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METHODS OF DIAGNOSIS AND TREATMENT

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ROLE OF MRI «TOTAL BODY» IN EARLY DIAGNOSIS OF VARIOUS DISEASES

ABSTRACT

This article dwells on whole-body MRI «Total Body» efficacy as the choice method for whole-body screening for the purpose of early diseases diagnostics. On the basis of whole-body MRI analyses during one and a half year we've got the results allowing speaking about a new precise and reliable method for revealing pathology of minimal dimensions in any organ, including malignant tumors.

Keywords: screening, whole-body MRI, CT, diseases, radiation.

INTRODUCTION

Whole body Magnetic and Resonance Tomography (MRI) allows studying a morphological picture of all organs and tissues with the detailed image that provides diagnose the development of many malconditions at early stages.

Accumulation of the large volume of statistical data obtained as a result of magnetic and resonance tomography methods penetrated into common diagnostic practice leads to the expected

number of new methodologically issued standards of protocols of program MRI researches. Some new protocols of the MRI program settings allow conducting complex «blind» trial searching of various malconditions on the background of lack of complaints and, apparently, the complete wellbeing of the patient. These complex researches are united by:

- the larger size of the explored area together with its natural and pathological tissues polymorphism – it investigates

whole body or its majority with all organs and systems of organs and tissues of the explored site;

- technologies complexity – in the course of the research, according to prearranged program, MR-tomograph switches on/off various modes of scanning and processing of the received images for identification of pathological changes, different in structure;

- cross-sectional study – whole body testing of the patient or its majority

part is made in a continuous cycle, for one positioning of the patient ;

- noncontact, noninvasive – means the result of high-contrast native images of all organs and tissues.

As a result of such researches - they can be united under the name MRI «TOTAL BODY» (whole body) or in abbreviation «TB» - in a number of cases, there is an identification of the pathological changes, absolutely unexpected for the patient, which are not accompanied with any symptomatology [2]. Besides, it should be noted that validity of MRI «TOTAL BODY» is defined by absolute harmlessness and safety of this research, there is no radiation exposure and minimum contraindications. Frequency of the research and age groups are without restrictions, and recently, foreign researches proved MRI safety for pregnant women [6,10,12,15,16]. Practical accumulation of the considerable number of the performed TB, with the revealed pathological deviations, allows starting analyses of its diagnostic value and possible new, more extended possibilities.

Recently the considerable attention was concentrated on visualization screening of whole body for early disease diagnostics [14]. Screening means systematic survey of the body for detection of the unexpected, latent pathologies. The optimum candidate for the screening is the person without any symptoms of any disease. Good screening - the test has to be highly sensitive and specific to reduce number of false positive results.

Until recently the Computer tomography (CT-screening Total body) has been used, however, this method possesses a number of weak points: radiation, obligatory use of the intravenous contrast agent. Also, there is a growing concern in medical community that CT - screening of Total body leads to a large number of the doubtful conclusions demanding padding procedures, including operations, creating padding scratches and expenses for the patient [8]. In this connection interest in receiving «safe» MR-screening - the tests displaying internal structure of whole body of the patient throughout the head to toe [2], without obligatory use of the contrast agent has increased. The potent magnetic field and radio-frequency energy of MRI are safe, it cannot be the cause of cancer or anomalies of fetus, unlike the ionizing radiation (X-rays) used in CT which is the known reason of cancer and anomalies of fetus [11]. Gadolinium containing intravenous

contrast agents used in MRI is also much safer, than similar agents on the basis of iodine used in CT. The smaller association with causing injury of kidneys is noted much, less allergic reactions, including heavy which can lead to death [3,5]. In general, when comparing both screening methods of visualization of whole body we have revealed that MRI screening Total body proves more diseases (malignant/benign) than CT. In this quality, MRI surpasses CT [7,9,13]. The main objective of MRT research «TOTAL BODY» - early diagnostics of neoplasms; which can considerably change treatment type, available to the patient. Other revealed problem areas which are not falling into to cancer can promote prime changes in the way of life of the person, such as eating/sports habits. Now MRI - screening of Total body is regularly used in such countries as the USA, Great Britain, Japan [1].

The aim of the research is to estimate the frequency, quantity and nature of the revealed changes among the population of various age groups during the native (noncontact) MRI testing «Total Body».

MATERIALS AND METHODS

127 trials of MRI group «TOTAL BODY» have been done (2014 - 27, 2015 - 42, during 9 months 2016 – 58 researches) on clinical base of medical institute of NEFU – in MRI centre of Victory Clinic, from March, 2014 till September, 2016. Researches were conducted on the modern digital MR-system of GE 1,5 Tesla Optima MR360 Advance. The program MRI «TOTAL BODY» used: T1, T2 STIR modes in coronary projections, T2 in sagittal, T2, T1, FLAIR, DWI in axial projections; the specialized programs allowing to unite images from different anatomic floors in a single whole. Thickness of cuts was from 1 to 8 mm. The field of the review of the patient – from the head to the top third of tibia. The research didn't test mammary glands, lungs, heart for the reasons of «method limit» and need of padding specialized opportunities of the device were not estimated.

We've carried out the retrospective analysis of the clinic researches for diagnostic of technique value for new possible indications of preventive research to early identification of pathological processes.

By sex: male – 60, female – 67;

By age:

From 16 to 45 years – 40 (31,5%)

From 45 to 60 years – 57(44,9%)

Over 60 years – 30(23,6%)

For authentic analysis patients were distributed into two groups:

1 group: patients with healthy background («for themselves» - 38 (29,9%);

2 group: patients with available symptoms and anamnesis of a disease – 89 (70,1%), among them: 2A with common complaints – 80 (63%); 2B with oncological anamnesis – 8 (6,2%); 2C with specific tubercular anamnesis – 1 (0,8%).

The received results were divided into 3 types: the 1st type – a low significance, not demanding further treatment and observation, the 2nd type – a moderate significance, demanding observations perhaps treatment and the 3rd type - an essential or potential significance, demanding treatment or immediate measures to define the nature of changes.

RESULTS

We have established that in the first group of patients as a result of the conducted «blind» MRT test «TOTAL BODY» there were 3 patients (2,3%) with no pathology; 4 cases (3,1%) with the changes requiring close attention (the 3rd type); other patients - 31 patients (24,4%) had some changes which we referred to small and average pathology (the 1st and 2nd type) with no threat for life but demanding dynamic observation and, perhaps, treatment.

Table 1 Anxiety life-threatening pathology (Type 3)

In the second group of patients (2A), with the available common complaints and the anamnesis to the postponed diseases, in 72 cases (56,6%) changes of the 1st and 2nd type, in 8 patients (6,2%) changes of the 3rd type have been revealed.

Table 2 Anxiety life-threatening pathology (Type 3)

In the second group of patients (2B) with the established oncological diagnosis, after operative therapy, without serious complaints the program MRI «TOTAL BODY» was chosen for the purpose of specification of recurrence, metastasing, assessment of surgical treatment. Among the above described group, given for the continued growth, a recurrence, metastasing, were not revealed in 5 cases (3,9%), change-types 2 were revealed. In three cases (0,2%) the mediastinum lymphadenopathy (in the anamnesis the operated malignancy of thyroid gland), abdominal cavity and pelvis (in the anamnesis the operated malignancy of uterus/ovaries) which was regarded as metastatic affection – change-types 3 was revealed. One of patients of this group has passed repeated dynamic Total Body (2014 and 2016) after the carried-out mastectomy

Table 1

Table 1 Anxiety life-threatening pathology of group 1(Type 3)

Pathology	Number of the diagnosed cases
growth in right lung	1
urinary bladder growth	1
large intracerebral meningioma	1
aneurism of intracranial vessels	1
TOTAL	4

(in 2012) concerning a malignancy of mammary gland.

In the second group (2C) with the tubercular anamnesis widespread inflammatory changes of backbone, spondylitis, spondylarthritis, ankylosis of sacroiliac joints, prostatitis have been revealed (change-types 2).

Having analysed quantity of zones with the revealed changes, we came to a conclusion that in most cases the revealed changes were found in three and more zones (in calculations 119 cases from 127 were considered).

Among the found changes which we referred to the 1st and 2-groups,

benign neoplasms (cysts, hemangiomas, myomas) of various localization (liver, kidneys, ovaries, uterus), degenerative changes of backbone, arthroses, arthritises of various degree of expressiveness, hernia and protrusion of disks, focal vascular changes of brain, postinfarction changes, aneurisms of vessels of brain, inflammatory and proliferative (adenoma) changes of prostate have been revealed. However, in patients of middle and senior age groups, often, the pathology revealed for the first time which had bright proliferative character met more often on the basis of neglect pathological process, poor

previous medical examination.

CONCLUSION

1. MRI test of whole body is safe and reliable method of early diagnostics of various pathological conditions of any age group, and also identification of complications to patients with earlier established diagnosis.

2. High quality scanning of the MRI program «TOTAL BODY» allows revealing minimum size pathology in any organs for short time.

Practical recommendations

1. The program MRI «TOTAL BODY» is recommended to be used for the purpose of monitoring of the revealed earlier pathological states, processes, and also for assessment of effectiveness of treatment.

2. For the purpose of prophylaxis of oncological and other diseases use of MRI program «TOTAL BODY» is recommended to all citizens older 40 years 1 time in three years and 50 years old patients are recommended do it annually.

3. It is expedient to include MRI program «TOTAL BODY» as the quota paid researches compulsory health insurances of high technologies.

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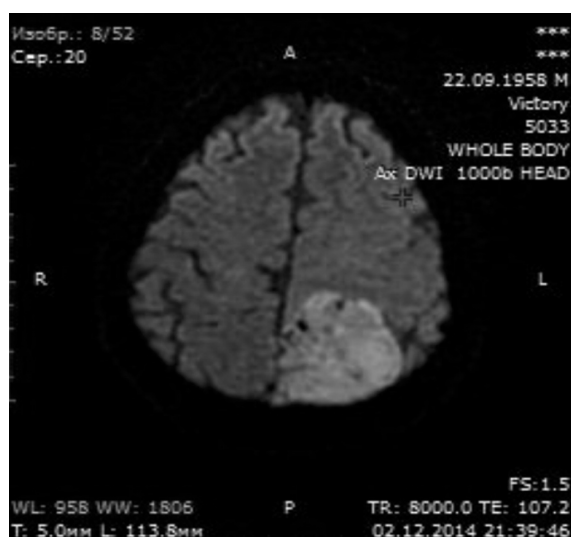
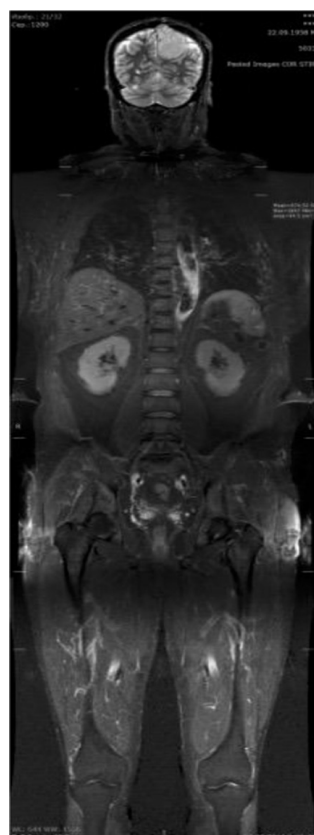
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Table 2

Table 2 Anxiety life-threatening pathology of group 2A (Тун 3)

Pathology	Number of the diagnosed cases
growth in pancreas	2
chest cavity with hydrothorax growth	1
growth in kidney with metastasing in lymph nodes and perinephric fat, lymphadenopathy in portal fissures	1
aneurysm of intracranial vessels	1
liver growth, with metastasing in lymph nodes, brain	1
liver growth, rectum with metastasing in lymph nodes	1
growth in abdominal cavity, head of pancreas, moderate vascular pathology of brain, moderate degenerative changes of backbone (state after cholecystectomy)	1
TOTAL	8



Diagnostic cases:

Fig. 1 Patient of 58 years. Without complaints. Large asymptomatic meningioma of brain. Operative treatment. The diagnosis has been verified.

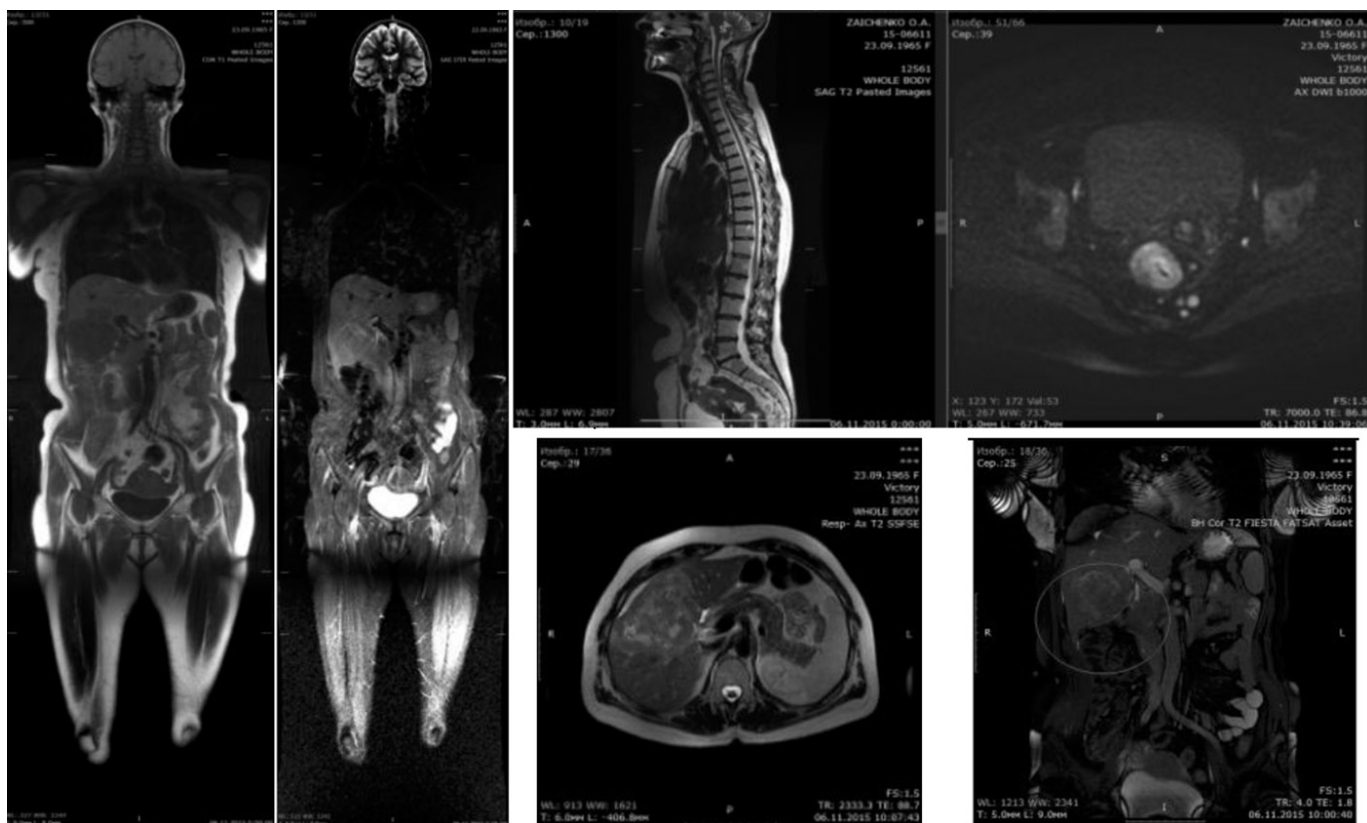


Fig. 2 Patient of 51 years old. Examination «oncology». Self-reversal. Without particular complaints. Liver growth. Growth of sigmoid department of intestine. Metastasing in regional lymph nodes of paraproctium.

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