging is an important technique to provide useful information for the diagnosis of different kinds of diseases [1]. To provide better quality information and images, a great number of research studies have been performed on MRI [2]. Although a considerable number of studies have been conducted, additional possibilities are available for the investigation of new methods or tuning parameters [3]. The brain is a vital organ in all living creatures. In the event of a fault in the brain, the other parts of the body may be paralyzed, or difficulty may occur. If the fault in the brain is examined [4], it can be diagnosed according to its types, and treatments can be applied. Moreover, stroke is one of the leading causes of death and can have long-term impacts on brain function. Improving survival rates and reducing the long-term consequences of stroke requires quick and accurate diagnosis. In clinical practice, magnetic resonance imaging plays an important role in the diagnosis of acute stroke due to its non-invasive nature, high sensitivity, and ability to distinguish tissues based on contrasts such as T1, T2, perfusion, and diffusion sequences. Diffusion-weighted imaging has been considered the most clinically important sequence for detecting acute ischemic lesions, which appear as restricted diffusion due to accumulating excitatory glutamate [5,6].

Magnetic resonance imaging provides important information for intracranial hemorrhage, limitation of the treatment window prior to perfusion imaging by defining the existence of pre-existing infarct, and an increase in the differentiation of the acute area from edema. For this reason, the use of MRI can increase the population that will benefit from thrombectomy treatment. It provides the possibility of revealing the exact volume of infarct and especially the potential infarct volume [7,8]. In addition, it has been found to be a more sensitive modality for identifying regions with such low cerebral blood flow. It has been shown that despite a normal dynamic susceptibility contrast examination of acute stroke patients at the early stage, the acute episode developed longer ADC thresholds, and restrictions in these thresholds were found in MRI treatments [9]. DWI has another important outcome independent of its ability to visualize infarct that occurs in acute stroke. This imaging technique allows us to identify blood flow via imaging and, consequently, to calculate the absolute brain blood volume. DWI has a role independent of guidance to detect specific regions such as brainstem stroke. DWI, on the other hand, is known to be extremely sensitive in detecting new ischemic events within minutes. Due to the aforementioned advantages, functional tissue defect volume estimation can provide different results in patient populations and may predict outcomes beyond the development of specific techniques aimed at tissue grouping and collateral-driven treatment [10-15]. The importance of MRI in the hyperacute phase, other than for stroke treatment time, is not well mastered. The posterior incidence of the stroke pattern in the brainstem is important, and MRI is more sensitive than CT in stroke diagnosis. In acute stroke patients, a precise diagnosis is crucial since both stroke pathogenesis and early treatment decisions depend on it. In particular, when considering an AIS patient for endovascular treatment, the location, size, and specific type of the acute ischemic lesion become crucial information for the neuro-interventional team. Patients are usually assessed using non-contrast enhanced CT. While this method is particularly sensitive for the exclusion of ICH and skull fractures or deformations, magnetic resonance imaging provides superior results with respect to an ICH-negative diagnosis. With

diffusion-weighted imaging, MRI is highly sensitive for early AIS diagnosis as it visualizes the cytotoxic edema precursor to the preceding cytotoxic necrosis [16]. This imaging technique has demonstrated substantial success in this setting and has earned considerable market share over the last 15 years. DWI sequences with optimal magnetization-preparation for signal contrast with the lowest b-value possible provide sufficient tissue contrast, signal-to-noise ratio, and image quality, yet are time-consuming [17,18].

Routine MRI images such as T2-weighted imaging or T1-weighted imaging with or without contrast enhancement have only limited importance in the first 24 hours after symptoms begin. These techniques only become of interest after the first day to detect or investigate further potential ischemic or hemorrhagic complications. Multi-parametric MRI, including time-of-flight angiography or contrast-enhanced MRI angiography sequences/ arteriography protocols, are much more frequently used for non-acute or chronic problems outside the therapeutic time window [19,20]. The combination of 4D angiography with blood flow imaging provides hemodynamic information about the collateral status of the ischemic area, which might help to evaluate the patient individually to potentially select the subgroup of patients with a higher chance of treatment success even after a long interventional time window. With such information, the decision-making process appears more complex than the time criteria usually suggest [21].

Diffusion-weighted MRI (DWI) plays a crucial role in the early diagnosis of acute ischemic stroke, with the b-value being a critical parameter influencing image quality and diagnostic accuracy While higher b-values reduce signal-to-noise ratio, they significantly enhance contrast-to-noise ratio, potentially improving the detection of subtle ischemic changes in hyperacute stroke settings.

Study objectives are to investigate the feasibility of using low b values for T2-weighting based on acute ischemic stroke visual diagnosis and to compare the results of this method with the accuracy of infarction site determination using actual T2-weighting with standard values of b. For the selection of the b0, b=300 s/mm² and b=900 s/mm² b-values, the following information was taken into account. The image, which is obtained at b0, corresponds to T2-weighting, providing images of the brain with a high signal and offers the best opportunity to evaluate the general and focal characteristics of different organic structures [22]. The image, which is obtained at b=300 s/mm², is called high metaphrase contrast image and is most sensitive to the metabolism processes in cerebral tissue.

Materials and Methods.

The simplest method for modelling diffusion is to take into account either Gaussian or free diffusion. The r displacement of a random spin from its initial position and the period t through which this displacement is recognised in one dimension are related by Einstein's equation as show below:

$$\left\langle r^2 \right\rangle = 2Dt \tag{1}$$

where t is the amount of time needed for the spin to disperse, and D is the coefficient of diffusion [23]. It is common practice to incorporate the impact of duration into the signal equation based on this assumption by defining the b-value. The b-value provides information about the timing and amplitude of the gradients used to create diffusion-weighted pictures. The greater the b-value, the bigger the diffusion effects [24]. The following equation demonstrates how the b-value's influence may be seen clearly in MR images:

$$S = S_0 e^{-b.D} \tag{2}$$

where D is the coefficient of diffusion, S_0 is the MR standard signal, and is the resulting MR signal. Before imaging, the operator $e^{-b.D}$ calculates the value of b. Following this calculations, the observed diffusion-weighting level can be adjusted. Diffusion is therefore an additional relaxing step in addition to T1 and T2. This relaxing process affects the final signal by just 5% in pulse sequences without additional diffusion gradients. The main tissue contrast mechanism is diffusion; however, the presence of diffusion gradients greatly increases its effect.

The strength, duration, and separation between these pulsed gradients all affect the b-value [25]. The gradient amplitude, duration, and interval between gradient pulses must all be raised in order to raise the b-value, as indicated by the following equation:

$$b = \gamma^2 G^2 \delta^2 \left(\Delta - \frac{\delta}{3} \right) \tag{3}$$

The Stejskal-Tanner diffusion pulse sequence [24,25] illustrates this, with γ representing the gyromagnetic ratio, δ the gradient amplitude, G the gradient length, and Δ the time interval between the diffusion gradients.

The accuracy of prospective stroke diagnosis is the main focus of our research. A patient who was enrolled in this research provided the data. An acute cerebral stroke has been found in a 44-year-old woman. The patient underwent a 1.5 T brain MR scan (Siemens Healthiness-Magnetom Sempra) at Anwar Shekha's medical city/radiology department. A 16-channel phased-array head and neck coil was utilised, along with a pulse sequence shown in Figure 1. The imaging procedure was used to gather the data, and a diffusion-weighted sequence with difference b-values of (a) 0-1000 s/mm², (b) 100-1000 s/mm², (c) 200-1000 s/mm², and (d) 300-1000 s/mm² was part of the brain routing. Notably, the MR technique comprised Axial DWI without contrast. The stroke was then shown using the ADC (Appear diffusion coefficient) value, a quantitative metric obtained from DWI [25,26]. Single-shot echo-planar imaging (SS-EPI) was used to produce diffusion pictures in the axial plane, with selective fat suppression chemical agents used to suppress the fat. A "high" repetition rate (TR) of 5800 ms, a "short" echo time (TE) of 113 ms, and an axial slice thickness of 5 mm were used to get the diffusion. The ideal b-factor varied between around 300 and 1000 s/mm² when various b-values were computed for acute stroke. It is preferable to maintain the frequently used b factor at its highest value of s/mm² rather than raising it to s/mm² when using a single b factor to assess acute stroke.

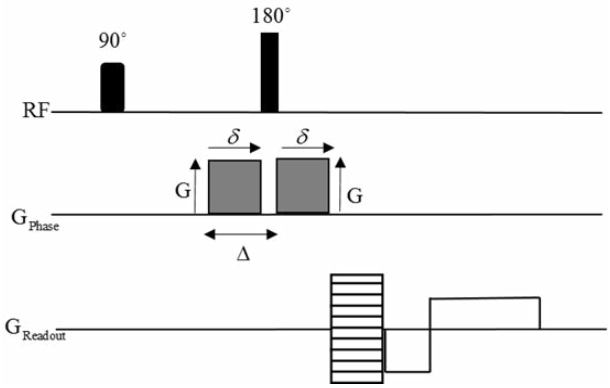

Figure 1. *Diffusion-weighted pulse sequence (DWI). As Show in Equation 3, where γ is the gyromagnetic ratio, G is the gradient amplitude, δ is the gradient duration, and Δ is the time interval between the diffusion gradients, determines the parameters that are utilized to obtain the b-values.*

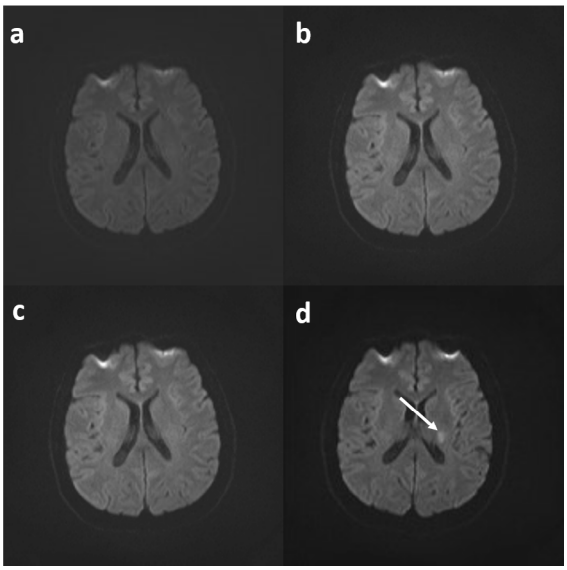

Figure 2. *MRI layer Section 1: Acute stroke in the brain has been identified in a 44-year-old lady. Various b-values have been employed to improve the diagnosis of acute stroke: 0-1000 mm/s^2 (a) and 100-1000 mm/s^2 (b). 200–1000 mm/s^2 (c) and 300–1000 mm/s^2 (d). The findings indicate that b-values between 300 and 1000 mm/s^2 are better than other values.*

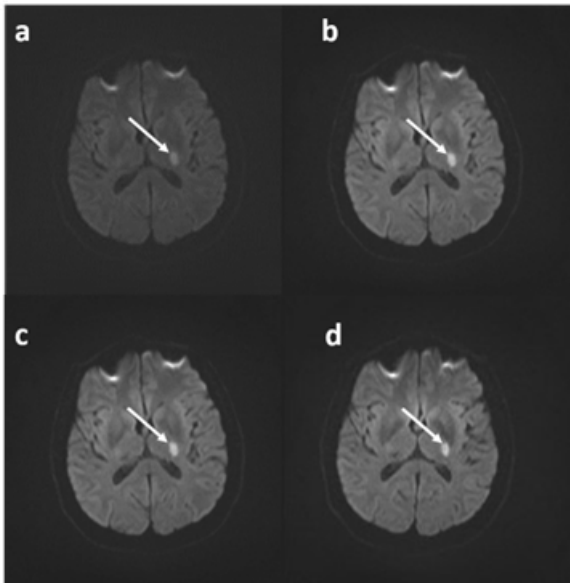

Figure 3. *MRI layer Section 2: Acute stroke in the brain has been identified in a 44-year-old lady. Various b-values have been employed to improve the diagnosis of acute stroke: 0-1000 mm/s² (a) and 100-1000 mm/s² (b). 200–1000 mm/s² (c) and 300–1000 mm/s² (d). The findings indicate that b-values between 0 and 1000 mm/s² are less sensitive than other values.*

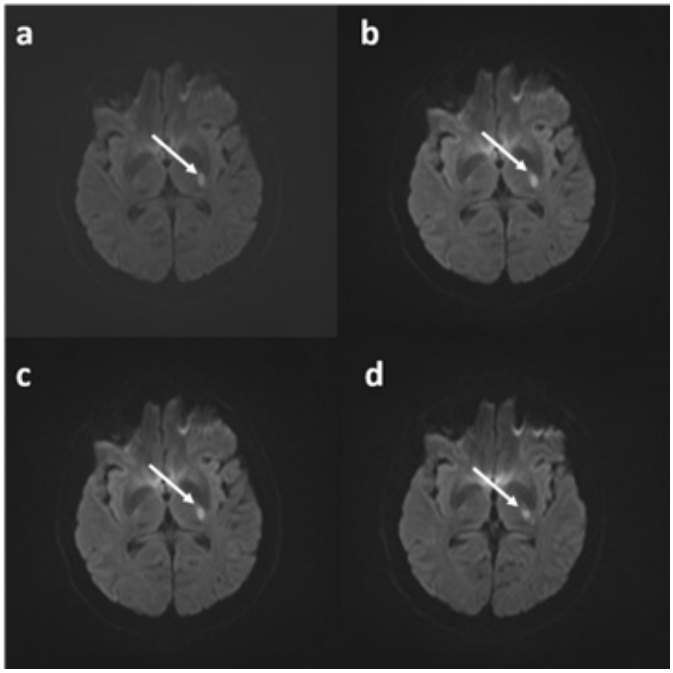

Figure 4. *MRI layer Section 3: Acute stroke in the brain has been identified in a 44-year-old lady. Various b-values have been employed to improve the diagnosis of acute stroke: 0-1000 mm/s² (a) and 100-1000 mm/s² (b). 200–1000 mm/s² (c) and 300–1000 mm/s² (d). The findings indicate that b-values between 0 and 3000 mm/s² are superior than other values.*

Results and Discussion.

The image dataset was gathered and shown in Figures 2,3 and 4 which demonstrate various b-values to provide a clearer picture of acute stork. It is evident that the ideal b-value for acute stock vision is between 300 and 1000 s/mm^2.

To achieve a larger b value, increase the gradient's duration and amplitude as well as the time between two gradient pulses [27-30]. The findings show that the appearance of acute stroke in the Diffusion-weighted Imaging (DWI) method for this specific patient can be influenced by varying b-values. The findings go counter to Chilla's [30] assertions that values of about 1000 s/mm^2 are ideal. When deciding how to employ various b-values for better diagnosis of brain acute stroke These findings should be considered worldwide to achieve an accurate diagnosis, including in Iraq [32,35]. Our result in in line with several studies conducted about the importance of b value for getting best imaging but our result ger certain umber of b value [36,37]. However, the results cannot be shown with fresh clinical cases because of the small number of patients. Future research directions might involve adding additional individuals to this regimen in order to obtain precise diagnosis.

Conclusion.

For acute stroke, diffusion-weighted imaging magnetic resonance imaging (MR) offers a superior diagnostic tool. Results for acute stroke disease vary significantly depending on the b-value used. In theory, b-values depend on the various parameters, as does equation (3). DW MR images were used to analyse the appearance of the acute stroke brain as the diffusion gradient strength (b value) increased from 0 to 1,000 s/mm^2. A higher b value in DW pictures has enhanced the ability to detect the stroke area. Better findings can be obtained in future studies by expanding the number of patients and investigating the selected b-values at 3T rather than 1.5T.

Limitations and Future Directions.

We can also use a DNN-based DC-tuning method to further explore the associations between the optimized b-values and stroke diagnosis and compare the stroke detection performance between using the proposed dynamic b-value and only commonly used b-values. We expect to validate the necessity of the dynamic selection of b-values when detecting a representative b-value for better acute stroke diagnosis. Since the proposed dynamic b-value range throttling sets relevant b-values of each stroke to the usual optimized range, we can directly compare stroke detection performance between using the proposed dynamic b-value and only using the conventional optimal b-value at their corresponding condition for all strokes and small and large vessel subtypes. Our MRI stroke detection study is currently based on the clinical stroke corpus and can be further enlarged by including more clinical stroke datasets of general stroke populations, thus yielding a more potential practical detection model. Also, considering our proposed method's futuristic and significant application in clinical stroke diagnosis using MRI technologies, particularly the advanced and automatic large vessel detection algorithm, and the system incorporating those DNNs is further developed for broader clinical applications, along with rapid upgrades. Additionally, apart from the proposed therapeutic time detection for stroke clinical applications, the proposed dynamic b-value definition can also be used to develop longitudinal and repeated MRI scan models at different optimal b-value sets that are suitable for tracking the stroke progression of individual patients or different cohort groups.

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Author contribution

H S H: conducting the research, Methodology, draft writing, A J A: Editing, statistical analysis, Figure providing; H A A : Proofreading , Editing , writing the original article.

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Conflict of interest.

None.

Ethical Approval.

This research was conducted after obtaining approval from the Iraq Medical Center (REF. no: 2935 \ 7\2023) and according to the Helsinki Agreement not to harm any human being and not to cause any side effects on humans. The experiment included only the use of the MRI device on volunteers with their knowledge, there is no medication or harm substance tested on them, written consent was obtained from them before starting the experiment.

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