Protocol Title: MEG/EEG/MRI and Psychophysics Study of Developmental Disorders

Principal Investigator: TAL KENET, PhD

Site Principal Investigator:

Description of Subject Population: Children ages 5-17 and adults ages 18-45 who are healthy or have autism spectrum and or other developmental disorders. Adult consent, parent and guardian consent, adult and teen (14-17) assent.

About this consent form

Please read this form carefully. It tells you important information about a research study. A member of our research team will also talk to you about taking part in this research study. People who agree to take part in research studies are called "subjects." This term will be used throughout this consent form.

Partners HealthCare System is made up of Partners hospitals, health care providers, and researchers. In the rest of this consent form, we refer to the Partners system simply as "Partners."

If you decide to take part in this research study, you must sign this form to show that you want to take part. We will give you a signed copy of this form to keep.

Some of the people who are eligible to take part in this study may not be able to give consent to take part because of their medical condition. Instead we will ask the person's authorized representative to give consent. Throughout the consent form, "you" always refers to the person who takes part in the study.

Some of the people who are eligible to take part in this study may not be able to give consent because they are less than 18 years of age (a minor). Instead we will ask their parent(s) to give permission for them to take part in the study and will ask them to agree (give their

assent) to take part. Throughout the consent form, "you" always refers to the person who takes part in the study.

If you have questions or concerns about this research study, whom can you call?

You can call us with your questions or concerns. Our telephone numbers are listed below. Ask questions as often as you want.

Tal Kenet, PhD is the person in charge of this research study. You can call her at 617-643-6732. Voicemail or personal response will be available at this number 24 hours a day, 7 days a week. You can also call our Research Coordinator, who is in charge of scheduling visits and obtaining consent, at 617-966-9766. This is a cell phone, so we may answer even outside normal office hours and you can leave a message on it with questions about this research study.

If you have questions about the scheduling of appointments or study visits, call our Research Coordinator at 617-966-9766.

If you want to speak with someone **not** directly involved in this research study, please contact the Partners Human Research Committee office. You can call them at 857-282-1900.

You can talk to them about:

- Your rights as a research subject
- Your concerns about the research
- A complaint about the research
- Any pressure to take part in, or to continue in the research study

Detailed Information

A description of this clinical trial will be available on *http://www.ClinicalTrials.gov,* as required by U.S. Law. This Web site will not include information that can identify you. At most, the Web site will include a summary of the results. You can search this Web site at any time.

Why is this research study being done?

The purpose of this research study is to better understand how information may be processed differently in the brains of individuals with autism spectrum and other developmental disorders. Specifically, we are trying to understand how sensory information (sight, hearing, and touch) is processed in the brain of an individual with autism spectrum or other developmental disorder as compared to a healthy individual.

Who will take part in this research?

You are asked to participate in this research either as a healthy volunteer or because you have been diagnosed as having an autism spectrum disorder or other developmental disorder. We need to compare people from both groups to answer the research questions we are interested in.

We expect to enroll 400 subjects in this study at Massachusetts General Hospital (MGH). Information provided by you from another study (Protocol 2007p000062, Database for Persons Interested in Research Studies of Developmental Disorders) will be used in this study.

How long will I take part in this research study?

You will have one visit for each type of imaging session that is part of the study, plus possible extra visits for MRI practice or in case some images are not good enough. Usually there are 2 visits, if there is a need for practice or rescans, there may be up to 6 visits. The duration of each visit varies, but is expected to be between one and four hours, depending on which type of scan you are doing and how many breaks you would like during the visit. The whole study will take from 1 day to 3 months, subject to your availability. You may opt to complete all study visits in one day due to long travel distances or personal preference. If you choose to complete all the study visits in one day, the total time for the scans will be no longer than 6 hours including preparation, and 7.5 hours including extensive breaks (e.g. for meals).

What will happen in this research study?

You are being asked to participate in the following (study staff will check which procedures you will do):

☐ An MEG (magnetoencephalography) imaging session

☐ A combined MEG/EEG (electroencephalography) imaging session

☐ An MRI (Magnetic Resonance Imaging) scanning session (including, when relevant, an MRI training session in the mock MRI machine)

☐ A computer based testing (called "psychophysics")

Each of these aspects of the study will require a separate visit. It is possible that one procedure (e.g. MRI) will require more than one visit, should you require extra acclimatization to the procedure, or due to other unforeseen circumstances (e.g. technical issues). You are free to withdraw from the study at any time. During the COVID-19 pandemic, we may also check your temperature and your parent's temperature with a non-contact thermometer to screen for COVID-19.

MEG is very similar to EEG except that it reads the magnetic output of the brain (as opposed to EEG which reads the electric output of the brain). Both devices are completely non-invasive and are "read only" devices; neither device emits magnetic or electric fields.

EEG is done by gently pasting little circular metal discs that look a bit like little buttons on the head (the paste is washable). The EEG "buttons" (called electrodes) can be individual or sometimes they are attached to a cap that looks a bit like a swimming cap.

MEG is done by simply placing the head in the helmet like device of our machine while in a lying down or sitting position. The face and the rest of the body are not covered by anything.

EEG and MEG can be combined by first pasting on the EEG electrodes and then placing the head in the MEG helmet with the electrodes on. Because pasting on all of the electrodes on the EEG cap is a lengthy process, not all participants will be asked to undergo this part of the experiment. Even if you are asked to participate, you may request not to do so or to stop the EEG section at any time without having to withdraw from the MEG part of the experiment. You may be asked to have only a few EEG electrodes pasted on your head. This will not be very time consuming but you can still opt out of this part of the study if you prefer.

If you are asked to participate in an MEG session, you will have to lie fairly still in a bed or sit still in a chair in our magnetically shielded MEG room and will be asked to remain still for

as long as you are able to, up to almost two hours. During the session you may experience the following (study staff will check which procedures you will do):

- ☐ Visual stimulation (pictures or images on the screen, like black and white lines, circles, moving dots, or short video clips from a popular movie)
- ☐ Auditory stimulation (sounds, such as beeps or noise bursts)
- ☐ Tactile stimulation (such as vibrations on the finger tips)

You will *not* be asked to verbally respond to the stimuli but you will be asked to attend to the screen during the visual session. You may be able to watch a silenced movie when no visual stimuli are played. We may also track your eyes using an eye tracker while in the MEG. This will be done using a remote infrared camera that tracks the position of the dark circle in the center of your eye (the pupil), and it does not involve wearing any special equipment. This will allow us to know where you're looking.

We will maintain constant voice and video contact with you when you are in the shielded room. You will be able to have someone in the room with you should you choose to do so. We will stop every few minutes to allow you to stretch your limbs and wiggle your head slightly but we prefer that you stay in the bed or on the chair until the session is done. You will be free to stop the research tests at any time should you choose to. If you do wish to take a longer break and leave the shielded MEG room before completing the session, for instance to have a snack, go to the bathroom, or just stretch, you can do so; you just need to let us know you need a break.

Whether or not you are asked to participate in the EEG part of the experiment will depend first on the needs of the ongoing studies at the time of your visit and also on your ability to tolerate about 45 minutes of sitting still while the electrodes are pasted onto your head if the full cap option is being considered.

One important thing about MEG is that it is very sensitive to metals. Therefore**,** it is done in a special room where there are no metals that interfere with the signal. Because of this, anyone who enters the MEG the room need**s** to remove all metals such as jewelry, watches, under wire bras, jackets with metal zippers, etc. You may be asked to change to hospital clothing if there are metals in your clothes.

If you are asked to participate in the "psychophysics" session, you will be asked to sit across from a computer monitor and perform various tasks in response to sensory stimuli (sight, sound, and touch).

During the psychophysics session, you will be asked to respond to stimuli (study staff will check which procedures you will do):

☐ Visual stimulation (pictures or images on the screen, like black and white lines, circles, moving dots)

☐ Auditory stimulation (sounds, such as beeps or noise bursts)

☐ Tactile stimulation (such as vibrations on the finger tips)

Responses will include tasks such as "which was louder, the first or second"; rating the intensity of a stimulus; pointing to objects on the screen; or other simple tasks. In all cases**,** tasks will be set up so that you can respond either verbally or by pointing, using either your hands or a computer mouse if you prefer.

The sensory stimuli are harmless and should not make you uncomfortable. If you do feel discomfort from one or more stimuli, we will stop the use of those stimuli immediately.

You may be asked to participate in the MRI session. The MRI session may include:

☐ Visual stimulation (pictures or images on the screen, like black and white lines, circles, moving dots)

☐ Auditory stimulation (sounds, such as beeps or noise bursts)

☐ Tactile stimulation (such as vibrations on the finger tips)

IF YOU ARE ASKED TO PARTICIPATE IN THE MRI SESSION, we may choose to first train you in the mock scanner. This session will be short (about 15-30 minutes or so usually), can be combined with another visit (for instance your screening visit when you enroll in our database), and it is meant to get you familiar with the MRI. A "mock scanner" is a fake scanner that looks like an MRI machine but does not have any magnets. The "mock scanner" will be used to show you what will happen during the MRI scan and allows you to practice staying still.

The most important part of the mock scanner session is for you to practice lying on your back and staying still while you goes into the scanner tunnel. Once you get comfortable being in the tunnel, we may put a little movement sensor on your forehead (this is very small) and let you

watch a movie that you likes. The sensor on your head will be able to tell when you move your head, and every time you move your head the movie will stop. This way you will learn that in order to keep watching the movie you need to keep your head still. This method will allow you to practice being still. You will need to stay still while we are taking pictures of your brain in the real scanner in order for the brain pictures to come out clearly.

During the real scanning visit, you will receive an MRI scan at the Martinos Imaging Center at the MGH Charlestown Navy Yard. Before the scan, you will be asked to fill out an MGH-NMR Center Patient/Volunteer Screening Form, which asks questions to make sure it is safe for you to get an MRI. The study staff will review whether or not it is safe for you to get an MRI. For instance, it may be unsafe for you to get an MRI if you have certain metal implants.

All female participants will be screened for pregnancy as part of the MRI screening form, which we will also give you together with this consent form. The MRI screening form asks about pregnancy. For female participants, if pregnancy is confirmed on the screening form, you will not be able to take part in the study. If there is risk of pregnancy, and you are not sure whether or not you might be pregnant, we will ask you to do a urine pregnancy test, which we will provide. If the test result is positive, we will tell you and you will not be able to take part in the study. For participants who are under age 18, we may also inform your parent/guardian of the positive test result. If you think you may be pregnant but do not want to do the urine pregnancy test, you will not be able to take part in the study.

During the MRI session, you will be asked to lie on a padded table that slides into a large plastic tunnel. Sometimes people are uncomfortable lying on the padded table for a long time. You will be placed in the tunnel from your head to about the middle of your thighs. Sometimes people feel anxious or claustrophobic inside the MRI Scanner. The machine around the tunnel has a large magnet behind it with coils that are used to take pictures of the brain. As pictures are taken, you will hear loud, sudden knocking noises. You will wear earplugs to help reduce the noise. You will be able to hear and speak to the investigators at all times. If you wish, one of the researchers as well as a parent may stay with you in the MRI room. If a parent would like to stay in the MRI room with you, they will need to complete the necessary forms before entering the MRI room. These forms are necessary to make sure it is safe for you to enter the MRI room. They will also need to remove all metal objects from their body.

It will take about 5-10 minutes to set up for the MRI. Setting up involves getting the settings and positioning right for you. Including setup, it will take no more than two hours (and probably less than one and a half hours) to take pictures of your brain. Scanning will end either a) when you ask us to stop scanning b) when you becomes restless and can no longer lie still or c) after all of the necessary pictures have been taken. You can ask to stop the study at any time.

If we run out of time during one visit or if you or you would like to stop for the day, we can finish the scanning on a second session if that is okay with you.

The MRI scan is designed to answer research questions, not to examine your brain medically. This MRI scan is not a substitute for a scan a doctor would order. It may not show problems that would be detected by a medical MRI scan. However, if we believe that there is something unusual in your MRI, we will ask a doctor trained to read MRIs to look at your MRI. If the specialist thinks that there may be something unusual in your MRI, we will contact you and refer you to another doctor for follow-up. The results of your research MRI will not routinely become part of your hospital record.

The studies are separate from each other, and doing one study does not mean you have to do another study if you do not want to.

We are asking your consent to share any research data we collect, in a de-identified form, on the National Database for Autism Research (NDAR). NDAR is an NIH-funded research data repository that aims to accelerate progress in ASD research through data sharing. Data is made available, on appropriate terms and conditions as specified by the NIH, to qualified investigators.

As part of your participation in the study, a unique subject number, called a GUID, will be assigned to you that will allow researchers to see if you have been involved in more than one study or database used to study ASD. If you have participated in more than one study or database, this unique subject number will help connect information across studies. This subject number will also allow your de-identified data to be combined with data from other research studies to increase the likelihood of meaningful analysis. Only this subject number, and not your personal identifiable information, will be accessible to other investigators. This unique subject number may make it possible for a researcher who used this unique subject number in another study that you took part in to identify you.

This consent form applies to one study, which includes all of the procedures checked on this consent form. Should you be asked to participate in another one of our studies, we will present you with a separate consent form for that study.

We will label all your study information with a code number instead of your name. The key to the code connects your name to your study information. We will keep the key to the code here at Partners. No one outside Partners will know which information and/or samples are yours.

How may we use and share your samples and health information for other research?

The samples and information we collect in this study may help advance other research. If you join this study, we may remove all information that identifies you (for example your name, medical record number, and date of birth) and use these de-identified samples and data in other research. It won't be possible to link the information or samples back to you. Information and/or samples may be shared with investigators at our hospitals, at other academic institutions or at for-profit, commercial entities. You will not be asked to provide additional informed consent for these uses.

Will you get the results of this research study?

No. The research study we are doing is only a stepping stone in understanding autism spectrum disorder. Therefore, no information about the results of this research study or the results of your individual participation in the research study will be given to you or your doctor. Tests done for the research using your samples will not be useful in directing your medical treatment. The results of the tests will not be placed in your medical record.

You can choose to get a newsletter that will tell you about the research studies we are doing. This newsletter will not announce your results or anyone else's, but it will tell you some information about what we are learning about autism spectrum disorder. We will also publish what we learn in medical journals. In the future, when research results are published, they may show that certain groups (for example, racial or ethnic groups, or men/women) have genes that are associated with increased risk of a disease. If this happens, you may learn that you are at increased risk of developing a disease or condition.

What are the risks and possible discomforts from being in this research study?

There are no known risks from either MEG or EEG imaging. The procedure is entirely one of *reading* brain waves, and no electric or magnetic fields are applied to the brain.

There are also no known risks associated with any of the computer-based interactions that are part of the psychophysics study.

MRIs use powerful magnets to make images. There are no known radiation risks associated with MRI. However, persons with metal implants, such as surgical clips, or pacemakers should not have an MRI. All credit cards and other items with magnetic strips should also be kept

out of the MRI room. People who feel uncomfortable in confined spaces (claustrophobia) may feel uncomfortable in the narrow tube. The MRI makes loud banging noises as it takes images. Earplugs can be used to reduce the noises. The MRI can be stopped at any time at your request. If you are or suspect you are pregnant, you cannot participate in this study. The MRI has the potential, during normal routine use, to cause localized warming of your skin, or the underlying tissues. You should immediately inform us if you experience any discomfort, and the procedure will be stopped.

Some people experience dizziness or rarely nausea when going into an MRI scanner and these sensations may be more common in scans with higher magnetic fields. In most cases, these symptoms only last a short time. However, some people may experience them throughout the scan and/or continue to experience them for a short period of time after; generally, less than half an hour. No case of permanent problems is known."

What are the possible benefits from being in this research study?

There will be no direct benefit to you from participation in this study. However, this study may lead to a better understanding of how autism spectrum and other developmental disorders affect the brain, possibly contributing to better treatments for these disorders.

Can you still get medical care within Partners if you don't take part in this research study, or if you stop taking part?

Yes. Your decision won't change the medical care you get within Partners now or in the future. There will be no penalty, and you won't lose any benefits you receive now or have a right to receive.

We will tell you if we learn new information that could make you change your mind about taking part in this research study.

What should you do if you want to stop taking part in the study?

If you take part in this research study, and want to drop out, you should tell us. We will make sure that you stop the study safely. We will also talk to you about follow-up care, if needed.

Also, it is possible that we will have to ask you to drop out of the study before you finish it. If this happens, we will tell you why. We will also help arrange other care for you, if needed.

Will you be paid to take part in this research study?

You will be reimbursed for transportation at the current government rate for mileage if driving or for your Uber/Lyft expenses, up to $80 total per visit ($40 per way).

You will receive $70 minimum for the first hour of preparation and scanning. When the visit goes into a second hour, you will receive $70 per hour pro-rated by the quarter hour with a maximum of $280 for four hours per visit. In the case that you opt to combine all visits in one day, it will be a maximum of $525 (including any break time between the MEG and MRI scans).

What will you have to pay for if you take part in this research study?

The research is paid for in full by the researchers, and there are no costs to you.

What happens if you are injured as a result of taking part in this research study?

We will offer you the care needed to treat any injury that directly results from taking part in this research study. We reserve the right to bill your insurance company or other third parties, if appropriate, for the care you get for the injury. We will try to have these costs paid for, but you may be responsible for some of them. For example, if the care is billed to your insurer, you will be responsible for payment of any deductibles and co-payments required by your insurer.

Injuries sometimes happen in research even when no one is at fault. There are no plans to pay you or give you other compensation for an injury, should one occur. However, you are not giving up any of your legal rights by signing this form.

If you think you have been injured or have experienced a medical problem as a result of taking part in this research study, tell the person in charge of this study as soon as possible. The researcher's name and phone number are listed in the beginning of this consent form.

If you take part in this research study, how will we protect your privacy?

Federal law requires Partners to protect the privacy of health information and related information that identifies you. We refer to this information as “identifiable information.”

In this study, we may collect identifiable information about you from:

- Past, present, and future medical records
- Research procedures, including research office visits, tests, interviews, and questionnaires

Who may see, use, and share your identifiable information and why:

- Partners researchers and staff involved in this study
- The sponsor(s) of the study, and people or groups it hires to help perform this research or to audit the research
- Other researchers and medical centers that are part of this study
- The Partners ethics board or an ethics board outside Partners that oversees the research
- A group that oversees the data (study information) and safety of this study
- Non-research staff within Partners who need identifiable information to do their jobs, such as for treatment, payment (billing), or hospital operations (such as assessing the quality of care or research)
- People or groups that we hire to do certain work for us, such as data storage companies, accreditors, insurers, and lawyers
- Federal agencies (such as the U.S. Department of Health and Human Services (DHHS) and agencies within DHHS like the Food and Drug Administration, the National Institutes of Health, and the Office for Human Research Protections), state agencies, and foreign government bodies that oversee, evaluate, and audit research, which may include inspection of your records
- Public health and safety authorities, if we learn information that could mean harm to you or others (such as to make required reports about communicable diseases or about child or elder abuse)
- Other researchers within or outside Partners, for use in other research as allowed by law.

Certificate of Confidentiality

A federal Certificate of Confidentiality (Certificate) has been issued for this research to add special protection for information and specimens that may identify you. With a Certificate, unless you give permission (such as in this form) and except as described above, the researchers are not allowed to share your identifiable information or identifiable specimens, including for a court order or subpoena.

Certain information from the research will be put into your medical record and will not be covered by the Certificate. This includes records of medical tests or procedures done at the hospitals and clinics, and information that treating health care providers may need to care for you. Please ask your study doctor if you have any questions about what information will be included in your medical record. Other researchers receiving your identifiable information or specimens are expected to comply with the privacy protections of the Certificate. The Certificate does not stop you from voluntarily releasing information about yourself or your participation in this study.

Even with these measures to protect your privacy, once your identifiable information is shared outside Partners, we cannot control all the ways that others use or share it and cannot promise that it will remain completely private.

Because research is an ongoing process, we cannot give you an exact date when we will either destroy or stop using or sharing your identifiable information. Your permission to use and share your identifiable information does not expire.

The results of this research may be published in a medical book or journal, or used to teach others. However, your name or other identifiable information **will not** be used for these purposes without your specific permission.

Your Privacy Rights

You have the right **not** to sign this form that allows us to use and share your identifiable information for research; however, if you don't sign it, you can't take part in this research study.

You have the right to withdraw your permission for us to use or share your identifiable information for this research study. If you want to withdraw your permission, you must notify the person in charge of this research study in writing. Once permission is withdrawn, you cannot continue to take part in the study.

If you withdraw your permission, we will not be able to take back information that has already been used or shared with others, and such information may continue to be used for certain purposes, such as to comply with the law or maintain the reliability of the study.

You have the right to see and get a copy of your identifiable information that is used or shared for treatment or for payment. To ask for this information, please contact the person in charge of this research study. You may only get such information after the research is finished.

Informed Consent and Authorization

Statement of Person Giving Informed Consent and Authorization

- I have read this consent form.
- This research study has been explained to me, including risks and possible benefits (if any), other possible treatments or procedures, and other important things about the study.
- I have had the opportunity to ask questions.
- I understand the information given to me.

Signature of Subject (use for participants ages 18 and older):

I give my consent to take part in this research study and agree to allow my identifiable information to be used and shared as described above.

_____	_____	_____
Subject	Date	Time (optional)

Signature of Parent(s)/Guardian for Child (use for participants ages 17 and younger):

I give my consent for my child to take part in this research study and agree to allow his/her identifiable information to be used and shared as described above.

_____	_____	_____
Parent(s)/Guardian for Child	Date	Time (optional)

Signature of Guardian or Authorized Representative for Adult:

I give my consent for the person I am authorized to represent to take part in this research study and agree to allow his/her identifiable information to be used and shared as described above.

Print Name (check applicable box below)

- ☐ Court-appointed Guardian
- ☐ Health Care Proxy
- ☐ Durable Power of Attorney
- ☐ Family Member/Next-of-Kin

Signature | Date | Time (optional)

Relationship to Subject:_____

Assent

Statement of Person Giving Assent

- This research study has been explained to me, including risks and possible benefits (if any), other possible treatments or procedures, and other important things about the study.
- I have had the opportunity to ask questions, and my questions have been answered.

Signature of Child (use for participants ages 14-17):

I agree to take part in this research study and agree to allow my identifiable information to be used and shared as described above.

Child, Ages 14-17 | Date | Time (optional)

Signature of Adult:

I agree to take part in this research study and agree to allow my identifiable information to be used and shared as described above.

Adult	Date	Time (optional)

Signature of Study Doctor or Person Obtaining Consent:

Statement of Study Doctor or Person Obtaining Consent

- I have explained the research to the study subject.
- I have answered all questions about this research study to the best of my ability.

Study Doctor or Person Obtaining Consent	Date	Time (optional)

Consent Form Version Date: 12/5/2024