5. Litovka IH, Berezovskyy VYa. Vplyv mahniyu na remodelyuvannya kistkovoyi tkanyny. Fiziol. zhurn. 2018; 3(64):91–99. doi: 10.15407/fz64.03.091 [in Ukrainian].
6. Mayboroda RYe. Kompyuterna statystyka: pidruchnyk. Kyyiv: VPTS Kyyivskyy universytet. 2019. 589. [in Ukrainian].
7. Osypchuk RI, Zhyhulova EO, Zdanyuk VV, Markovych OV. Dotsilnist zastosuvannya diyetychnoho kharchuvannya v prohramakh fizychnoyi terapiyi. Rehabilitation and Recreation. 2023; 15:95–100. doi: 10.32782/2522-1795.2023.15.12. [in Ukrainian].
8. Chukhray N, Mashkarynets O, Lysak T, Bodnaruk N, Lysak M. Stomatolohichnyy status ditey na tli somatychnoyi patolohiyi (ohlyad literatury). Via Stomatologiae, 2024;1(2):5–15. doi: 10.32782/3041-1394.2024-2.1. [in Ukrainian].
9. Godovanets O, Kotelban A, Romaniuk D, Moroz P. Clinical features of the caries course of temporary teeth in children. Wiad Lek. 2023;76(7):1549–1553. doi: 10.36740/WLek202307106.
10. Gun ZH, Arif A, Boyce AM. Fibrous dysplasia in children and its management. Curr Opin Endocrinol Diabetes Obes. 2024 Feb 1;31(1):60–66. doi: 10.1097/MED.0000000000000847.
11. Hensel ALJ, Nicholson K, Anderson KK, Gomaa NA. Biopsychosocial factors in oral and systemic diseases: a scoping review. Front Oral Health. 2024 May 30; 5:1378467. doi: 10.3389/froh.2024.1378467.
12. Klitynska OV, Stishkovskyy AV, Hasiuk NV, Avetikov DS, Ivaskevych VZ. Statistical analysis of the impact of clusters on caries prevalence and intensity in children aged 6–7 with different somatic health statuses. Wiad Lek. 2020;73(3):434–440.
13. Lippert F, Martinez-Mier EA, Zero DT. An in situ caries study on the interplay between fluoride dose and concentration in milk. J Dent. 2014;42(7):883–90. doi: 10.1016/j.jdent.2014.01.010.

Стаття надійшла 5.07.2023 р.

DOI 10.26724/2079-8334-2024-3-89-173-177
UDC 616-003.92:618.46:612.59

O.A. Toropov, V.O. Lychman, D.V. Steblovskyi, I.V. Boiko, O.P. Bukhanchenko, P.I. Yatsenko, O.S. Ivanytska
Poltava State Medical University, Poltava

EFFECT OF PLACENTAL CRYOEXTRACT ON SCAR TISSUE FORMATION AFTER ELECTIVE SURGERY IN PATIENTS WITH MORNING CHRONOTYPE

e-mail: o.toropov@pdmu.edu.ua

In the realities of today, the number of maxillofacial injuries is growing every day, which increases the number of people who visit maxillofacial surgeons, which in turn leads to an increase in the percentage of pathological scarring. Previous studies have shown that the formation of scars after surgery is also influenced by a person's chronotype. Circadian rhythms play a fundamental role in the regulation of basic functions in the human body, such as changes in body temperature, hormone secretion, cognitive and physical abilities, etc. Placental cryo-extract has a positive effect on wound healing throughout the entire treatment period. The main factor is the chronotype of a person, so in people with a morning biorhythm who underwent surgery in the first half of the day, the indicators are better than in patients who underwent surgery in the second half of the day.

Key words: cryopreserved placenta, scar, chronotype, extract, skin, biological rhythms.

О.А. Торопов, В.О. Личман, Д.В. Стебловський, І.В. Бойко, О.П. Буханченко, П.І. Яценко, О.С. Іваницька

ВПЛИВ КРІОЕКСТРАКТУ ПЛАЦЕНТИ НА УТВОРЕННЯ РУБЦЕВОЇ ТКАНИНИ ПІСЛЯ ПРОВЕДЕННЯ ПЛАНОВИХ ОПЕРАТИВНИХ ВТРУЧАНЬ У ПАЦІЄНТІВ ІЗ РАНКОВИМ ХРОНОТИПОМ

У реаліях сьогодення кількість щелепно-лицевих травм зростає з кожним днем, це збільшує аудиторію яка звертається до щелепно-лицевих хірургів, що в свою чергу веде до збільшення відсотка утворення патологічний рубців. Попередні дослідження показали, що на формування рубців після хірургічних утручань також впливає хронотип людини. Циркадні ритми відіграють фундаментальну роль у регуляції основних функцій в організмі людини таких як, зміна температури тіла, секреція гормонів, когнітивних і фізичних здібностей та інші. Кріоекстракт плаценти позитивно впливає на загоєння рани протягом всього терміну лікування. Головним фактором виступає хронотип людини, так у осіб з ранковим біоритмом яким оперативні втручання проводилися о першій половині доби показники кращі, ніж у пацієнтів яким оперативні втручання проводилися у другій половині доби.

Ключові слова: кріоконсервована плацента, рубець, хронотип, екстракт, шкіра, біологічні ритми.

The work is a fragment of the research project "Algorithm for the complex treatment of inflammatory processes and prevention of the formation of pathological scars of the scalp and neck after planned and urgent surgical interventions", state registration No. 0124U000093.

In the realities of today, the number of maxillofacial injuries is growing every day, which increases the number of people who visit maxillofacial surgeons, which in turn leads to an increase in the percentage of pathological scarring [4].

Despite the fact that there is currently a strong interdisciplinary interest and a significant amount of literature on the prevention and treatment of pathological postoperative scars, international guidelines

and treatment regimens still do not correspond to current knowledge and practice in many medical institutions [1, 13]. Ideally, in order to minimize the appearance of facial scars and optimize the cosmetic result, the process should begin with planning the surgery, proper selection of suture material, and proper wound care in the postoperative period [7, 12].

Previous studies have shown that the formation of scars after surgery is also influenced by a person's chronotype. Circadian rhythms play a fundamental role in the regulation of basic functions in the human body, such as changes in body temperature, hormone secretion, cognitive and physical abilities, etc. [11].

The term “chronotype” is used to describe the individual characteristics of a person's circadian rhythm [3]. Swedish psychologist Oskar Okvist in his research identified three main types of chronotypes:

– Morning type (“larks”);

– Intermediate (“pigeons”);

– Evening type (“owls”).

According to his research, 20 % of all chronotypes are morning, 60 % are intermediate, and the remaining 20 % are evening chronotypes. Thus, morning chronotypes include people who wake up early and are active mainly until noon. People with an intermediate chronotype wake up 1–2 hours later but are active throughout the day. Evening chronotypes wake up later and are less productive before lunch, but more productive in the evening.

Circadian rhythms play an important role in environmental adaptation and survival. Previous studies have shown that biological rhythms affect not only the mental state, but also the recovery functions in wound healing and postoperative rehabilitation [10].

The purpose of the study was to establish the effect of the patient’s chronotype on the postoperative course and wound healing on the 90th, 180th, and 360th day, depending on the patient's chronotype and the time of the surgical intervention.

Materials and methods. The study was carried out in 2023–2024 on the basis of the Department of Maxillofacial Surgery of the KP “Poltava M.V. Sklifosovsky Regional Clinical Hospital” of the Poltava Regional Council.

A total of 30 patients who were hospitalized for planned surgical interventions in the head and neck area took part in the study. Before hospitalization, patients were interviewed using a test to determine the chronotype of human performance and examined on the 90th, 180th and 360th day.

Based on the survey data, patients were divided into the following groups:

Group 1 – 10 patients with a pronounced morning chronotype who underwent injection of placental cryoextract during surgery, included two subgroups.

– 1.a group – 5 patients who underwent surgery in the morning.

– 1.b group – 5 patients who underwent surgery in the afternoon.

Group 2 – 10 patients with a pronounced morning chronotype who underwent combined injection of placenta cryoextract during the surgical intervention at the intraoperative stage and additionally by electrophoresis in the postoperative period on the 90th and 180th day, included two subgroups:

– 2.a group – 5 patients undergoing surgery in the morning.

– 2.b group – 5 patients undergoing surgery in the afternoon.

Patients of group 3 with a pronounced morning chronotype were operated on according to the classical methodology without the use of additional preventive measures.

– 3.a group – 5 patients who underwent surgery in the morning.

– 3.b group – 5 patients, respectively, who underwent surgery in the afternoon.

The following parameters were used to obtain the results and to assess wound healing and scar formation:

P-1 – Vascularization (from 0–2 points);

P-2 – Pigmentation (from 0–2 points);

P-3 – Height of the scar (from 0–2 points);

P-4 – Surface (from 0–2 points);

P-5 – Scar density (from 0–2 points);

P-6 – Subjective feelings of the patient (itching) (from 0–2 points);

P-7 – Subjective feelings of the patient (pain) (from 0–2 points).

Results of the study and their discussion. During the routine examination of patients who underwent surgery in the first half of the day on the 90th day of the clinical trial in group 1.a, the total score was 30 points, in group 2.a this index was the best and less by 36.6 % of 1.a and amounted to 19 points, group 3.a – 38 points, which is 21.1 % more than in 1a and 50 % more than in 2a (fig. 1).

As for patients with morning chronotype who underwent surgery in the second half of the day, we have the following results: 1.b – 34 points, a more optimal result was obtained in group 2.b, which was 25 points, which is 26.5 % less than in group 1.b and 45.6 % less than in the control group, whose score was 46.

On the 180th day of the clinical trial, the total score in group 1.a was 21 points, in group 2.a – 11 points, and in group 3.a – 26 points. Analyzing the results, we can note the following: the best result was in group 2.a, in this group, placenta cryoextract was used intraoperatively and electrophoresis on the 90th and 180th day postoperatively. Comparing the results of group 2.a with the other groups, the following data were obtained, namely, the index of this group was 47.6 % lower compared to 1.a and 57.7 % lower than 3.a, respectively (fig. 2).

On day 180, during the examination of patients who underwent surgery in the second half of the day, the following results were obtained. Patients in the control group scored 32 points, which is 21.8 % more than in patients of group 1.a, who scored 25 points. Patients in group 2.b with an additional method of prevention scored 16 points, which is 36 % less than in group 1.a and 50 % less than in the control group with a total score of 32 points.

Analyzing the data on day 360 of the clinical trial, we observed that the total number of points in group 2.a (4 points) was 50 % less than in group 1.a and 71.4 % less than in group 3.a (fig. 3).

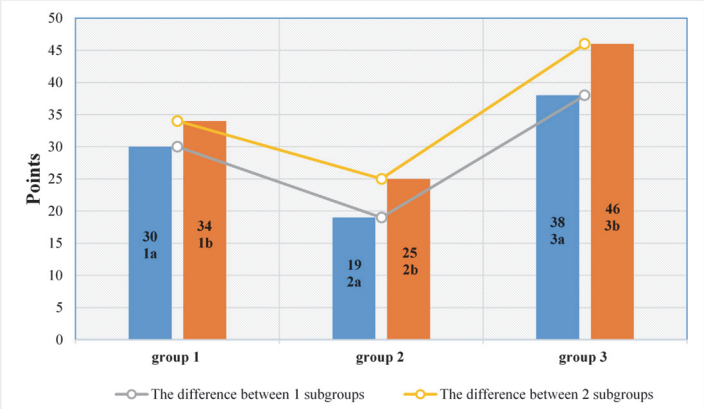

Fig. 1. The total amount of indices for 90 days of research

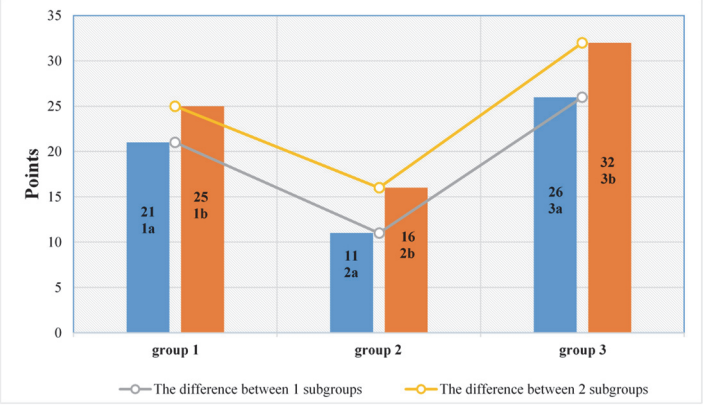

Fig. 2. The total amount of indices for 180 days of research

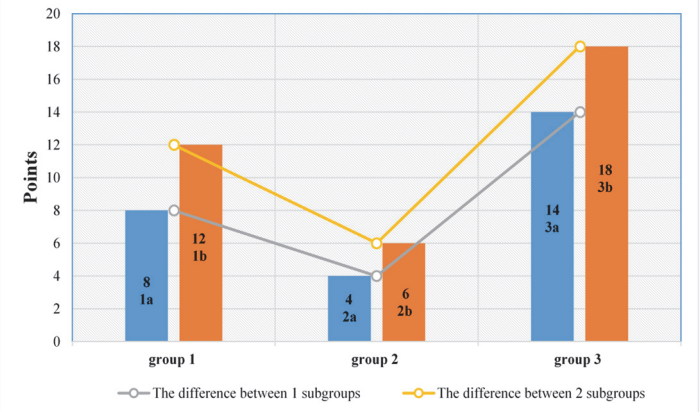

Fig. 3. The total amount of indices for 360 days of research

In patients with morning chronotype who underwent surgery in the second half of the day, we have the following results: 1.b – 12 points, a more optimal result was obtained in group 2.b, it was 6 points, which is 50 % less than in group 1.a and 66.7 % less than in the control group, whose score was 18.

Analyzing the received digital data of P-1 – P-7 indicators in group 2.a patients, we have the following data.

The P-1 index on the 180th and 360th days of the clinical study did not differ and had a value of 0, and the indicators on the 90th and 180th days of the clinical study did not show a significant difference.

The index P-2 – skin pigmentation – on the 180th and 90th days significantly decreased, this applies to the 90th and 360th days, and the difference between the 180th and 360th days was not observed.

Index P-3 – the height of the scar above the surface of the skin – on the 180th day of the clinical study decreased by 66.0 % compared to the 90th day. In patients with a morning type of chronotype, on the 360th day, this index decreased by 75 % relative to the previous period of the study (180th day), the difference in the decrease of the index by 75 % was established between the 360th and 90th days.

The index P-4 – scar surface – on the 180th day compared to the 90th, differed, but insignificantly, decreasing by 25.0 %. Comparing this index, a significant difference of 75.0 % was observed between the 360th and 90th days of the clinical trial, and it decreased by 66.7 % between the 360th and 180th days, respectively.

Index P-5 – the difference in scar density indicators between the 90th and 180th days was 44.4 %, the indicator was smaller on the 180th day of the study. This index was 77.8 % lower than on the 360th day compared to the 90th day, and 60 % lower than on the 180th day.

The P-6 index on the 180th was less than 14.3 % compared to the previous term, and on the 360th day it reached zero values compared to the previous terms.

Index P-7: 1 patient complained of mild pain on the 90th day, no difference was found between the 180th and 360th days, which indicated the absence of pronounced pain sensations in all patients.

Analyzing the digital data of the indices in groups 3.a and 3.b, it should be noted that none of them reached zero at the end of the observation period, and the digital data of all 7 indices on the 360th day were probably greater in 3.b, than similar indices in group 3.a, which must be taken into account when planning surgical intervention.

Chronotype, also known as a circadian clock, is a partially genetically determined construct expressing a person's activity in a certain period [6, 9].

Approximately 10 % of the world's population has an evening chronotype, which is associated with poor metabolic regulation, impaired glycemic control, metabolic disorders, and a high incidence and prevalence of type 2 diabetes [8]. This suggests that the mismatch between chronotype and working time may increase the impact of chronotype on the risk of various pathologies [2, 5].

Analyzing the digital indices and the data obtained by clinical groups, it should be noted that the best result was obtained in group 2.a, it was in this group that during the surgical intervention a combined injection of the placenta cryoextract preparation was performed at the intraoperative stage and additionally by electrophoresis in the postoperative period on the 90th and 180th day.

The slightly lower rates of group 2.b can be explained by the fact that patients with the morning chronotype underwent surgical interventions in the second half of the day, which could cause desychronosis.

Positive results were observed in group 1a, these are patients with the morning type of chronotype who underwent surgery in the morning and were administered the drug at the intraoperative stage, but without additional prophylactic methods. In group 1.b, it is also worth noting the optimal result compared to the control group.

The data obtained will confirm the previous research of our department on circadian rhythms, which directly indicates that the biological clock has an impact on reparative processes [1].

Conclusion

Placental cryo-extract has a positive effect on wound healing throughout the entire treatment period. The main factor is the chronotype of a person, so in people with a morning biorhythm who underwent surgery in the first half of the day, the indicators are better than in patients who underwent surgery in the second half of the day. Comparative analysis of the data obtained on the 90th and 360th day showed a decrease in group 1.a by 73.3 %, in group 1.b by 64.7 %, in group 2.a by 78.9 %, in group 2.b by 76 %.

Comparing the indices in the control groups, we have the following: none of the seven indices had 0 values, and the difference between the indices on day 360 was 71.4 % greater between 3.a and 2.a, and 66.7 % greater between 3.b and 2.b.

References

1. Avetikov DS, Bukhanchenko OP, Ivanytskyi IO, Aipert VV, Steblovskyi DV. Perspectives for applying the additional study methods for diagnostics optimization of postoperative hypertrophic scars of the head and neck. Wiad Lek. 2018;71(3):470–473.
2. Belfry KD, Deibel SH, Kolla NJ. Time of Day Matters: An Exploratory Assessment of Chronotype in a Forensic Psychiatric Hospital. Front Psychiatry. 2020;11:550597. Published 2020 Dec 18. doi:10.3389/fpsyt.2020.550597.
3. Ekstein SF, Wyles SP, Moran SL, Meves A. Keloids: a review of therapeutic management. Int J Dermatol. 2021;60(6):661–671. doi:10.1111/ijd.15159.
4. Khanji MY, Karim S, Cooper J, Chahal A, Aung N, Somers VK, et al. Impact of Sleep Duration and Chronotype on Cardiac Structure and Function: The UK Biobank Study. Curr Probl Cardiol. 2023 Jul;48(7):101688. doi: 10.1016/j.cpcardiol.2023.101688.
5. Kianersi S, Liu Y, Guasch-Ferré M, Redline S, Schernhammer E, Sun Q. Chronotype, Unhealthy Lifestyle, and Diabetes Risk in Middle-Aged U.S. Women: A Prospective Cohort Study. Ann Intern Med. 2023;176(10):1330–1339. doi: 10.7326/M23-0728.
6. Kim HJ, Kim YH. Comprehensive Insights into Keloid Pathogenesis and Advanced Therapeutic Strategies. Int J Mol Sci. 2024;25(16):8776. Published 2024 Aug 12. doi:10.3390/ijms25168776.
7. Kurtović A, Talapko J, Bekić S, Škrlec I. The Relationship between Sleep, Chronotype, and Dental Caries-A Narrative Review. Clocks Sleep. 2023;5(2):295-312. Published 2023 May 15. doi:10.3390/clockssleep5020023.
8. Magnani L, Aguglia A, Alexander J, Maiorano A, Richard-Lepouriel H, Iancau SP, et al. Evening Chronotype and Suicide: Exploring Neuroinflammation and Psychopathological Dimensions as Possible Bridging Factors-A Narrative Review. Brain Sci. 2023;14(1):30. Published 2023 Dec 28. doi:10.3390/brainsci14010030.

9. Montaruli A, Castelli L, Mulè A, Scurati R, Esposito F, Galasso L, et al. Biological Rhythm and Chronotype: New Perspectives in Health. Biomolecules. 2021;11(4):487. Published 2021 Mar 24. doi:10.3390/biom11040487.
10. Obi EE. Surgical considerations in skin of colour: minimizing pathological scars. Clin Exp Dermatol. 2022;47(8):1429–1437. doi:10.1111/ced.15147.
11. Schulz A, Shoham Y, Rosenberg L, Rothermund I, Perbix W, Christian Fuchs P, et al. Enzymatic Versus Traditional Surgical Debridement of Severely Burned Hands: A Comparison of Selectivity, Efficacy, Healing Time, and Three-Month Scar Quality. J Burn Care Res. 2017;38(4):e745–e755. doi:10.1097/BCR.0000000000000478.
12. Seago M, Shumaker PR, Spring LK, Alam M, Al-Niaimi F, Rox Anderson R, et al. Laser Treatment of Traumatic Scars and Contractures: 2020 International Consensus Recommendations. Lasers Surg Med. 2020;52(2):96–116. doi:10.1002/lsm.23201.
13. Tarasenko LM, Neporada KS, Klusha V. Stress-protective effect of glutapyrone belonging to a new type of amino acid-containing 1,4-dihydropyridines on periodontal tissues and stomach in rats with different resistance to stress. Bull Exp Biol Med. 2002;133(4):369–371. doi:10.1023/a:1016250121896.

Стаття надійшла 19.08.2023 р.

DOI 10.26724/2079-8334-2024-3-89-177-183
UDC 616-008.815+612.015.1+616.832-004.2

I.K. Churpiy, V.A. Hryb, S.L. Popel, I.I. Liskevych, Yu.S. Kuravska, V.I. Hrynchak, L.A. Pylypiv
Ivano-Frankivsk National Medical University, Ivano-Frankivsk

MORPHOLOGICAL AND FUNCTIONAL CHANGES OF ERYTHROCYTES AND ENZYMES OF THE ANTIOXIDANT SYSTEM IN MULTIPLE SCLEROSIS

e-mail: ch.igor.if@gmail.com

In the pathochemical complex formed in multiple sclerosis, the central role is given to the disintegration of metabolism, activation of lipid peroxidation processes, and suppression of the antioxidant defense system. The results of the conducted research indicate that in the pathogenesis of multiple sclerosis, significant importance is attributed to the activation of enzymatic and free radical lipid oxidation of erythrocyte cell membranes in conditions of complete or partial inability of antioxidant defense mechanisms. The consequence is significant changes in the structure of erythrocyte membranes and their functions. The detected destructive changes in erythrocytes correlate with the severity of clinical manifestations of multiple sclerosis, thus, they can be used not only to determine the severity of the disease but also for predicting its course, as well as monitoring the quality and effectiveness of therapeutic interventions in such patients.

Key words: multiple sclerosis, antioxidant defense mechanisms, erythrocyte membranes.

І.К. Чурпій, В.А. Гриб, С.Л. Попель, І.І. Ліскевич, Ю.С. Куравська, В.І. Гринчак, Л.А. Пилипів

МОРФО-ФУНКЦІОНАЛЬНІ ЗМІНИ ЕРИТРОЦИТІВ ТА ФЕРМЕНТІВ АНТИОКСИДАНТНОЇ СИСТЕМИ ПРИ РОЗСІЯНОМУ СКЛЕРОЗІ

У патохімічному комплексі, що формується при розсіяному склерозі, центральне місце відводиться дезінтеграції метаболізму, активації процесів перекисного окислення ліпідів і пригніченню системи антиоксидантного захисту. Результати проведеного дослідження свідчать, що в патогенезі розсіяного склерозу значне місце належить активації ферментативного та вільнорадикального окиснення ліпідів клітинних мембран еритроцитів в умовах повної або часткової неспроможності механізмів антиоксидантного захисту. Наслідком є значні зміни структури клітинних мембран еритроцитів та їх функції. Виявлені деструктивні зміни еритроцитів корелюють з важкістю клінічних проявів розсіяного склерозу, а значить, багато в чому їх визначають, що можна використовувати для визначення не тільки важкості захворювання, але й для прогнозування його перебігу, а також контролю за якістю та ефективністю терапевтичних заходів у таких пацієнтів.

Ключові слова: розсіяний склероз, антиоксидантний захист, мембрани еритроцитів.

The work is a fragment of the research project "Clinical-pathogenetic parallels of diagnosis, treatment and prevention of vascular and neurodegenerative diseases of the nervous system", state registration No. 0121U109419.

The steady increase in prevalence and severe socio-economic consequences of multiple sclerosis (MS) make it necessary to further analyze this pathology, especially the study of its pathogenesis, as a key to finding promising methods of pathogenetic therapy [6]. In the pathochemical complex formed in MS, the central place is given to the disintegration of metabolism, the activation of lipid peroxidation processes (LPP) and the inhibition of the antioxidant defense system (ADS). The relationship between disorders in the immune system and the accumulation of LPP-lipoperoxide products in the body has been established. Excessive retention of LPP products in the body serves as one of the factors in the formation of autoimmune responses, while the state of the health system can determine the degree of recovery of neurological deficits. To reveal the pathogenetic mechanisms of tissue and cellular damage formation in MS, it is of great interest