

NATIONAL UNIVERSITY OF PUBLIC SERVICE
DOCTORAL SCHOOL OF MILITARY ENGINEERING

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*A NEW METHOD FOR TESTING OF CAPABILITY IN HUNGARIAN
MILITARY FORCES:*

*Determination of Carbohydrate-deficient transferin in percentage for
detecting of alcohol abusers and consumers of illegal substances for
improving of physical performance*

Phd thesis and the official reviews

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Budapest
2015

1. DEFINITION OF THE PROBLEM

Personal selection in military forces is a problem in which crucially responsible approach is required. In compliance with the development of science and innovation it is a high demand for testing of personal competence and capability tests as an effective instrument of selection. A complex health capability testing is an instrument of a high level and optimal regulation in the sphere of defence. Concerning that the main tasks are focused in order to insure the personal security of the forces. Within living memory in order to achieve success in military tasks it has been necessary to have sense for responsibility, perseverance, pertinacity, self control and ad absurdum self-sacrifice. Currently these „old-fashioned” attributes became less-dominant in civile-sphere as well as among persons of military forces. Concerning that the control is crucially important for out-selection of incompetent persons in leading as well as lower positions. In systems requiring military discipline and competence for extreme physical and psychical tasks it is not allowed to employ irresponsible persons because they represent a high risk for the tasks as well as for physical existance of their fellows. It is a burden for all soldiers so that they are looking for easier and less demanding ways in order to pass the tests of physical capability. Actually a lot of illegal chemical substances for improving of physical performance are available. However these substances do not guarantee better performance by physiological way.

Alcohol as a substance influencing consciousness and belief is well known in our culture and is as old as the mankind. Because the age of renting in Hungarian army has increased from the age of 43 years to 62 years, the active duty in military forces has been prolonged to a longer period of life. This circumstance causes a lot of stress and problems of adaptability to new conditions what frequently does not evocate optimal solutions among older persons in spite of their more life experiences. The aging person with more rigid personality solves the problems sometimes by inappropriate alcohol consumption what is not flagrant during the first time neither for the person nor for the community. This circumstance asks for a solution because of its demoralizing effect for the person as well as for the working community and society. Because special tasks of military forces could be performed only by responsible persons, the presence of alcohol dependent incompetent persons threatening themselves as well as their neighbourhood is undesirable in the system.

The aim of my work was to introduce a system which is able to improve conditions and security of human resources as key factors during performing professional tasks. The method was prepared with the purpose of introducing a highly specific, sensitive and well applicable method for detecting of alcohol and drug dependent persons as well as persons consuming other illegal substances improving physical performance or persons in chemical exposition. In our study we defined alcohol consumption exclusively as drinking of ethyl alcohol.

In my study I try to detect alcohol dependence by measuring of carbohydrate-deficient transferin level (CDT%). CDT is one of the markers of liver function. Analysis of carbohydrate deficient transferin (CDT) concentration is primarily used in social security studies as a proof of regular alcohol consumption exceeding the daily dose of 60 grams. According to literature sources its serum concentration correlates well with the intensity of chronic alcohol consumption. Although so far it has not been clearly established why the concentration of asialo-, mono- and disialo isoforms of transferin increases after intensive alcohol consumption, the fact that ethanol abuse does not impacts tri-, tetra- and pentasialo transferin concentration is well-known. The proportion of these two distinct fractions as a result of abolished glycosilation process is measurable by CDT% after chronic alcohol consumption exceeding the daily dose of 60 grams. In cause of consumption in lower doses data of various authors are not consistent.

During my study I collected a lot of data concerning other factors influencing CDT% concentration. That is why I consider as important to explain some not expected results and analyze their possible background. In case of some liver diseases sensitivity and specificity of CDT% is maximally 85-90% because these illnesses influence CDT% levels. Although CDT% level elevation caused by alcohol was published as early as in the seventies, the exact mechanism has not yet been clearly established.

The results and conclusions of my study which enable elimination of latent alcohol abusers and persons consuming illegal substances improving physical performance may be useful and applicable in military forces as well as in occupations in the civil sphere requiring high responsibility.

Non alcoholic fatty liver disease (NAFLD) is an acquired metabolic disease in the consequence of triglyceride accumulation in liver cells sometimes accompanied by

necrobiotic inflammatory reaction, fibrosis and also by liver cirrhosis. Its distinction from alcoholic fatty liver disease (AFLD) can be difficult. Clear anamnesis may help us but if the patient does not inform us about the alcohol consumption, the differentiation is not easy. Because the histologic features of the both diseases are same the main problem consists in making the appropriate diagnosis. According to the literature data mineral disbalancies observed in patients with cirrhosis influence CDT% levels in many ways.

Literature sources provide us only lower and secure cutoff points of CDT% tests concerning alcohol abusers. Other external factors impacting CDT% level have not been investigated so far. We had no data concerning population of non abusers as well as persons younger than 18 years old. Similarly the influence of other crucial diseases has not been investigated so far.

2. AIM OF THE STUDY

In my study I will try to explain the exact role of CDT% in medical screening, especially in military medicine. I will evaluate the role of other external or limiting factors influencing CDT% level. Based on it and in the absence of relevant literary sources the aim of my study is focused to the next theses:

- 1) In the absence of relevant literature sources to state the cut-off values of CDT% in adult, healthy, abstinent Hungarian population related to sex- and age groups. It could be a reference to the analysis of other population groups. In order to insure the objectivity of the study as well as the possibility of practical application of its results the next purpose is to acquire a precise auto- and heteroanamnesis.
- 2) To state the cut-off values of CDT% in adult, healthy, but regularly alcohol drinking group focused to sex- and age groups and compare them with the literature sources.
- 3) To measure CDT% values after exposition to various chemical substances.
- 4) To evaluate the influence of illegal food supplements consumed in order to improve physical performance on CDT% value.
- 5) According to the results of above mentioned studies to study soldiers in professional military forces in order to do screening and evaluation of CDT%

level influencing factors, e.g. alcohol abuse, illegal food supplements, chemical exposition.

- 6) In the absence of literature sources to state the cut-off values of CDT% in an abstinent healthy group related to sex- and age groups based on formerly investigated healthy, young, abstinent population.
- 7) To study the impact of regular alcohol abuse on CDT% value in a group of 14-18 years old adolescents.
- 8) To measure CDT% values in patients with Non Alcoholic Fatty Liver Disease (NAFLD), as well as to analyse the background of the outlier CDT% values according to the anamnesis.

3. METHODS OF THE STUDY

I carried out my examinations in a Hungarian settlement (Enese) as an addition to the routine laboratory tests of inhabitants who attended the clinics for screening or diagnostic purposes. Additionally I carried out my study among persons from other locations who were taking illegal food supplements or among secondary school students who were alcohol-abusers. Additionally I studied persons in Hungarian professional military forces for scientific purposes.

3.1 The investigated persons

1. In order to state cut-off values of healthy population 409 persons without chemical exposition, illegal food supplement consumption, NAFLD or chronic alcohol abuse with features of chronic alcoholism were enrolled. Age of the studied persons was 49,7 years on average, there were 204 male (average age 49,3 years) and 205 female (average age 50,1 years) in the studied group. According to their drinking customs the examined persons were divided to two groups:

- 1) Abstinent group consisted from persons drinking max. 40 g alcohol/ week according to their heteroanamnesis. This group was used later as the control group.
- 2) Alcoholic group consisted from potators with the daily dose of 40-60 g (social drinkers) according to WHO classification.

2. 119 persons from the basic population were exposed at least 10 years to professional chemical exposition due to their occupation. There were 83 male (average age 41,6 years) and 36 female (average age 48,2 years) in this group.

3. Sportsmen from two sports clubs were involved to the study because of their intriguing physical performance in order to exclude their use of food supplements which arteficially improve physical performance. There were 15 bodybuilders and 10 boxers involved (average age 30 years and 25,1 years) to the study. All of them were male. Since anabolic drugs increase reflex time by that "slowing down the boxer", as a rule, they did not use such supplements. According to their regular routine control they were healthy. Their regular doping tests were negative. On the contrary bodybuilders did not absolve (denied to absolve) any doping test.

4. During evaluation of persons belonging to Hungarian military forces I had opportunity to compare their results with the data of the civil group. The average age of the investigated persons was 35 years.

5. The study of adolescents was performed among 14-18 years old healthy students from two West-Hungarian secondary schools. There were 307 adolescents (88 boys with average age 16.8 years and 219 girls with average age 17.2 years) who decided to participate in the study. After the second anamnesis we could divide a distinct subgroup of regular alcohol abusers who formerly denied any alcohol drinking.

6. In our study investigating patients with NAFLD 39 persons with hepatic steatosis verified by abdominal ultrasonography were involved, 21 from them were female, 18 from them were male. The average age of the group was 55 years, the age of males was 53 years on average, the age of females was 58 years on average.

3.2 Samples and protocols

All study participants underwent phlebotomy, venous blood was collected from the medial cubital vein of the participants into appropriate blood collection tubes. The next laboratory parameters including CDT were determined from the blood samples: MCV of erythrocytes, AST, ALT, GGT. CDT was determined with the TINA-quant% CDT 2-nd generation Roche immunoturbidimetry test applied on the Roche Hitachi Modular P 9002 system (Roche Diagnostic GmbH Mannheim). After anion exchange separation, it

enables the measurement of the exact amount of CDT. Subsequently it is possible to calculate CDT% from the proportion of soluble transferrin and total transferrin.

4. RESULTS

On the basis of the data taken during exact auto- and heteroanamnesis I formed the relevant investigation groups which enabled us to make a difference between CDT% level of social drinkers and that of chronic alcohol abusers (alcohol exceeding amount 40-60 g/day).

Range of CDT% in abstinent (under 40g alcohol/day) varies from 1,95 on average in the age group of persons younger than 25 years old to 2,4 among older persons.

CDT% level of 183 persons drinking alcohol in amounts less than 40 g/ week was lower than that of the 226 social drinkers. CDT% had a continuously increasing trend within the age range of 18 till 65 years old people with CDT% values from 2,05 to 2,65. In the group of social drinkers (40-60 g alcohol/ day) there is a tendency to higher CDT% levels among males than in females.

In my case study consisting from 119 persons exposed to chemical exposure I tried to evaluate sensitivity of CDT% without exact specification of chemical agents. From the measured parameters only CDT% level increased significantly after chemical exposition (in contrast to reference range), values of all the other parameters (MCV, ALT, AST) do not exceeded the reference range and GGT value was not twice as higher as the reference level. There were no relationships among values of CDT%, MCV and GGT except some extremely high outlier values. We can conclude from it that in spite of the fact that routine laboratory markers have normal results CDT% could be a sensitive marker of chemical exposition.

During the study of three interesting cases we concluded that the effect of protein substances used by bodybuilders and that of food supplements not qualified as drugs on CDT% was probable. In this study I investigated the effect of these substances on sportsmen of two sportsclubs. Among bodybuilders taking of anabolic substances and protein-vitamin formulas is generally accepted while in boxers anabolic drugs increase reflex time by that "slowing down the boxer", as a rule, they do not use such supplements.

In terms of CDT%, MCV and GGT levels of the two sport groups we can conclude that only CDT% levels of the two groups are different, GGT and MCV markers accentuated in elimination of chemical exposure are not significantly different.

In the evaluated group of military forces CDT% was 2,75 on average, the minimal value was 1,93, the maximal value was 4,1. In the age group of 25-45 years old military forces members cut off value of CDT% calculated from the value of abstinent was $2,25 \pm 0,14$. Although the average CDT% value in this group exceeds the value of abstinent healthy members of the entire Hungarian population as well as the subpopulation of males, the difference is not significant. MCV value was in the normal range among all the investigated persons, values of the other parameters are slightly higher than the routine reference values.

Because of wide distribution of the values in the military group the values divided according to referential values calculated for the age ranges could be sorted into two subgroups in terms of the intensity of alcohol consumption. In the first group only ALT levels exceeded minimally the referential range, all the other parameters were in normal range. Consequently this group may be considered as the abstinent group conditioned that its members are not exposed to chemical exposition or do not take illegal substances in order to improve their physical performance.

In the group of 14-18 years old students CDT% was not impacted by the differences arising from the age distribution within this age range. Members of the group with CDT% less than 2,1 were abstinent according to the second anamnesis and were in proportion approximately 40% of all the investigated students. Members of the other group were in proportion approximately 60% of the investigated population, their CDT% exceeded 2,1 on average and they were not abstinent. There was significant difference between CDT% of the two groups. There was no significant difference between the two sex groups either in the group of abstinent or among alcohol abusers.

Cut off values of CDT% concerning chronic alcohol abuse could be stated for each age group from CDT% levels of our two CDT% distribution groups. Levels of all parameters generally used for the confirmation of alcohol abuse (MCV, AST, ALT, GGT) were in the reference range and there was no significant difference in their values between our two distribution groups concerning CDT%.

In our study investigating patients with NAFLD we observed that there was no difference between CDT% (CDT% = $2,39 \pm 0,52$ %) of patients within age group of 55 years old persons and CDT% formerly observed in the age range between 45 years and 65 years in the general population. There was significant linear relationship between CDT% and the age in the males group and between CDT% and ferritin in the females group.

5. DISCUSSION

Our study was the first complex study evaluating abstinent healthy people in the age range from 14 till 80 years in terms of alcohol abuse. According to the literature sources it was the largest study which comprised autoanamnesis as well as heteroanamnesis. So far, no study has investigated relationship between CDT% level and aging and between CDT% and sex groups. In the evaluated groups CDT% level increased with age in abstinent group as well as in the alcohol abuser group. This results support the general relationship between age and CDT% level. CDT% in the group of social drinkers (drinking 40-60 g alcohol/ day) was higher than CDT% of abstinents what confirms the well-known relationship between alcohol and CDT% approved by other authors.

Among abstinents in the age range of 18-45 years old persons we observed higher CDT% levels in the female group. This difference disappears over the age of 45 years in the consequence of hormonal changes and may be explained also by the influence of hormonal contraception during fertility period. Among alcohol abuser 25-65 years old females we observed lower CDT% levels than in males of the same age. We may conclude from this results that diagnostic specificity of CDT% for chronic alcohol abuse is lower in females than among males.

According to literature sources measuring of GGT in terms of alcohol abuse verification has limits, especially concerning the time period that lasted between alcohol drinking and the analysis. We did not observe this handicap in terms of CDT%. In my study I confirmed normal range of CDT% between 2,19 and 2,81 in healthy 18-80 years old Hungarian population. CDT% levels exceeding this range are suspicious from alcohol abuse of the investigated persons or from being influenced by other factors.

From generally increased CDT% levels in the group which consisted from persons who had been exposed to chronic chemical exposition we can conclude that CDT% level is influenced by chronic chemical exposition. Linear increase of CDT% level is not accompanied with the linear increase of MCV, GMT, AST and ALT level what supports its higher sensitivity in terms of chemical exposition. Transaminase elevation only in the higher ranges of CDT% levels confirms its higher sensitivity concerning alcohol abuse.

During investigation of 25 sportsmen I confirmed that routine laboratory parameters are not sensitive enough in terms of screening for illegal food supplements taking. On the contrary significant elevation of CDT% after taking of food supplements leads to an assumption that it is important in the physiologic answer reactions to them. Maybe it can be used as a pretest for doping tests in the future.

Prevention of human resources in the military forces from undesirable factors is one of the main tasks to be done. CDT% analysis may help in it. We can conclude from the results of the examined persons of the military forces that food supplements, protein formulas taken on the voluntary basis were the only external chemical factors which influenced them. Probably there were not any alcohol abusers in the military group, we found also no persons taking illegal food supplements.

CDT% levels within the young group in age range between 14 and 18 years are not significantly different concerning the age. On the other hand results from the entire population group have significantly increasing trend in terms of age. In the young group there is no difference between the sex groups, either in the whole group, or in the subgroup of alcohol abusers. In concordance with our results we may presume that there is no relevant hormonal influence on CDT% level in this age range. According to our experiences CDT% seems to be a better marker of alcohol abuse than GGT or other laboratory markers.

We found no significant difference between patients with NAFLD and the healthy control group. Our results suggest that probably there is no interaction between pathophysiology of NAFLD and CDT% elevation. These results are limited by the fact that our group of patients was not representative in terms of the entire Hungarian population.

6. NEW RESULTS

I point out the next main results of my study:

- 1) I succeeded in stating cut-off values of CDT% in terms of age and sex groups in the healthy adolescent and adult abstinent group over the age of 14 years as the first author as far as appropriate literature sources are concerned.
- 2) I succeeded in measuring of CDT% values above the age of 14 years in an adult alcohol abuser group. In this group CDT% values exceeded those of the abstinent group and had increasing trend in each age range. Chronic alcohol abuse impacts the adolescent organism by similar way as it does the adult one, increasing by that CDT% level.
- 3) I succeeded in confirmation of the influence of chemical exposition on CDT% level and also the impact of illegal substances taken in order to improve physical performance on it as the first author as far as appropriate literature sources are known. This results are the first concerning the number of the investigated persons as well as the complexity of the study. CDT% elevation is not accompanied paralelly by MCV and transaminase elevation, what confirms high sensitivity of CDT% to chemical exposition.
- 4) Measuring of CDT% may be useful as a marker in capability tests of the military forces. It can be used also as a marker of chemical exposition during professional tasks or prior to them. Similarly it can be applicable as a screening test for alcohol abuse or taking of illegal food supplements taken in order to improve physical performance. It is supposed that our results may be also useful for surgeons in the military forces during making decisions.
- 5) I confirmed that according to the results of the investigated group CDT% is not influenced by pathophysiological processes in NAFLD.

7. PRACTICAL APPLICATION OF RESULTS

Because CDT% level increases as a consequence of alcohol consumption, latent alcohol abuse can be detected by comparing CDT% of the investigated person with reference values stated according to age ranges. Because cut-off values of CDT have not been

stated so far as it is known according to current literature sources, investigation was formerly based only on hetero- and autoanamnesis taken during evaluation.

Our results suggest that CDT% seems to be a sensitive marker of chronic alcohol abuse, chemical exposition and use of anabolic steroids. Although the method is not specific to any chemical substance and the exact mechanism has not yet been clearly established it is a sensitive marker of a general answer reaction to chemical insult. According to our results it can be stated that the increase of CDT% level as a result of chemical exposition is more severe than that after alcohol abuse what may help us in the differential diagnosis.

Thanks to it chemical exposition before military action or during it can be detected earlier and the preventive measures may be performed adequately in order to prevent severe damages. According to our very intriguing and significant results in terms of chemical exposition it would be desirable to measure CDT% of soldiers before as well as after performing their special tasks in order to eliminate dispersion of values arising from individual differences.

It would be advisable for members of military forces to be monitored continuously in order to evaluate their personal capability for performance of special tasks as well as for their personal security. The test is also suitable for screening of legal and illegal substances taken in order to improve performance. It enables to assess the real physical state of the evaluated person and also his physical performance and capability. Because of its high sensitivity in terms of screening for chronic alcohol abuse the test would be useful for preliminary and continual monitoring of terrestrial forces as well as units performing critical missions.

The method could be useful as a pretest of young persons preparing for occupations in military forces in order to assess their capability. Our results suggest that CDT% monitoring seems to be applicable especially in adolescents under the age of 18 years attending military secondary schools in order to detect their latent alcohol abuse.

The price of CDT% test performed by HPLC method is actually 1500- 2000 Forints. In terms of its practical applicability it is much more universal and cost-effective test than other biochemical methods of its monitoring. Compensation fees in cases of disability after injuries are much more higher in many orders but protection of life is on the highest

order position. Individual and leaders personal responsibility is the most important factor in this problem.

Our predominantly epidemiological studies are the first to demonstrate biochemical results concerning this area of study. There are many ways and areas of their applicability in military forces as well as civil sphere, especially in terms of capability tests for occupations with high risk and personal responsibility. Purpose of my work was to establish a method which is able to improve security of human resources as crucial factors during performing of their tasks. Results of the method help in many ways to armed forces officers during making their decisions in various situations.

8. PUBLICATIONS IN THE AREA OF STUDY

Articles published in reviewed journals:

1. Szabó György dr., Fraenkel Emil dr., Dinya Elek dr., Jegessy Andrea dr., Bajnóczky István dr., Huszár András dr., Fehér János dr.†: A szénhidrátszegény transzferrin értéke absztinens és nem absztinens fiataloknál, *Gyermekgyógyászat*, Semmelweis Kiadó Kft., Budapest, 2014, 99-104/65(2).
2. Mátyus M, Szabó Gy, Grósz A, Fraenkel E, Szabó G, Dinya E, Huszár A: A májenzimek és a szénhidrátszegény transzferrin (CDT%) % értékeinek változásai toxikus hatások következtében 25-35 év közötti férfiak körében, *Honvéder orvos*, HM Zrínyi Térképészeti és kommunikációs Szolgáltató Közhasznú Nonprofit Kft., Budapest, 2013, 34-44/1-2.
3. Szabó G, Fraenkel E, Szabó G, Keller E, Bajnóczky I, Jegessy A, Huszár A, Dinya E, Lengyel G, Fehér J: A szénhidrátszegény transzferrin értékének változásai doppingoló és nem doppingoló sportolóknál, *Orvosi Hetilap*, Akadémiai Kiadó, Budapest, 2012, 514-7/153(13).
4. Szabó György, Fraenkel Emil, Szabó Gergely, Keller Éva, Bajnóczky István, Jegessy Andrea, Huszár András, Dinya Elek, Lengyel Gabriella, Fehér János: Ökölvívóiknál és testépítőknél észlelt biokémiai eltérések, különös tekintettel a CDT%, MVC és GGT értékekre, *Magyar Sporttudományi Szemle*, Kiadó, Budapest, 2012, 38-42/13(52).

5. György Szabó, László Környei, Éva Keller, Gabriella Lengyel, János Fehér: Levels of Carbohydrate-Deficient Transferrin according to Gender and Age in a Small Town in Hungary, *Clinical and Experimental Medical Journal*, Akadémiai Kiadó, Budapest, 2009, 319-325/3(2).
6. Fraenkel E, Szabó G, Lengyel G, Jarcuska P, Lazúrová I, Dinya E, Fehér J: Diagnosztikus értékű-e a szénhidrátszegény transzferrin nem alkoholos zsírmájban? *Orvosi Hetilap*, Akadémiai Kiadó, Budapest, 2009, 1471-5/150(31).
7. Fraenkel Emil, Szabó György, Lengyel Gabriella, Jarcuska Pater, Lazúrová Ivica, Dinya Elek, Fehér János: Carbohydrate-deficient transferrin, a sensitive biomarker and diagnostic parameter in non-alcoholic fatty liver, *Clinical and Experimental Medical Journal*, Akadémiai Kiadó, Budapest, 2009, 479-486/3(3). - Másodközlés angol nyelven
8. György Szabó, Éva Keller, László Környei, Gabriella Lengyel, János Fehér: Carbohydrate-deficient Transferrin-Values after Exposition to Chemicals at Workplace, *Hungarian Medical Journal*, 2008, 623-628/2(4). - másodközlés angol nyelven
9. Szabó G, Keller E, Szabó G, Lengyel G, Fehér J: A szénhidrátszegény transzferrinszint testépítőknél megemelkedik, *Orvosi Hetilap*, Akadémiai Kiadó, Budapest, 2008, 2087-90/149(44).
10. Szabó G, Keller E, Környei L, Lengyel G, Fehér J: Szénhidrátszegény transzferrin vizsgálat eredményei munkahelyi vegyszer-expozíció után, *Orvosi Hetilap*, Akadémiai Kiadó, Budapest, 2008, 415-9/149(9).
11. Szabó G, Környei L, Keller E, Lengyel G, Fehér J: A szénhidrátszegény transzferrin szintje a magyarországi népességben a nem és kor viszonylatában, *Orvosi Hetilap*, Akadémiai Kiadó, Budapest, 2007, 1409-13/148(30).
12. Fehér J, Lengyel G, Szabó Gy: Carbohydrate-Deficient Transferrin as a Marker of Alcohol Consumption, *Hungarian Medical Journal*, Akadémiai Kiadó, Budapest, 2007, 73-82/1(1). - Másodközlés angol nyelven
13. Fehér J, Lengyel G, Szabó G: A szénhidrátszegény transzferrin mint az alkoholfogyasztás jelzője, *Orvosi Hetilap*, Akadémiai Kiadó, Budapest, 2006, 1915-20/147(40).

9. SZAKMAI ÖNÉLETRAJZ

Dr. Szabó György 1953-ban született Kaposváron. Édesapja Szabó György fodrász, édesanyja Szabó Ilona nővér volt. Középiskolai tanulmányait helyben, a Munkácsy Mihály Gimnáziumban végezte. Fiatal korában úszott és birkózott. 1979-ben végzett a Pécsi Orvostudományi Egyetem Általános Orvosi karán. Házas, két gyermek apja.

Első munkahelye Mezőgyánban, (Békés megye) házi orvos, mellette két évig a Gyulai Megyei Kórház belgyógyászati osztályán dolgozott. 1982-től a Győr-Moson-Sopron megyei Enesén házi orvos. 1985. tavaszán általános szakorvosi szakvizsgát tett Budapesten, majd a Budapesti Református Teológiai Akadémia alapozó levelező szakára iratkozott. 2000-ig szakvizsgákat tett Foglalkozás orvostanból, Sportorvostanból, Honvéd- és katasztrófa-orvostanból, Repülő- és űrorvostanból. Licenz vizsgákat tett UH diagnosztikából, Lézer terápiából, Ring orvostanból és Magánbiztosítási orvostanból.

1983. óta foglalkozik intenzíven alkoholbetegek gyógyításával. Több mint 10 évig, naponta 10-20 beteg vette be jelenlétében, négyszemközt az elvonókúrákon szokásos gyógyszereket, és pszichoterápiás beszélgetéseket folytatott velük. 1985-től a Győri 3. számú Pszichiátria Osztályon katolikus és evangélikus lelkészekkel együtt addiktológiai betegekkel végzett csoportos foglalkozásokat. 1985-től hazánkban először falusi, zártkörű, alkoholbetegekből álló antialkoholista klubot hozott létre. 1985-től foglalkozott Lüscher Farb Form tesztjével, deviancia szűrés céljából. Több mint 5000 vizsgálatot végzett 1988-1991-ig Győrben. Lelkészek és Orvosok a Mentálhigiénés kultúráért címmel havonta előadásokat szervezett elismert pszichológusok és pszichiáterek segítségével, helyi és országosan ismert előadókkal, 50-150 fős szakmai közönség számára. 1995-től a győri ökölvívók számára ringorvosi és csapat keret orvosi tevékenységet végez.

1996-ban Dr. Horvát Imre főorvos, az Allianz Biztosító Bizalmi orvosa hívta fel a figyelmét a szénhidrátszegény transzferrinre (CDT), mint a titkolt alkoholfogyasztás kimutatására általánosan használt markerre. 1998-ban lehetőséget kapott arra, hogy első alkalommal hazánkban a szénhidrátszegény transzferrin, CDT% mérési vizsgálatokat elkezdhesse. A vizsgált beteganyagot különleges, de életszerű szempontok alapján állította össze. A vizsgált minták analízise érdekes eredményekhez vezetett. 2005 őszén

megkezdte a felkészülést egy nagyobb volumenű, szénhidrátszegény transferrin szint felmérésére, akkor még epidemiológiai céllal. 2005. december 13-án kezdődött a vizsgálat, amelynek méréseit CDT%-ra vonatkozóan a kaposvári Kaposi Mór Megyei Oktatókórház Laboratóriumi osztályán végezték, ahol akkor az országban egyedülállóan, a megfelelő szakmai és műszeres feltételek adottak voltak. A rutin parallel vizsgálatokat a Győri Megyei Kórházban végezték.

2006 nyarán Prof. Fehér János felkérte külső munkatársnak, és a 2010-ben bekövetkezett sajnálatos haláláig a CDT% kutatási témakörben sokat tanult a híres kutató professzortól. 2007. és 2009. között a Katonai toxikológiai laborból a magyar honvédség részére összesen 30 vizsgálat történt, 4 fő a légielő részére 26 fő a szárazföldi egységek részére. 2008-ban a PTE Igazságügyi Orvostani Intézetével történt együttműködés keretében emberölés bűncselekményében, felkérésükre végzett CDT% vizsgálatot - a sértett és az elkövetők vonatkozásában is - a nyomozásban talált adatok alátámasztása érdekében, az úgynevezett kaposvári gimnazisták ügyében.

2006-tól Csorna és Csorna járás sportorvosi teendőit végzi, mellette, szabadidejében ellátja a Győri Bokszt klubok ringorvosi feladatait. 2007-től a Nyugat Magyarországi Egyetem Apáczai Csere János Karán oktat sporttal és orvosi élettani ismeretekkel kapcsolatos tárgyakat. 2010-ben a Nyugat Magyarországi Egyetem címzetes egyetemi docensi címet adományozott számára. A Pécsi Orvostudományi Egyetem Igazságügyi Orvostani tanszéke 2011 márciusában önkéntes segítői (régén külső tudományos munkatársi) szerződést kötött vele, kutatási-oktatási tevékenységre.

Az elvégzett munkája alapján Dr. Huszár András, a Pécsi Igazságügyi Orvostani Intézet volt vezetőjének javaslatára 2013-ban jelentkezett és felvételt nyert a Nemzeti Közszolgálati Egyetem doktori iskolájába, egyéni felkészülési formában. Témavezetője először Dr. Huszár András egyetemi tanár volt, az ő akadályoztatását követően pedig Dr. Kóródi Gyula orvos alezredes, egyetemi docens lett. Iránymutatásuk alapján készítette el doktori értekezését, és készült fel a védésre.

Budapest, 2015. év.....hó.....nap

Dr. Szabó György