Answers can be found on the MATR website (www.matr.vcu.edu)

M) Calf N) Owlet O) Caterpillar P) Kid	l) Gosling Vguy (L Ms Tadpole L) Tadpole	E) Foal F) Chick G) Bunny H) Lamb	Baby animals A) Kitten B) Joey C) Duckling D) Piglet
Flyfy? — A baby butterfly? — Spob ydsd A — S199b ydsd A — S19b y	A baby kangaroo?	Faboy goose?	Swoo ydsd A
	A baby chicken?	A baby sheep?	Sgiq ydsd A
	A baby goat?	Syoub ydad A —	Slwo ydsd A

A baby horse?

Match the baby animal to the adult by placing the correct letter next to the animal

KIDS COUNTEUR

A baby cat?



A Family Newsletter from the Mid-Atlantic Twin Registry



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A Family Newsletter from the Mid-Atlantic Twin Registry

A Message From The Director

Dear MATR Community:

With summer comes new beginnings and the MATR is no exception. While we continue work on our current studies we are always looking ahead to exciting new

Many of you have asked about results from recent studies you have participated in so we have included updates from our research in this newsletter. While the MATR does not directly publish study reports, we do ask the doctors and scientists to provide information on the work they do. It is important for our participants to know that their contribution truly does make a difference.

Finally, we would like to offer our thanks to everyone who participated in the Genes, Environment and Development Initiative, a study that completed sample collection in the beginning of this year. Please read over the article included in this newsletter to learn more about the progress of the study.

As always, thank you for your support of the Mid-Atlantic Twin Registry, when you take part in our research you are helping to improve the well-being of generations to

MATR Scientific Director

MATR EMAIL ADDRESSES

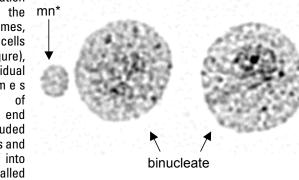
The MATR would like to, once again, thank everyone that has provided us with your email address. As mentioned in this Newsletter, we are preparing to invite eligible participants to take part in an on-line survey. To ensure your email provider will deliver our correspondence to you properly, and not filter it to spam, please add our email address, matr@vcu.edu, to your email address list.



FACTORS

Dr. Colleen Jackson-Cook and fellow researchers at Virginia Commonwealth University are making progress on a study to identify factors that lead to chromosomal changes which occur with normal human aging. Our DNA (and thus genes) is arranged into structures called chromosomes. Usually, our chromosomes are found in the cell's nucleus, which is thought of as

"organization center" of Sometimes, cell. when our cells divide (see figure), whole individual chromosomes or fragments of chromosomes end up being excluded from the nucleus and are "packaged" into structures called micronuclei (singular micronucleus) instead. These micronuclei



*mn=micronucleus (if there are two or more they are called micronuclei)

are important for this study, because the researchers used a biological test called an assay to determine the number and other qualities of the micronuclei in participants' samples as a measure of acquired chromosomal changes. In other words, the more micronuclei a person has then the more acquired chromosomal changes they have as well. While these researchers have already determined some of the factors that impact micronuclei formation, they are interested in learning even more about this cellular mechanism that likely plays a significant role in how we age.

So far a total of 145 twins, who range in age from 7 to 85 years have completed this study. The scientists have observed that micronuclei frequency significantly increases with age for both men and women. However, this effect was more pronounced in females compared to males. Further, this increase in frequency related to aging involved micronuclei related to the chromosomes that determine our sex (the X and Y chromosomes) instead of non-sex

determining chromosomes. An exciting new discovery was determining that micronuclei observed in children appear to occur as a correction for chromosome sorting errors common in cell division; in other words, for children the formation of micronuclei tended to have a positive effect. In contrast, the larger frequency of micronuclei present in older twins reflected an increase in chromosome

> sorting problems which contributed chromosome imbalances; or in this case, as you age the increase in micronuclei suggests a problem and is not as beneficial as those found in children. This finding may indicate a decrease in the cell's ability to form corrective micronuclei. The role this chromosomal imbalance plays in

developing age-related problems will definitely be an area for future investigations.

By studying twins the researchers were also able to determine that both genetic as well as environmental factors (such as diet and lifestyle) are important contributors to observed age-related increases in the frequency of chromosomal changes. Specific environmental exposures and health conditions shown to influence micronuclei frequencies included: intake of multivitamins,

(Factors in Human Behavior continued on page 3)

In this Issue:

- Study Updates & Findings
- MATR Survey Initiative
- Kids Corner

Commonwealth University

MICROBIOME STUDY

So far we have had a great response to Dr. Gregory Buck's study on women's reproductive health being conducted here at VCU. The initial findings are showing interesting results with promising outcomes that will lead to improved treatment and healthcare for women. Thus far twins of all ages and from all over the country have participated. The study is ongoing and any female twin pairs interested still have a chance to take part.



NEW MATR SURVEY INITIATIVE:

In the next few months the MATR may be contacting you regarding a new initiative we're preparing to launch. We are currently developing a secure, online MATR questionnaire that can be completed using a typical web browser, such as Internet Explorer. Ideally, if we have your email address, we'll send the link to the survey to you using your email; otherwise, you may get an invitation to participate in the mail or we may contact you by phone or mail to request your email address. This will be our first online survey so we are particularly excited about this project. The survey will ask questions covering a wide variety of topics including demographic characteristics, specific health conditions, and general physical fitness and health habits. There will also be questions regarding personality, experiences with depression, and social and political attitudes. When twins participate in this kind of survey, we are able to create a resource for researchers interested in studying a range of topics, such as the genetic and environmental factors that contribute to the development of specific health conditions or certain behaviors. We hope that learning more about these topics will lead to improved treatment and prevention plans for certain diseases and conditions and to a better understanding of what drives human behaviors and some of the choices we make.

CAUSES OF PARENTAL BEHAVIOR

It was often assumed that the effects of a parent-child relationship are unidirectional (from parent to child). However, we now recognize that these relationships go both ways. This means that not only do parents influence their child's behavior, but children also affect the behavior of their parents. More generally, genetic and environmental differences between children in the same family create different patterns of parent-child interaction between the parent and each individual child. In particular, we were interested to learn more about the role that maternal warmth played in this interaction; how does a mother's level of affection influence their child's behavior and vice versa? To answer such questions, we analyzed data from nearly 3,000 children who participated in the Children of Twins (COT) study and 1400 juvenile twin pairs from the Virginia Twin Study of Adolescent Behavioral Development (VTSABD) and were able to test alternative models to explain the association between maternal warmth and a child's behavior. The models included:

- 1) The mother's genes for maternal warmth
- 2) The family wide environmental effect of the mother's parenting behavior
- 3) The reverse direction of causation from the child to the mother.

The latter represents what is referred to as evocative genotype-environment correlation or ErGE in which genetically influenced behaviors of the child elicit behaviors from the parent. This means that certain genetically influenced behaviors of the child could encourage or discourage specific behaviors from the mother which may then influence the behavioral and emotional functioning of the child. These findings emphasize the reciprocal nature of parent-child interactions and the important role the child's genotype plays in interactions between parents and their children.

If you are interested in additional findings from the COT study see:

Silberg J, Maes H, Eaves L. Genetic and environmental influences on the transmission of parental depression to children's depression and conduct disturbance: an extended Children of Twins study. Journal of Child Psychology and Psychiatry 2010; Epub ahead of print.

GENES, ENVIRONMENT AND THE DEVELOPMENT OF SUBSTANCE USE DISORDER INITIATIVE (GEDI)

Sample collection for Drs. Eaves' and Silberg's "Genes, Environment and the Development of Substance Use" study is complete. We collected over 900 samples for the multi-site Genes, Environment and Development Initiative (GEDI) established by the National Institute on Drug Abuse (NIDA). Now that sample collection is complete, the next phase of the project, genotyping (determining the genes and/or genetic variation in the samples), has begun

Using the genotypes and the data collected during previous long-term studies, such as the "Virginia Twin Study of Adolescent Behavioral Development" (VTSABD) or the "Young Adult Follow-up Study" (YAFU), the researchers are hoping to find any associations between certain traits that they asked about during those previous studies (such as substance use) and any genetic variants identified in the genotypes. If strong associations are found between a trait and genetic variant then this suggests that gene greatly influences the expression of that trait. Much of the previously collected data was done so at different points in each participant's life, so the researchers are also hoping to shed light on the risk associated with developing substance use issues at different developmental periods. For example, there is evidence to suggest that a person's risk to develop a substance use problem might change throughout development milestones, such as childhood, adolescence, and young adulthood. So ultimately, the researchers are hoping to clarify this triangle of interactions between genes, environment and developmental transitions in order to help predict not only if someone is more or less susceptible to develop a substance use disorder, but at what stage in life, and perhaps which drug is likely to be more problematic. As you can well imagine, it will take many years to reach this level of understanding, but ultimately, this would allow the scientific community to establish intervention and prevention programs that are likely to be successful at minimizing the impact substance use disorders have on an individual, their family, and society as a whole.

NATIONAL INSTITUTE OF CHILD HEALTH & HUMAN DEVELOPMENT STUDY (NICHD)

The MATR is still contacting registry participants

about the National Institute of Child Health & Human Development's (NICHD) "Development & Aging" study. Early participant enrollment has focused on individuals in the 60 years plus age category. We will now start focusing on contacting identical twins between the ages of 18 and 30. As some of our newsletter readers may remember, this study is investigating factors that affect human development and aging. The researchers for this study hope to learn more about how our genes and environment interact to impact human aging and development. They are particularly interested in learning how certain chemicals in our cells regulate the genes that we suspect or know play a role in aging and development. This regulation mechanism often falls into a relatively new exciting area of research called "epigenetics." These chemicals can help turn on or off the expression of certain genes, including those genes that impact how we age, and may account for why some individuals tend to age "better" than others. For example, why do some of us develop more serious age-related conditions than others even when our "aging" genes and environments are similar? This is why the NICHD researchers approached the MATR and asked us to contact twin pairs that might be willing and eligible to participate. In addition to focusing on the 60 years plus age category, we have also been focusing enrollment efforts on monozygotic (identical) twin pairs, though at some point we may be contacting dizygotic (fraternal) pairs too. As you can imagine, if you are a member of a monozygotic pair where both you and your twin are considered genetically identical, then you should express aging patterns that are almost the same. Interestingly enough, this is not always the case. Sometimes this can be explained because one member of the pair had exposure to certain environmental factors, which we know will likely negatively impact a person's health quality as they age, for example if one twin was a long-term, heavy smoker. But there are also examples where there is no clear reason that there should be differences in the aging patterns between the members of an identical twin pair. This has lead researchers to the conclusion that some other mechanism must be at play to account for those differences. Many speculate that these differences could be the result of variations in a person's epigenetic factors; in other words, those chemicals in your cells that help regulate your gene expression. And this is something the NICHD researchers aim to determine by collecting samples from twin pairs in order to compare both their genetic make-up as well as the chemicals that regulate certain age-related genes. Their analysis will likely help determine if and to what degree the epigenetic or regulatory chemicals impact how we age and develop during our lives.



STRESSAND COPING

A range of analyses have continued on the Stress and Coping Project. The American Psychiatric Association (APA) is again revising their diagnostic manual. Two studies were commissioned by the APA, using results from the Stress and Coping Study, to examine the interrelationship between depression and anxiety, and trying to determine how to best measure severity of major depression (headed by Dr. Kenneth Kendler).

Other studies in the Stress and Coping Project have looked at specific symptoms of eating disorders; and examined the interrelationship between church attendance, and alcohol and nicotine consumption. In the latter study, we showed that in childhood and adolescence, the interrelationship between the frequency of church attendance and risks for using alcohol and nicotine were entirely a result of family experiences. That is, those families that tended to encourage frequent church attendance in their twin children also discouraged their children from using alcohol and nicotine. However, when the twins were studied in adulthood, we found that genetic factors became more important in explaining the tendency for some individuals to go to church frequently and to infrequently use alcohol and nicotine, and for others to use the substances more frequently and also attend church infrequently. A final analysis done in the last year asked whether the diagnosis of major depression should be made independently of the psychosocial context in which the depression arose. That is, if someone develops a depression after a severe stressor such as the breakup of an important relationship, being given a severe medical diagnosis such as early cancer, or with the severe illness or death of a loved one, is that kind of depression substantially different from the depression that arises without major stress? Contrary to traditional clinical wisdom, the evidence of these studies was that there were only modest differences between these two kinds of depression. These results suggest that individuals who continue to demonstrate severe depression long after such major adverse life events actually have a similar vulnerability as those who develop depression after more minor

(Factors in Human Behavior continued from page 1) leafy green vegetables, fruit, folate-enriched bread and vitamin E supplements, use of tobacco, and a history of arthritis, migraines and allergies.

In summary, this research has led to new insights about the frequency and types of chromosomal changes that occur in cells as we age. Since there is still more to learn, participant enrollment is ongoing. Participation involves providing blood and cheek swab samples and completing a brief questionnaire. Participants get to learn more about their chromosomal make-up and their zygosity (if they are identical or fraternal). The researchers want to thank all of the twins who have generously contributed to this research study!

WE VALUE YOU.

The Mid-Atlantic Twin Registry (MATR) greatly values its participants and strives to treat you with consideration and respect. We have the same expectations for researchers that interact with our twins. If you have feedback regarding your experiences with MATR staff or research staff for any study, please do not hesitate to send us an email matr@vcu.edu, call 1-800-URA-TWIN (800-872-8946) or call our Participant Coordinator, Carol Williams, at 804-828-8116 and we will address your concern immediately.



EMAIL ADDRESSES

If you are a member over 18 years o or the parents of younger twins, w would love to have your email addrest to send you information periodical about new studies. If you would like provide your email address, please visour website at www.matr.vcu.edu or yo can email us at matr@vcu.edu. As wi all information you provide, we will n share your email address with anyor and you may ask that your email address be removed at any time.

DO YOU KNOW MULTIPLES WHO WANT TO REGISTER WITH US?

If so, please ask them to visit the Register With MATR section of our website at www.matr.vcu.edu or call us at 1-800-URA-TWIN (800-872-8946), so they can join the thousands of multiples who are willing to consider participating in health-related research

MOVING?

Remember to contact the MATR if your name, address, email address or telephone number changes by visiting the Update Your Contact Information secion of our website a www.matr.vcu.edu or calling our toleree number 1-800-URA-TWIN.