

Genetic Factors in Concussion Susceptibility

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RESEARCH TEAM

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DESCRIPTION

The Genomics Research Centre is involved in researching the genetic background of several diseases and disorders. This research is a study on various aspects of concussion and its effects. In this study we are attempting to determine how genes and variations in genes can contribute to a person's susceptibility to concussion and the after effects of concussion. We are attempting to discover if we can determine who will suffer more strongly from concussion aftereffects and who may need more care and rest following a concussion to help prevent long term health problems.

If you are interested in participation in this research, you should take your time to read this information sheet and the associated consent form. If you have any questions about the research, please contact a study team member as indicated below.

Concussion is a condition that arises following some kind of impact, usually directly to the head, and results in a number of following physical and mental symptoms. The symptoms can include confusion and thinking difficulties, slowed reaction times, personality changes, drowsiness, emotional changes, and headaches. These symptoms subside over a period of time, commonly one or two weeks, but for some individuals, the symptoms can last for months or even years.

Concussion is a health factor that has been receiving greater attention in recent years, in part because of a growing awareness of the potentially serious consequences and long-term effects that can result from even quite mild concussion. In the United States, about 1.4 million brain impacts occur annually, while in 2004 – 2005, Australia recorded 22,710 brain impacts. The exact number of concussions is difficult to determine, however, as not all concussions may be reported as a concussion by a doctor, and not all people suffering from concussion will visit a doctor or hospital to seek treatment.

While we know something about what happens in a person's brain following a concussion, we don't have a good idea as to why some people may suffer severely, or for a very long time, while others will not. We believe that genetic variation may offer a solution to this question. We know that people with certain genetic conditions are very sensitive to minor head trauma, and we believe that there may be genetic variations that cause similar effects in the general population.

These genetic variants may not cause any noticeable symptoms, but they may make an individual's reaction to a concussion slightly stronger or weaker. Just one of these variations alone would probably not be enough to be noticeable, and a person's reaction to a concussion would depend on what mix of variations they had.

As a result, it is the intent of this study to search for genetic variants or changes to the way genes operate in the body that may affect how strongly people respond to a concussion. We would like to examine a wide range of genes that are connected to nerve function and looking for genetic changes within them. Because there are significant regions of DNA whose function is not yet clear, we may extend our examination to an individual's complete DNA, in order to find new genes that may be involved in concussion response. We hope to better understand how specific genetic variants affect concussion symptoms and perhaps improve the ability of doctors to know how to treat people who have had a concussion. We do this by looking at genetic variants in people with and without severe concussion symptoms and seeing if certain genetic variants are more common (or only found) in one group or the other. If your concussion is recent, we would also like to examine your blood composition (e.g. blood sugars) which may give us clues to the severity of your concussion symptoms.

Improving our understanding of the genetic causes of concussion will hopefully lead to the development of new diagnostics or treatment methods for concussion. It will take a long time to find out everything there is to know about this complex condition, so the project will probably go on for many years. The project will be reviewed every five years to ensure that it is being carried out properly.

The Genomics Research Centre gratefully acknowledges your support and participation in this research project.

PARTICIPATION

You are eligible for this study if you fall into one of two groups. In the first group, you would be a person who has suffered a concussion and has had treatment for it or are currently getting treatment for it. In the second group, you would be a sportsperson whose sport has a high potential for suffering from a concussion at some point, and you would be entering the study before suffering a brain impact.

If you choose to participate, you will be asked to fill in a questionnaire that asks you about specific diseases and medical health history, which will take from 15 to 30 minutes to complete.

Your doctor or a qualified phlebotomist (pathology collector) will take a 40ml blood sample for genetic and biochemical testing. Overall this procedure will take about 15 minutes. The only risk to your health will be from the blood extraction; minor bruising and discomfort to your arm may result.

If you decide not to give blood, or blood taking when attempted is difficult, you will be asked to provide a 2ml saliva sample collected in a self-collection kit or a swab sample from the inside cheeks of your mouth. These procedures offer no risk to you.

We may also ask you to undertake some additional questionnaires if you are still suffering the effects of your concussion. These include the Cambridge Neuropsychological Test Automated Battery (CANTAB), Rivermead Post-Concussion Symptom Questionnaire (RPQ), the 36-Item Short Form Health Survey (SF36) and the illness perception questionnaire (IPQR) and the Hospital Anxiety and Depression Scale (HADS) questionnaire. These additional tests should take no longer than 95 minutes to complete.

If you are a sportsperson who may suffer a concussion in the future, in addition to the initial sample you give, we ask that should you suffer a concussion, additional blood/saliva samples are collected as close to the incident as possible (within 24 hours if we can), this is likely to be via your attending club doctor, or other attending doctor if you are seen in hospital or have a scan. We would also ask to obtain samples again at one week and two weeks from your concussion. If your symptoms persist for a long time, we would also ask whether we could obtain more samples to help determine whether there might be signs in the blood/saliva that would indicate what is occurring. We would arrange this collection with your team doctor (if possible) or another doctor you are seeing for treatment so as to minimize any difficulties for you.

We also ask for you to give permission for the research team to obtain copies of your medical records from your general practitioner, specialist or the hospital you have attended for treatment. Only information relevant to this research project will be requested, and only with your full informed consent. This information would include brain scans, blood tests, reports of symptoms, drug treatment, memory or psychological testing and similar measures taken to evaluate the effect of your concussion.

The biochemical tests we are most interested in are blood levels of: Glucose, Sodium, Calcium, Potassium, blood fats, white blood cell counts, markers of immune system activity and nerve activity. The medical records we are most interested in are: MRI/fMRI/CT scans, x-rays of the concussion site, memory testing, mood/psychological testing, testing of your perception, testing of your reflexes. In all cases we will only ask for results connected to your concussion.

If you are also involved in the brain scanning research being undertaken by the associate investigator Dr Fatima Nasrallah, we will also make use of data from the scans undertaken in that research. We will use those results to determine whether genetic factors can help predict who will suffer most from concussion symptoms, or how rapidly people recover from concussion.

Your blood/saliva sample, your genetic material, your questionnaire and other data will be kept securely at the Genomics Research Centre in locked laboratories and offices with password protected computers. Your sample and genetic material will be given a code number and have your name removed to protect your privacy, and in research publications your name or other identifying information will not be used.

Your information will be transcribed into a database, and the copies of that database which are used in day to day research will only have the code number on them, which will prevent your data from being connected to you without access to the securely stored original documents or database. The study will also not include any identifying information in research publications.

Your participation in this project is entirely voluntary and you do not have to take part in it. If you do agree to participate you can withdraw from the project without comment or penalty. If you withdraw, on request any identifiable information already obtained from you will be destroyed. Please note, however, that already published information will not be destroyed. Your decision to participate or not participate will in no way impact upon your current or future relationship with QUT, your sports club/association or your treating physician.

You should not feel pressured to participate in this research for any reason. We will not discuss your participation with anyone outside the research team if you do not choose to share that information, and neither will we discuss your withdrawal from the research should you decide to leave the project.

EXPECTED BENEFITS

There are not expected to be any immediate or direct benefits to you as a result of these projects. The research will provide a greater understanding of the complex condition of concussion, which will improve the ability of additional research to uncover new treatments and diagnostic methods.

The information gained from this research may have future commercial significance, but other research will need to be done to confirm things that we originally discover here. As an individual you do not have ownership of the overall study results, overall research records, or the sample that you gave, except that you may withdraw at any time and have your information and sample destroyed as noted above. You will therefore not benefit financially from participation in this study. We hope that in the future, we will be able to offer more individualised care and recovery plans for individuals who have suffered concussion, as well as understand who may be at risk for more severe reactions to a head injury, so they can take appropriate steps to avoid them.

The Genomics Research Centre will reimburse you for reasonable travel costs incurred for donation of your samples if you are not attending care for some other reason, and we will also bear the cost of sample collection and transport of your sample to our laboratory.

RISKS

There are relatively few risks arising to you as part of your participation in this project. When giving blood, there are the physical risks associated with this procedure, including minor bruising or discomfort, or possible infection at the injury site. We follow best clinical practice for such extractions which should keep these risks to you low.

If you are a sports person, there is a risk that members of your club may pressure you into participation in the research in a way that makes you uncomfortable. If you feel that you do not wish to participate in the research or wish to withdraw after offering your consent, you may do so freely. We will not discuss whether or not you have withdrawn with other members of your sports club so that you will not be pressured or pestered regarding this research project.

There is a chance that this research will identify a genetic factor that you carry which predisposes to a significant medical condition. This may include a severe reaction to concussion or a medical condition not related to concussion in any way. Such information may have health implications for your blood relatives as well as yourself. You may be required to disclose this information or that potential testing has been performed to medical or life insurance providers if you know it has occurred. Information about such a genetic condition may affect insurance coverage and future work prospects if it becomes known. You can choose to be told about any genetic factor we find and if you don't want to know, we will only tell you if you specifically ask us to (see Feedback below).

The study team will not provide information about your DNA to anyone outside the study team other than yourself and your designated physician without your permission, unless we are compelled by force of law to do so. If you are a sports person, your club will not receive this information from us unless you specifically tell us to pass it to them. We only provide information about a medically important genetic variant to the doctor that you designate when you consent. That doctor does not have to be a club or team doctor unless you want it to be. However, if you are concerned about what learning this information might mean for you, you should consult your doctor, insurers or club as you think necessary.

QUT provides for limited free psychology, family therapy or counselling services (face-to-face only) for research participants of QUT projects who may experience discomfort or distress as a result of their participation in the research. Should you wish to access this service please call the Clinic Receptionist on **07 3138 0999** (Monday–Friday only 9am–5pm), QUT Psychology and Counselling Clinic, 44 Musk Avenue, Kelvin Grove, and indicate that you are a research participant.

Alternatively, in Australia, Lifeline provides access to online, phone or face-to-face support, call **13 11 14** for 24 hour telephone crisis support.

PRIVACY AND CONFIDENTIALITY

The Genomics Research Centre is committed to the protection and privacy of your genetic and research data. We will not publish data from this research that contains identifying information about you in any journal or scientific database. In the future, other scientists and doctors may wish to work with us on the research and assist us with analysing samples or information about your concussion symptoms that we have collected. Before these people assist with the research, their involvement will be approved by an accredited Human Research Ethics Committee. Data and samples that are shared with scientists or doctors who are outside the research team in any context will have all identifying information removed before they are shared.

With your permission your blood or saliva sample will be retained for future use in other genetic studies. The conduct of this research involves the collection, access and / or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. A de-identified copy of this data may be used for other research purposes. However, your anonymity will at all times be safeguarded.

CONSENT TO PARTICIPATE

You will be asked to sign a form giving your consent to participate in the study after you have read this information sheet and agreed to the conditions listed on the consent form.

As part of your participation in this study, we are asking for extended (long term) consent to use the sample you give in this study and following studies on concussion. Following studies would be studies that are continuations of this study. This means that the studies will have the same overall goal of identifying genetic factors that are involved in the susceptibility to concussion and concussion symptoms and not for any other diseases or disorders.

Future versions of the project would use newly developed scientific methods or technologies to examine genetic material, or follow new clues from research performed elsewhere as to what genes or genetic regions are important. However, in future projects your samples and data would be used in essentially the same manner as they will be now.

We ask for extended consent for this project because the biology of concussion is complex, and in some ways quite specific to the individual. Thus, in order to properly identify the genetic risk factors affecting concussion, we will have to make many comparisons between the effects of different genes to see which of them are affecting concussion in specific ways. Indeed, it is possible for some genetic factors to only affect risk when they are found together, and not individually. Unravelling these relationships will require many years of study, and it is very helpful to us to be able to look back over the totality of a specific person's genetic makeup when trying to work out how all the genes contribute to concussion. All future versions of the project would be subject to the same conditions, and they would also be approved by an accredited research ethics committee.

You should remember that consent for the research can be modified at a later time. Regardless of whether you choose to offer extended consent, you may still withdraw from the study at any point in the future or change what feedback you receive by contacting the research team, or other QUT contacts listed here. Your samples and data will be stored in a coded form, so if you decide to withdraw, your data and biological samples can be identified and destroyed. Please note that already published data cannot be destroyed if you withdraw.

You may also consent to participate in other genetic studies carried out by the Genomics Research Centre for which your samples are suitable. This might include another condition you suffer from, or you might be able to participate as an unaffected individual for a condition you don't have. Any such study you were involved in would be carried out identically to this one, but would be focused on a different health issue. Consent to other studies is not required however, and is completely optional.

QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT

If have any questions or require further information please contact one of the listed researchers:

Professor L.R Griffiths

lyn.griffiths@qut.edu.au

07 3138 6002

Dr Robert Smith

r157.Smith@qut.edu.au

07 3138 0970

FEEDBACK

Feedback is conducted via newsletters sent out to you at various intervals. Alternately, information can be seen on our website at www.genomicsresearchcentre.org.

Feedback will be of a general nature regarding the discoveries made in the project and will not include genetic information specific to you. This is in part to protect your privacy, and because most of the genetic variations we examine will have small effects on susceptibility to concussion and in order to properly assess their significance to you personally, we will need additional research to confirm the findings you will help provide.

We may, however, find genetic variants that have significant health implications for you. If you would like a medically significant variant reported to you, you must indicate that you would like us to do so on the consent form. These results will not be reported directly to you, but will be reported to a doctor that you designate, so that you can receive proper medical advice and care. The doctor that you designate to receive this information does not need to be a doctor at your team or sporting club (if you attend one), or one of the study doctors and can be any clinical doctor you wish to nominate.

Please note that the tests used to research genes do not provide clinical-standard results, therefore if the tests show a genetic variation with a potential clinical indicator we advise you to contact your attending doctor for a more thorough clinical gene assessment. If you wish, you may also ask that information about a medically important genetic variant passed on to a potentially affected family member. If possible, please designate a doctor contact for the family member, as well as the family member's name, contact details and relation to you so we can arrange to provide the information most effectively.

CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT

QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Advisory Team on 07 3138 5123 or email humanethics@qut.edu.au. The QUT Research Ethics Advisory Team is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

**THANK YOU FOR HELPING WITH THIS RESEARCH PROJECT.
PLEASE KEEP THIS FORM FOR YOUR INFORMATION.**