

# CT AND MRI REFERRAL PRACTICES UNDER MANDATORY SOCIAL HEALTH INSURANCE: A SURVEY OF RADIOLOGISTS AND GPs

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## Abstract

**Background.** Modern imaging techniques, such as computed tomography (CT) and magnetic resonance imaging (MRI), are vital for diagnosing and monitoring diseases. Despite their value, challenges include high costs, radiation risks, and limited accessibility. Effective use requires collaboration between general practitioners (GPs) and radiologists. Misguided referrals burden healthcare systems, while underuse delays diagnoses.

**Objective.** This study assesses GPs' awareness of CT/MRI indications, examines challenges in referrals under the mandatory social health insurance framework, and analyzes radiologists' views on unjustified referrals.

**Methods.** Two surveys were conducted: one among 108 radiologists in Almaty and Astana and another among 163 GPs in Almaty and the Almaty region. Questionnaires included closed and open-ended questions, and responses were analyzed to identify barriers and optimize diagnostic processes.

**Results.** Among radiologists, 56.5% reported more than five unjustified referrals per month, with CT being the most overused modality (80.6%). Reasons included GPs' lack of knowledge about indications (66.7%) and patient pressure (67.6%). GPs cited limited mandatory social health insurance framework quotas (29.3%) and long waiting times (19.9%) as significant barriers. Both groups emphasized the need for clear clinical guidelines, enhanced education, and better interprofessional communication.

**Conclusion:** Systemic improvements in radiology services are necessary. Key recommendations include developing national clinical guidelines, educating GPs on CT/MRI indications, and streamlining administrative processes. These measures will reduce unjustified imaging, improve resource use, and enhance patient care.

## Introduction

Modern imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) play a key role in the diagnosis and monitoring of various diseases. These technologies provide highly accurate information about the condition of organs and tissues, which helps to improve the effectiveness of treatment. However, there are a number of challenges to their use, including high cost, the need for radiation risk assessment (in the case of CT), and limited availability in some regions.<sup>1,2</sup>

An important aspect of the rational use of imaging modalities is the interdisciplinary collaboration between general practitioners (GPs) and radiologists. GPs are often the first decision-makers in deciding whether to prescribe CT or MRI, while radiologists provide expert judgment and interpretation of the appropriateness of these modalities. Unwarranted prescriptions may result in unnecessary burden on patients and health care systems, and underutilization may delay diagnosis.<sup>3</sup>

The aim of this work is to analyze

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## Conflict of interest:

The authors declare no potential conflict of interest requiring disclosure in this article.

## Keywords:

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the awareness of GPs about the indications for CT and MRI and the problems they face in prescribing high-tech tests, as well as to assess the reasons for unjustified prescription of tests through the eyes of a radiologist, based on the results of their questionnaires. Analysis of interaction and perception of these specialists will allow identifying key barriers and suggestions for optimization of diagnostic processes.

#### Materials and Methods

A questionnaire survey was conducted among 108 radiologists of large medical organizations, cities of republican significance (Almaty, Astana) using Google form (online questionnaire). The questionnaire consisted of 12 questions, 11 with answer options and 1 open-ended question, 3 of them with multiple-choice answers.

By type of medical organization: 61 radiologists from city hospitals (56.5%), 18 employees of Research Institutes (16.7%), 21 physicians from private clinics (19.4%) and 8 radiologists from other types of medical enterprises (7.4%)

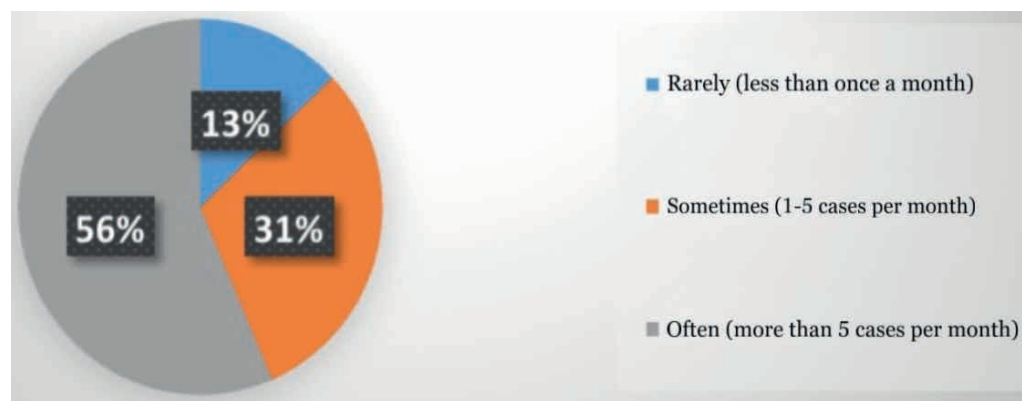
The data of the survey of 163 GPs on the topic "Assignment of CT and MRI examinations within the framework of mandatory social health insurance" were also analyzed by means of questionnaire survey in Almaty city and Almaty region. The data of questionnaire survey of 163 GPs were analyzed, 86 of which responded in paper form, 77 were surveyed online. The questionnaire consisted of 15 questions, with 11 single and 4 multiple-choice answers.

#### Results

Out of 108 radiologists, 35 of them had up to 5 years of experience in radiology, which is 32.4%; 36 doctors with 5 to 10 years of experience - 33.3%; 29 doctors with 11 to 20 years of experience - 26.9% and 8 doctors with more than 20 years of experience - 7.4%.

The frequency of unjustified investigations per month according to radiologists is: more than 5 cases per month - 61 (56.5%), from 1 to 5 cases - 30.6% (33) and less than 1 case - 13% (14), presented in Diagram 1.

**Figure 1.**  
Frequency of unjustified studies per month



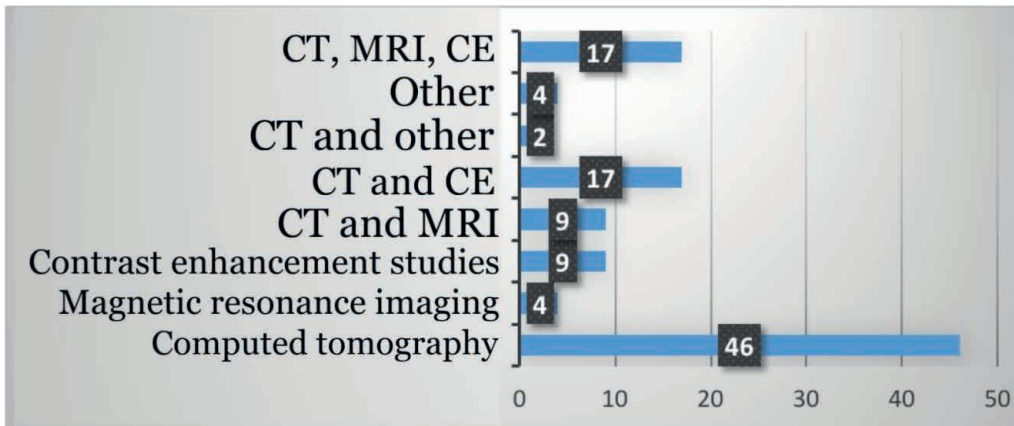
The most frequently unreasonably prescribed investigations are the following: CT - 87 (80.6%), MRI - 29 (26.9%), contrast-enhanced studies - 40 (37%), other (ultrasound, X-ray, mammography, etc.) - 11 (10%). More detailed data are shown in Diagram No. 2.

The categories of patients with the most frequent unjustified appointments for investigations are presented below: Patients with complaints that can be evaluated by other methods (e.g. ultrasound or radiography) - 77 (71.3%); Patients with no clear indications for investigation - 65 (60.2%); Patients insisting on investigation - 69 (63.9%), others - 2 (1.8%).

Radiologists consider the main rea-

sons for unjustified appointments to be: Lack of knowledge of doctors about CT/MRI indications - 72 (66.7%), Pressure from patients - 73 (67.6%), Pressure from administration about plan fulfillment - 37 (34.3%), Unnecessary reinsurance of doctor - 63 (58.3%), Lack of clear recommendations or protocols in mandatory social health insurance - 52 (48.1%).

Regarding the assessment of compliance of the mandatory social health insurance tarifficator list with the real costs of radiologic examinations, the following results were obtained: 5 (4.6%) believe that they fully comply, 27 (25%) partially comply, 76 (70.3%) do not comply, the real cost is higher than believed.



**Figure 2.**  
Distribution of unjustified appointments by type of trials

Do doctors receive additional payments for trials within the framework of MHI, the following comments were given: yes, regularly - 12 (11.1%); yes, but rarely - 16 (14.8%); no, I do not receive - 64 (59.3%); found it difficult to answer - 16 (14.8%).

As for the suggestions to reduce unjustified appointments for investigations, the following options were received: Raising awareness of GP physicians about protocols and indications - 82 (75.9%); Introduction of mandatory coordination with radiologists before appointing investigations - 59 (54.6%); Development of clear clinical guidelines for GP physicians - 75 (69.4%); Restriction of CT/MRI appointments within the framework of MHI for some cases - 36 (33.3%).

According to the results of the questionnaire survey of GPs, the number of doctors working in the city polyclinic was 114 (69.9%), working in private organizations was 11 (6.75%), combining/other

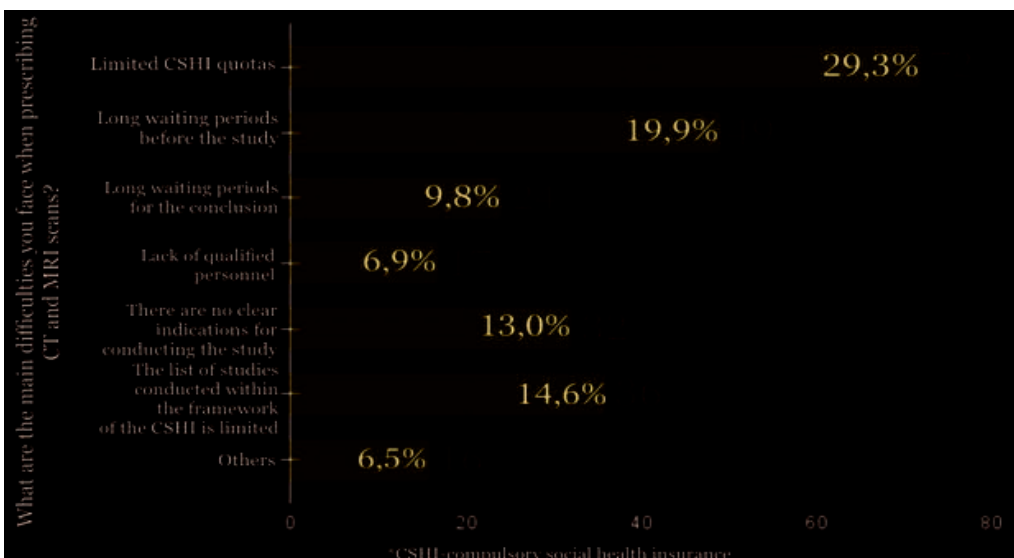
was 38 (23.31%) out of 163.

The mean age of the physicians was 30-40 years and mean work experience was 5-10 years.

The frequency of appointments for investigations by GPs within the framework of MHI was: 70 (42.9%) physicians answered "1-5 times a month", 67(41.1%) - less than once a month and 26 (16.0%) - more than 5 times a month.

Physicians consider the following as the main difficulties in prescribing CT and MRI scans: Limited MHI quotas - 72 (29.3%); Long waiting time before the study - 49 (19.9%); The list of studies conducted under MHI is limited - 36 (14.6%); No clear indications for the study - 32 (13.0%); Long waiting time for the conclusion - 24 (9.8%);

To the question "How often do you face unjustified referrals for CT or MRI?": 68 (41.7%) physicians answered "Rarely", 44 (27.0%) - "Sometimes", 30 (18.4%) - "Often", 18 (11.0%) - "Never", and 3 (1.8%) - "Always".



**Figure 3.**  
Main difficulties in prescribing CT and MRI scans

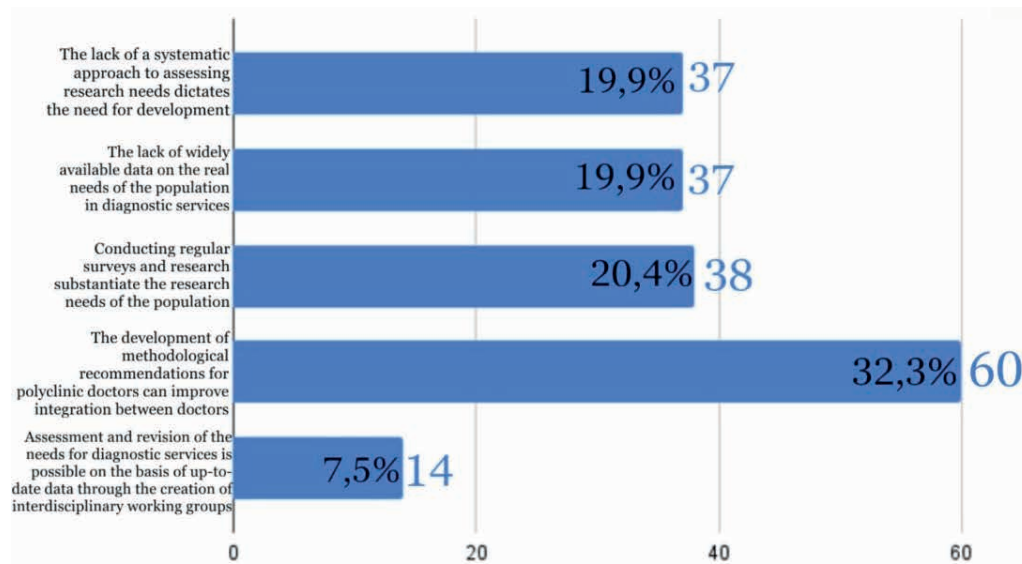
Gaps and shortcomings in radiology diagnostics according to primary care physicians are as follows: 60 (34.9%) doctors noted - Lack of standards and protocols for prescribing and performing examinations, which can lead to redundant or unnecessary examinations; Insufficient integration between different levels of medical care, which leads to inconsistencies in referrals for examinations - 30 (17.4%); Lack of qualified specialists, which makes it difficult to perform high-tech examinations - 24 (14%); There are no problems, because radiological diagnostics is not within our competence - 23 (13.4%); Don't know - noted by 35 (20.4%).

To the question "What risk factors in your opinion cause the increase in the number of CT and MRI examinations?": 61 (30%) physicians noted - It is necessary to introduce mandatory informing patients about radiation exposure and possible alternatives; 43 (21.1%) - Lack of informational activities for patients about explaining the risks and benefits of CT and MRI, 41 (20.1%) - Low level of patients' awareness about the risks and necessity of the studies; 32 (15.7%)

- Training of physicians to better explain the necessity of the studies; 27 (13.2%) - Lack of explanatory work on the part of physicians (lack of time at appointments), which may lead to excessive prescriptions.

In the question about the development of approaches to determine the need for high-tech methods of radiation diagnostics, doctors consider the following necessary: Development of methodological recommendations for doctors of polyclinics to determine the indications for referrals to CT and MRI can improve integration between doctors of different specialties - 60 (32.3%); Conducting regular surveys and studies substantiate the needs of the population in high-tech research - 38 (20.4%); Lack of data in wide access about the real needs of the population in diagnostic services - 37 (19.9%); Lack of a systematic approach to assessing the need for high-tech research in medical organizations necessitates development - 37 (19.9%); Assessment and revision of needs for diagnostic services is possible on the basis of up-to-date data through the creation of interdisciplinary working groups - 14 (7.5%).

**Figure 4.**  
The need to develop approaches to determining the need for high-tech methods of radiology diagnostics



### Discussion

The results of the study demonstrate important aspects of the current situation in the utilization of high-tech radiotherapy diagnostic techniques, including CT and MRI, and indicate key gaps and challenges faced by physicians.

The distribution of radiologists by years of experience shows that the most

significant part of the sample consists of specialists with up to 10 years of experience (65.7%). This may indicate that the majority of practicing radiologists are in the active phase of their professional activity. The small percentage of specialists with more than 20 years of experience (7.4%) indicates the need to attract experienced personnel to the

field to improve mentoring and knowledge transfer.

The data on the frequency of unjustified prescriptions is alarming, with more than half of radiologists (56.5%) reporting more than 5 such cases per month. This indicates a systemic problem that may be related to lack of physician knowledge, lack of strict protocols, or the influence of external factors such as patient and administrative pressure.

The most frequently unnecessarily prescribed diagnostic method is CT (80.6%), which emphasizes the need for attention to the rational use of this resource-intensive method associated with radiation exposure. MRI (26.9%) and contrast-enhanced studies (37%) also account for a significant share. This indicates the need for additional training of general practitioners (GPs) and the introduction of restrictions on such prescriptions in cases where they are inappropriate.

Analysis of the categories of patients with unjustified appointments highlights the main problems: a significant proportion of tests are performed in the absence of clear indications (60.2%) or in cases where the diagnosis can be established using less costly methods (71.3%). Also, patient insistence (63.9%) is an important factor emphasizing the need to work with patient expectations and inform them about diagnostic options.

Radiologists cited lack of knowledge of GP physicians (66.7%) and patient pressure (67.6%) as the main reasons for unjustified prescriptions. These data point to the need for systematic educational activities and the introduction of protocols that would allow GP physicians to act confidently, excluding redundant investigations. Pressure from the administration (34.3%) is also a significant factor emphasizing the need to revise management approaches.

The overwhelming majority of radiologists (70.3%) believe that the current tarifficator for mandatory medical social insurance does not correspond to the real costs of conducting trials. This indicates the need to revise the financial model of mandatory medical social insurance to ensure adequate compensation of costs for high-tech trials.

The majority of radiologists (59.3%) do not receive additional payments for trials under the MHI, which may reduce their motivation to participate in the development of the system. Fair remuneration for performing complex trials could be an incentive to improve the quality of services.

The results of the survey of primary care physicians show that the main group of respondents are doctors working in urban polyclinics (69.9%), which logically reflects the structure of primary health care in urban settings. About a quarter of respondents combine work in other organizations, this may indicate a high workload of primary care physicians. The average age of physicians (30-40 years) and length of service (5-10 years) indicate an active professional period, which makes their opinions particularly valuable for analyzing current problems.

The frequency of prescribing trials within the MHI varies, with 42.9% of physicians prescribing trials 1-5 times per month and 41.1% prescribing trials less than once. Only 16% of physicians prescribe trials more than 5 times a month, which may be due to quota restrictions, lack of physician awareness, or lack of clear protocols. This figure emphasizes the need to analyze the factors influencing the use of high-tech diagnostic methods.

The frequency of unjustified referrals is of concern. Although 41.7% of physicians noted that they encounter such cases rarely, 18.4% reported that it happens frequently. The main reason for unjustified referrals may be the lack of standards and protocols (34.9%), which is confirmed by the high proportion of physicians' responses to this item. Insufficient integration between levels of medical care (17.4%) also affects the compliance of referrals with clinical requirements.

Physicians noted the lack of standards and protocols (34.9%) as the main problem that leads to unnecessary tests. Insufficient integration between levels of medical care (17.4%) and lack of qualified specialists (14%) also create barriers to effective use of diagnostic methods. It is noteworthy that 20.4% of respondents found it difficult to answer

this question, which may indicate that physicians are not sufficiently informed about the organizational aspects of radial diagnostics.

Among GP physicians the key difficulties are limited MHI quotas (29.3%) and long waiting times for trials (19.9%). For radiologists, the lack of clear protocols (48.1%) and pressure from the administration (34.3%) remain the main problems. Both aspects indicate the need to optimize organizational processes and funding.

Both radiologists and GP physicians emphasize the low awareness of patients about the risks and necessity of investigations. There is also a lack of information activities for patients (21.1%) and lack of explanatory work on the part of doctors (13.2%). The introduction of mandatory informing of patients about radiation exposure and possible alternatives (30%) could significantly reduce unjustified prescriptions.

A common proposal for both groups is the development of methodological recommendations for GP physicians (75.9% among radiologists and 32.3% among GPs). The introduction of mandatory coordination with radiologists (54.6%) is also seen as an important step to improve the quality of the diagnostic process. Eliminating gaps in protocols and systematizing approaches to assessing the need for diagnostic services (19.9%) would improve interdisciplinary collaboration.

**Limitations.** The study relies on self-reported data from surveys, may introduce bias due subjective respons-

es. The geographic focus on Almaty and Astana the generalizability of findings to other regions or countries.

**What's known?** Unjustified referrals for CT and MRI are a global concern, contributing to resource overuse and unnecessary patient exposure to risks. General practitioners often lack adequate knowledge about imaging indications, which affects the appropriateness of referrals.

**What's new?** This study highlights the specific barriers faced by GPs and radiologists within the mandatory social health insurance framework in Kazakhstan, such as limited quotas and long waiting times. It quantifies the extent of unjustified referrals with 56,5 % of radiologists reporting frequent cases and CT being the most overused modality.

### Conclusion

The results of questionnaires of radiologists and GPs demonstrate the need for systemic changes in the organization of radial diagnostics. The main directions of work include: Development of educational programs for general physicians about indications for CT and MRI; Informing patients about risks and alternative methods of diagnostics; Optimization of the quota system and organizational processes of providing high-tech methods of radiation diagnostics; Development of clinical recommendations at the republican level for doctors of all specialties; These measures will not only reduce the number of unjustified prescriptions, but also improve the availability and quality of high-tech diagnostic methods for patients.

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## К 90-летию академика РАЕН, профессора Г. Н. Андреева



Г. Н. Андреев родился 07.01.1934 года, в селе Никольском Оренбургской области, в семье служащих. Отец – Николай Емельянович Андреев, доктор химических наук, известный партийный работник, парторг ЦК Березниковского химического комбината Мордовской АССР (теперь Пермская область). Репрессирован в 1937 году. Мать – Фаина Даниловна Концевая-Андреева, преподаватель истории и географии средней школы, парторг школы. Репрессирована в 1938 году, сослана в Казахстан, в Актюбинскую область.

Г. Н. Андреев закончил среднюю школу в 1951 году с серебряной медалью в поселке Шубар-Кудук, Актюбинской области. В связи с тем, что был сыном репрессированных родителей Андреев Г.Н. не был допущен к конкурсу для поступления в Военно-медицинскую Морскую Академию. В том же году поступил на лечебный факультет Казахского Государственного медицинского института города Алма-Аты, который закончил с отличием в 1957 году. Был рекомендован в аспирантуру, но по комсомольской путевке уехал работать в Хобдинскую районную больницу Актюбинской области, где проработал 5 лет.

В 1962 году Г. Н. Андреев поступил в клиническую ординатуру на кафедру госпитальной хирургии Алма-Атинского Государственного медицинского института, возглавляемую заслуженным деятелем науки, доктором медицинских наук, профессором М. И. Брякиным. По окончании клинической ординатуры был оставлен на кафедре аспирантом. В 1968 году защитил кандидатскую диссертацию, которая была посвящена экспериментально-клиническому изучению результатов операции Нобля, как метода лечения спаечной кишечной непроходимости. Модификация энтеропликации, предложенная Г.Н. Андреевым, заняла свое место в лечении спаечной кишечной непроходимости.

В 1968 г. прошел по конкурсу ассистентом кафедры госпитальной хирургии, отвечал за лечебную и научную работу

С 1971 года бессменно руководил научным студенческим кружком кафедры, был членом совета НИРС лечебного факультета и института.

В 1981 году на базе БСМП был организован Республиканский центр хирургии портальной гипертензии Казахстана как филиал Всесоюзного центра портальной гипертензии, где продолжались многосторонние клинические исследования различных осложнений портальной гипертензии. Руководимый Г. Н. Андреевым центр был признан лучшим в СССР академиком Б. В. Петровским.

В 1990 году во втором Московском медицинском институте имени И.М. Сеченова Г. Н. Андреевым была защищена докторская диссертация на тему «Диагностика и лечение осложнений портальной гипертензии»

С 1997 года профессор Г. Н. Андреев работал по контракту в институте медицинского образования, НовГУ, на кафедре госпитальной хирургии в городе Великий Новгород.



Профессор Г. Н. Андреев автор 524 публикаций, посвященных вопросам urgentной хирургии и портальной гипертензии, в т.ч. 24 монографии. Под его редакцией вышло 2 учебных пособия для студентов старших курсов медицинских институтов, 28 научных и учебно-методических рекомендаций, капитальное руководство по гепатологии с курсом клинической биохимии.

Под руководством профессора Г.Н. Андреева было защищено 5 докторских и 24 кандидатских диссертаций, из них 2 докторские, 12 кандидатских посвящены проблеме портальной гипертензии.

В 1998 году профессор Г. Н. Андреев избран академиком Российской Академии естественных наук, с 1996 года действительный член Ассоциации хирургов стран СНГ имени Н. И. Пирогова, Международной Ассоциации хирургов-гепатологов, международного клуба гастроэнтерологов-гепатологов. Профессор Г. Н. Андреев дважды награжден почетным знаком «Отличник здравоохранения СССР» (1961 и 1990 годы), медалью «Ветеран труда СССР» (1990 год). В 2007 году Г.Н. Андреев был объявлен: «Человеком года».

В 2009 г. профессору Г.Н. Андрееву присвоено звание «Заслуженный деятель науки РФ»

Работая в Новгородском универ-

ситете, профессор Г. Н. Андреев готовил научные кадры не только, для северо-запада России, но и для Республики Казахстан. Под его руководством защищены 5 кандидатских диссертаций преподавателями Казахского Национального медицинского университета им. С. Д. Асфендиярова. Профессор Г.Н. Андреев создал школу гепатологов РК и северо-запада России. Всю свою жизнь профессор Геннадий Николаевич посвятил делу спасения человеческих жизней, ибо ему было свойственно глубокое сострадание к пациентам, их боли, человечность и бескорыстие. Он воспитал не одно поколение своих последователей и многочисленных учеников, хирургов, как в России, так и в ближнем зарубежье, которые продолжают дело своего любимого учителя, не нарушая преемственности его дела.

Скоропостижная смерть прервала, научно-практическую деятельность академика РАЕН, «Заслуженного деятеля РФ», доктора медицинских наук, профессора Геннадия Николаевича Андреева, в 2009г. По книгам Г. Н. Андреева учатся врачи, студенты медицинских вузов РФ, республики Казахстана, создают модели портальной гипертензии в эксперименте.

Ученики проф. Г. Н. Андреева успешно выполняют трансплантации печени на уровне мировых стандартов.

**Профессор  
Врач**

**А.С. Ибадильдин  
Б. Аталыков**