

## CANADIAN ECD RESEARCH IN 2009

# CASH TRANSFERS, STRESS, DNA METHYLATION AND HEALTH

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**You may be reading this editorial because you're intrigued by the unlikely association of the words in the title. One common denominator is that they are all topics explored in this *Bulletin*. The other is that recent research suggests that they are all related.**

A decade ago, at a meeting on preventive interventions for poor pregnant women, experienced home-visiting nurses argued strongly against smoking reduction programs. They felt that these women benefited from smoking as a way to considerably reduce their stress. While some of the nurses argued that giving the women more money would also

reduce their stress, others argued that the money would simply be used to buy more cigarettes.

Our Top Ten articles on early childhood development published by Canadian scientists in 2009 will encourage clinicians to rethink the links between stress, smoking and poverty. The articles also demonstrate that funding

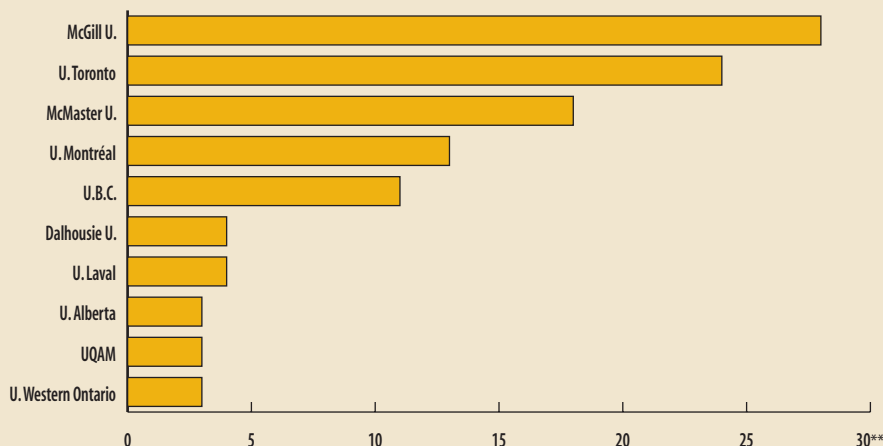
agencies invested their money wisely in the issues that matter most to clinicians seeking to provide the best possible services to young parents who live in difficult circumstances.

Two of the critical reviews in the *Bulletin* summarize the vast amount of evidence confirming that high levels of stress early in life put children on a long trajectory of health and social problems (see pages 7 and 9). A third paper confirms that prenatal stress should not be fought with cigarettes since children whose mothers smoked during pregnancy are at a much higher risk of substance use during adolescence, likely because of damage done to their brain while *in utero* (see page 4). A fourth paper suggests that cash transfers to poor parents can be an effective means of fostering children's healthy development, if the transfers are conditional on the parents using health and social services (see page 6).

Interestingly, we are also starting to unravel the different mechanisms that explain the potential long-term impacts of parents having access to cigarettes and money during their children's early years. The DNA methylation story that we highlighted in the 2004 edition of the Top Ten is gaining momentum (see pages 2 and 3), while the brain development story is getting clearer with early life imaging (see page 8) and longitudinal studies (see pages 4 and 5). However, we still have a long way to go before this knowledge becomes integrated into systematic prevention experiments and, eventually, into widely-used best practices. The critical review on prevention of child maltreatment (see page 10) presents challenges that we must meet with determination and the best scientific tools.

The graph to the left illustrates how well Canadian universities have done over the past nine years in terms of producing top-level knowledge to address these challenges. Notably, for the first time this year, we've included critical reviews in our Top Ten selection. We felt this strategy would be of interest, since articles that review a large number of older papers on a given topic complement articles that report new findings. 🌱

## TOP 90 PAPERS (2001-2009)\*



\* Only shown in this graph: Canadian institutions with at least 3 nominations in the top 90 papers (2001-2009).

\*\* Graph indicates the number of papers with at least one author from a Canadian institution.

# EPIGENETICS: CHANGING THE WAY WE VIEW PHYSICAL AND MENTAL DISEASE

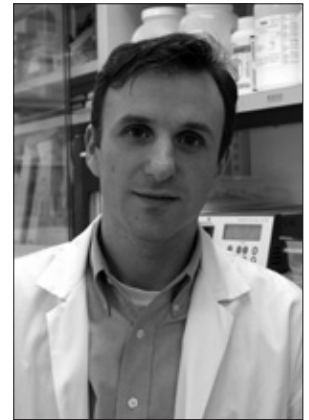
If you put experts in psychology, neuroscience, suicide and epigenetics together in one room, what would they do? If the team of Patrick McGowan, Moshe Szyf and Gustavo Turecki is any example, they would not only help explain the neurobiology of despair but also create the foundation for understanding the mechanisms by which the environment can shape our genes and brains both physically and measurably.



Patrick McGowan



Moshe Szyf



Gustavo Turecki

Working as a post-doctoral fellow under Michael Meaney, whose seminal animal studies on the effect of early life experience on behaviour set the stage for work in humans, Patrick McGowan wanted to understand more about the environment and the brain.

*"We know a lot about the effects of early life experience on behaviours and something about how early life experience can have a lasting impact on how the brain works,"* says Dr. McGowan, who is currently on faculty at the University of Toronto. *"But we don't know the connection between the two."*

## FORMING A SYNERGISTIC TEAM

To help bridge this gap, Dr. McGowan teamed up with Dr. Turecki, an expert in the neurobiology of suicide at Montreal's Douglas Hospital, and Dr. Szyf, a McGill-based expert in epigenetics.

*"Everything we think and feel is ultimately coded in the brain,"* says Dr. Turecki. But how? One explanation may be a process known as "methylation." According to Dr. Szyf, *"methylation is a grand mechanism of adaptation of the genome, and all human disease may be related to a misadaptation."* That is, a mismatch between the world your brain has been 'methylated' to live in and the world that you actually find yourself in.

Dr. McGowan and his scientific partners have shown that individuals who died by suicide and who had a history of abuse and/or neglect early in life had signs of methylation in

a gene known as GR, essentially turning it off. This was not seen in suicide victims without an early history of abuse and neglect or among individuals who died from other causes. Since the GR gene is responsible for regulation of the stress hormone glucocorticoid, those whose GR genes are shut down may be less able to handle stress.

## VAST IMPLICATIONS FOR MENTAL AND PHYSICAL DISEASE

The implications for this research, which links environmental triggers with biological effects on genes that, in turn, are linked with particular diseases and mental states, are astounding. It means biomarkers – that is, changes in a person's biology that can be directly measured – can be used to predict who is vulnerable to certain diseases (or negative mental states such as suicidality). Biomarkers can also be used to determine whether interventions and treatment (including drugs, psychotherapy, and other medical and social approaches) are actually working. They also suggest new roads to explore in terms of the development of novel treatments. Who knows? Maybe one day there will be a drug that can "unmethylate" targeted genes.

*"We hope that one day we and our colleagues will have many, many methylation signatures that could predict all kinds of pathologies very early in life,"* says Dr. Szyf. *"I think that will revolutionize medicine."* 🦋

BY ALISON PALKHIVALA

*"Everything we think and feel is ultimately coded in the brain."*

# HOW THE ENVIRONMENT SHAPES THE BRAIN

**Studying the brains of suicide victims is helping researchers understand how the environment can stimulate seemingly permanent changes in the brain that can result in a lifelong vulnerability to stress.**

It is well-known that there is a strong link between early life adversity and subsequent long-term difficulty coping with stress. What remains unclear is the mechanism – or mechanisms – by which this adversity impacts the body's stress-response system.

The first hint that epigenetics – or the effects of the environment on genes – might play a role derives from pivotal animal research led by Michael Meaney and Moshe Szyf from McGill University. Their research showed that rat pups separated from their mothers early in life would become extra sensitive to stress later in life, while licking and grooming from their mothers actually eased the stress response. They also demonstrated that more licking and grooming from mothers translated into more receptors in the hippocampus for an important stress-regulating hormone known as glucocorticoid.

## FROM RATS TO HUMANS

In collaboration with Dr. Meaney and Dr. Szyf's team, Dr. Patrick McGowan, currently an assistant professor at the University of Toronto, explored whether similar mechanisms are at play in humans. They examined the brains of two groups of suicide victims: those who had experienced abuse and neglect early in life and those who had not. They compared them with the brains of individuals who had died by other means.

Individuals who died by suicide and who had a history of abuse and/or neglect early in life had decreased levels of expression of the GR gene in the hippocampus of their brains, compared with the other two groups. These findings directly correlate with the animal studies, since the GR gene encodes for glucocorticoid receptor.

*"This is one of the mechanisms by which early childhood stress could lead to a high risk for suicide later in life,"* says Dr. McGowan. For susceptible individuals, he says, *"there's a possibility that early-life stress could have a lasting impact."*

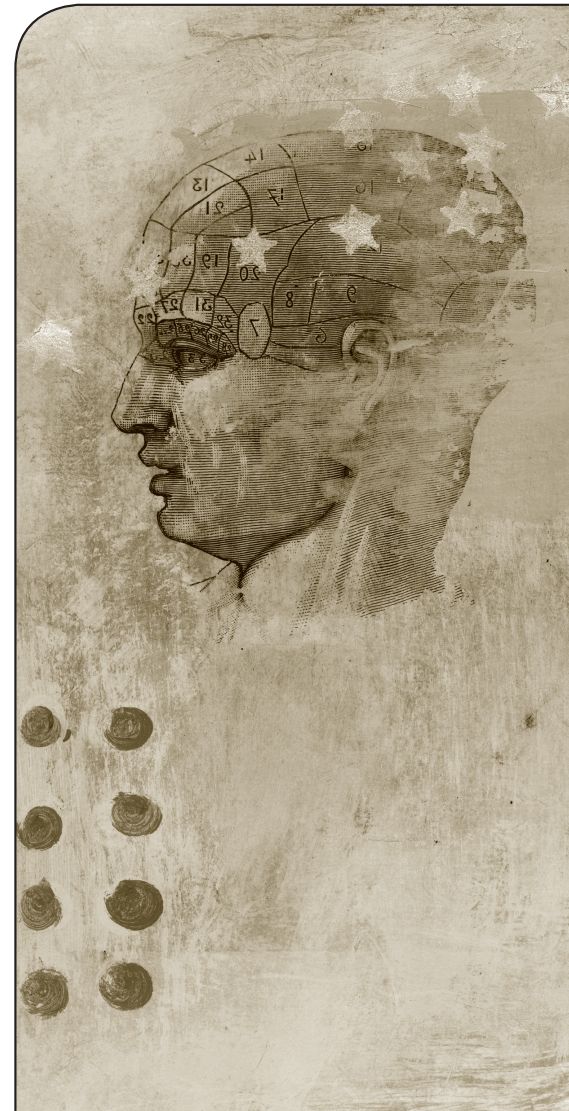
According to Dr. Martin Alda, an expert in psychiatric genetics at Dalhousie, this research is groundbreaking. *"It is very critical for understanding elements of how environmental stressful life events influence brain function and behaviour. ... It raises a lot of provocative questions,"* he says, such as, what would happen if abused or neglected children received help early on? Rescuing young children from overly stressful home environments could prevent brain changes that would make them vulnerable to mental illness for the rest of their lives.

## DEVELOPMENT OF BIOMARKERS

Exciting future possibilities of this research include the development of tailored therapies that could reverse these brain changes as well as the identification of useful biological markers – such as the concentrations of certain substances in the blood. Such "biomarkers," as they are known, could help pinpoint who is most vulnerable to brain changes as a result of early life neglect and abuse (and thus most in need of early intervention). The biomarkers could also help determine who is responding to treatment, be it medical, pharmacological, or social.

*"There's a lot of work being done trying to figure out what are effective interventions,"* says Dr. McGowan. *"If we understand more about how the brain changes in response to stress ..., then we have a better idea of how to tailor interventions to people who have differences in the way they respond to stress."* 🐾

BY ALISON PALKHIVALA



*"If we understand more about how the brain changes in response to stress ... then we have a better idea of how to tailor interventions."*



# SUBSTANCE USE IN TEENS

## LINKED TO PRENATAL MATERNAL SMOKING

**A study has found that prenatal exposure to maternal smoking is associated with an increased likelihood of substance use in adolescence (i.e., use of cigarettes, alcohol or drugs). The study was also an attempt to understand how exposure to nicotine *in utero* might affect the developing brain.**

Cigarette smoking during pregnancy is not uncommon: 16% to 60% of pregnant women smoke, with the number varying by country and socio-economic group. Yet smoking during pregnancy is associated with a number of adverse outcomes, including spontaneous abortion, sudden infant death syndrome and low birth weight, as well as increased rates of behavioural problems and other negative psychosocial outcomes.

While some studies had previously suggested a link with increased substance use later in life, *"this is the first study that shows what is happening in the brain of adolescents whose mothers smoked during pregnancy, with respect to drug experimentation,"* says Tomáš Paus, Tanenbaum Chair in Population Neuroscience, senior scientist at the Rotman Research Institute and professor of psychology and psychiatry at the University of Toronto.

In particular, researchers sought to determine the role of the orbitofrontal cortex (OFC) in this relationship. The OFC is one of the key structures in reward-related processes, *"a place where the brain decides whether something is rewarding or not, which is what substance use is all about,"* Paus explains. The study looked at nearly 600 adolescents, aged 12 to 18 years, in the Saguenay–Lac-Saint-Jean region of Quebec, Canada. It found that among adolescents exposed to maternal smoking during pregnancy, the thinner the cortex, the more likely it was that the adolescents had experimented with drugs.



*"Researchers suspect that when a pregnant woman smokes, it activates the nicotine receptors of the fetal brain."*

*"Our interpretation is that the thinner the cortex, the less sensitive people are to reward, so they keep 'shopping around' for another substance,"* says Paus. (He emphasizes, however, that increased use does not mean drug addiction, and that trying out cigarettes, alcohol or even marijuana is in fact a fairly normative behaviour in adolescence.)

Researchers suspect that when a pregnant woman smokes, it activates the nicotine receptors of the fetal brain. Repeated activation changes the sensitivity of other transmitter systems, including dopamine, an important neurotransmitter for reward-related processes. While at first this is a functional difference, it can translate into a structural difference, i.e., affecting the thickness of the cortex.

However, the study also suggests that some individuals may be "protected." Exposed

adolescents who had not tried drugs showed the same OFC thickness as non-exposed adolescents. *"This could mean that some kids who were exposed to smoking prenatally were protected by other factors,"* says Paus. *"It could be that different genes make them less vulnerable, or that certain maternal behaviours offset the potentially adverse effects."*

Tomáš Paus concludes that his group's findings help to provide a more detailed picture of the negative outcomes associated with prenatal exposure to maternal smoking. *"But we are also learning that not everyone is affected in same way. Future research might help identify what protects some individuals — so that if we cannot get the mother to quit, perhaps we can still offer some counter-measures."*

BY EVE KRAKOW

# ADHD AND BRAIN ASYMMETRY — A LITTLE IMBALANCE IS A GOOD THING

**The importance of the differences between the left and right hemispheres of the brain is being increasingly highlighted in brain imaging studies. In fact, lack of brain asymmetry has been linked to attention deficit hyperactivity disorder (ADHD).**

*“In healthy, right-handed adults,” says Dr. Philip Shaw, lead clinician of the ADHD research program at the National Institute of Mental Health (Maryland, USA), “the right front part of the brain and the left back part are bigger. But the puzzle has been, if you look at the brains of infants, this is reversed.” To find out how asymmetry in the brain shifts over time and to determine whether abnormalities in this process might help explain what is seen in ADHD, a condition in which weakness in the functioning of the right front part of the brain has been noted, Dr. Shaw used magnetic resonance imaging (MRI) to produce images of the brains of hundreds of children with and without ADHD. Importantly, most of the children were scanned repeatedly at different points in time, providing a longitudinal perspective. The results of this study were published in the August 2009 issue of the *Archives of General Psychiatry*.*

## **LONGITUDINAL DATA DEMONSTRATE DIFFERENT PATTERN OF BRAIN DEVELOPMENT IN ADHD**

*“ADHD changes over time. If you want to understand how something grows,” says Dr. Shaw, “using longitudinal data, where you collect the same information at multiple time points in the same subject, can really help you capture developmental processes.”*

The investigators were particularly interested in the thickness of the cortex, the outer layer of the brain responsible for higher level functioning. Dr. Shaw’s team included Dr. Alan Evans, from the Montreal Neurological Institute (MNI), and it was there that they developed

computer software to map over 40,000 corresponding points on the left and right sides of the cortex and then compare them to identify differences.

*“In very young healthy kids,” who are right-handed, says Dr. Shaw, “we confirmed what others have found: there’s a reversal of the adult pattern of asymmetry. The frontal cortex and the right rear region were thicker. We then did this little movie of how it grows from one end to the other, and you see this very nice progression of a flip. At the very front of the brain, it goes from left being thicker to the right being thicker, and then the opposite is happening at the back of the brain.”*

But the patterns of change were different for children with ADHD. *“In the back bit of the brain, the same developmental pattern was there, though a bit delayed, but for the front part*

*of the brain, they just showed no change at all.”* In children with ADHD, the right frontal part of the brain did not increase in size relative to the left, as it should.

Dr. Stacey Ageranioti Bélanger, director of the ADHD clinic at CHU Sainte-Justine in Montreal, says this is one of the largest imaging studies of the brains of children with ADHD. *“This study explains better than others the importance of anatomical asymmetries in the human brain,”* she says. It also helps explain one component of ADHD, which is a multifactorial disease. There may be *“links between abnormalities in brain development in very particular regions, for which the causes may not be completely known, but for which genetics may play a role,”* she explains. 🦋

**BY ALISON PALKHIVALA**

*“Lack of brain asymmetry has been linked with attention deficit hyperactivity disorder.”*



Ref.: Shaw P, Lalonde F, Lepage C, Rabin C, Eckstrand K, Sharp W, Greenstein D, Evans A, Giedd JN, Rapoport J. Development of cortical asymmetry in typically developing children and its disruption in attention-deficit/hyperactivity disorder. *Archives of General Psychiatry* 2009;66(8):888-896.

# CASH AND CARE: HELPING TO BREAK THE CYCLE OF POVERTY

**Conditional cash transfer (CCT) programs are designed to break the cycle of poverty. Cash is used both as a mechanism to allow parents to provide for their children's needs and as an incentive for investing in their children's health and well-being.**



**M**exico's *Oportunidades*, one of the first CCT programs, began in 1998 in a small number of very poor, rural communities. Families receive a basic cash transfer to help meet immediate needs as long as they comply with certain conditions, such as attending preventive health-care services and attending health and nutrition education sessions. Additional money is given if children are kept in school (as of the third grade) and attend regularly.

Three to five years after the program began, assessments on children who had been enrolled since birth showed improved outcomes for physical growth, cognition and language development and psychosocial functioning. Ten years after the program's launch, researchers investigated the effects of *Oportunidades* on children ages 8 to 10, and found the benefits still held.

*"Exposure to the program early in life had lasting benefits for physical growth and behaviour."*

*"Exposure to the program early in life had lasting benefits for physical growth and behaviour,"* says Dr. Lynnette Neufeld, a Canadian researcher and chief technical advisor at the Micronutrient Initiative in Ottawa, who leads the nutrition component of the external evaluation of *Oportunidades*. *"This finding shows how important it is for children in these kinds of vulnerable groups to receive, from a very young age, interventions that ensure that they have adequate health, nutrition and care."*

Overall, the cumulative amount of cash transferred to households was significantly associated with improved growth, high verbal and cognitive scores, and fewer behavioural problems; effects were greatest in children of mothers with no education. However, the effect of the cash did not explain the full impact of the program. *"While the cash component is very important, it is not enough in itself. It is the integrated nature of the program that produces such a big impact,"* Neufeld explains. Today, Mexico's program has five million beneficiary families.

Michael Feigelson, program director of the Bernard van Leer Foundation in the Netherlands, which funds a variety of projects aimed at improving opportunities for children growing up in socially and economically difficult circumstances, says this type of research can help his foundation understand what works and what doesn't when deciding what types of programs or interventions to support.

However, he says, more research is needed on the causal pathways of CCT programs. *"From this study, we don't know exactly which elements or combination of elements lead to the greatest benefits – the cash or something else,"* he adds. *"This is important for us in deciding what to invest in when we are forced to make a choice. In addition, more information on other outcome variables related to our specific goals, such as reducing violence in the family, would help us even more."* He notes that while his foundation is not involved in any CCTs, many of the programs it funds do provide both financial assistance and a set of services to families. 🦋

**BY EVE KRAKOW**

Ref.: Fernald LCH, Gertler PJ, Neufeld LM. 10-year effect of *Oportunidades*, Mexico's conditional cash transfer programme, on child growth, cognition, language, and behaviour: a longitudinal follow-up study. *The Lancet* 2009;374(9706):1997-2005.



New this year: In addition to the empirical studies usually presented in the *Bulletin*, critical reviews were included in the official selection of the Top Ten Canadian research papers. Six made it into our 2009 edition. They are presented on pages 7 to 12.

## THE CHILDHOOD ROOTS OF HEALTH DISPARITIES

**Early experiences can affect adult health in at least two ways: by cumulative damage over time or by the biological embedding of adversities during sensitive developmental periods. In both cases, there can be a lag of many years, even decades, before early adverse experiences are expressed in the form of disease.**

Based on such evidence, researchers are calling for a new framework for health promotion and disease prevention. *"There's now a sufficiently critical mass of neuroscience research that allows us to provide a set of core principles to guide the way we think about kids and their needs and how we address those needs as a society,"* says Dr. W. Thomas Boyce, professor of Pediatrics at the University of British Columbia and co-author of a review on the childhood roots of health disparities.

Brain research shows that toxic stress early in life can damage the very architecture of the developing brain. Toxic stress refers to strong, frequent and/or prolonged activation of a child's stress-response systems without the buffering protection of adult support. This sets the stage for lifelong patterns of emotionality and stress responsiveness, and can lead to increased rates of heart and respiratory disease, diabetes, cognitive impairment and mental illness.

Major risk factors include extreme poverty, recurrent physical and/or emotional abuse, chronic neglect, severe maternal depression, parental substance abuse and family violence. Children from families and communities with low income and low education levels may be especially vulnerable to the biological embedding of disease risk because of their disproportionate exposure to highly stressful influences.

The review's authors call for policies and programs aimed at reducing significant stressors in young children's daily lives. For example, increasing training and resources for primary care clinicians could be one approach to better identify and tackle child maltreatment, postpartum depression and parental substance abuse. High-quality early childhood

programs offer another potential infrastructure. *"Health, learning and behaviour are highly interdependent,"* Boyce notes. Finally, publicly mandated services to protect children who have been abused or neglected present further opportunities.

### A PUBLIC POLICY PERSPECTIVE

The Honourable Tim Sale, the first Chair of the Healthy Child Committee of Cabinet in Manitoba, says that Dr. Boyce's paper is *"a powerful motivator for public policy."* In the last decade, he notes, research in early child development has had a significant impact on public policy, and the latest findings in neurobiology reinforce this message.

He advocates policies that take a population approach and build on community strengths. *"In Manitoba, we're trying to make the whole notion of investment in early childhood and support for families in the prenatal, postnatal and early years a normative part of how we do business as a society,"* he says. *"If we focus too much on just one factor, such as socioeconomic level, we will miss a larger number of children, because risk extends way into the middle and upper-middle classes."*

Tim Sale is also a strong proponent of grass-roots involvement. For example, Manitoba boasts 26 regionally developed Parent Child Coalitions. Each coalition receives a grant to support programs and services for families with young children. *"Many have engaged community partners such as the Chamber of Commerce,"* he notes. *"They are helping them see that the health of their workers, both present and future, has a lot to do with the health of families."* 🐾

BY EVE KRAKOW

*"Brain research shows that toxic stress early in life can damage the very architecture of the developing brain."*



# PEERING INTO BABIES' BRAINS

**Recent improvements in brain imaging have brought this technology to the forefront in neonatal intensive care units (NICUs), where infants who were born prematurely or who endured difficult deliveries may be at very high risk for brain damage causing permanent disability. Dr. Steven P. Miller from the University of British Columbia is among the researchers at the forefront of this new frontier.**

**"O**ver the last decade or so, our ability to look into the infant brain has been revolutionized by new imaging tools, especially MRI [magnetic resonance imaging]," says Dr. Miller. "That's allowed us to appreciate the importance of connectivity in the brain."

Dr. Miller reviewed the latest research in the area of newborn brain imaging with Dr. Donna Ferriero from the University of California at San Francisco for the September 2009 issue of *Trends in Neurosciences*.

"We hope that understanding new mechanisms of brain injury will ultimately allow us to identify new opportunities for intervention," he says.

Dr. Michael Shevell, a pediatric neurologist at the Montreal Children's Hospital-McGill University Health Centre, agrees. "The two areas that have had the greatest impact on our understanding of the brain are imaging and genetics," he says. "Tremendous advances have occurred as a result of both of these areas, and one can expect similar advances in the future."

## IMPROVEMENTS IN CARE

Already, imaging research has improved patient care. "The big questions parents have when they have a premature infant or when they've had a baby who's been asphyxiated at birth are, 'What will the future bring? Will my child walk? Will my child talk?'" says Dr. Shevell. "Imaging technology, together with the clinical progress of the child, will help us answer those questions more definitively. It will also identify subgroups of children at risk for particular problems for whom we can target early interventions, most typically rehabilitation interventions."

In NICUs, imaging has provided the opportunity to better determine which interventions are most helpful and which might actually

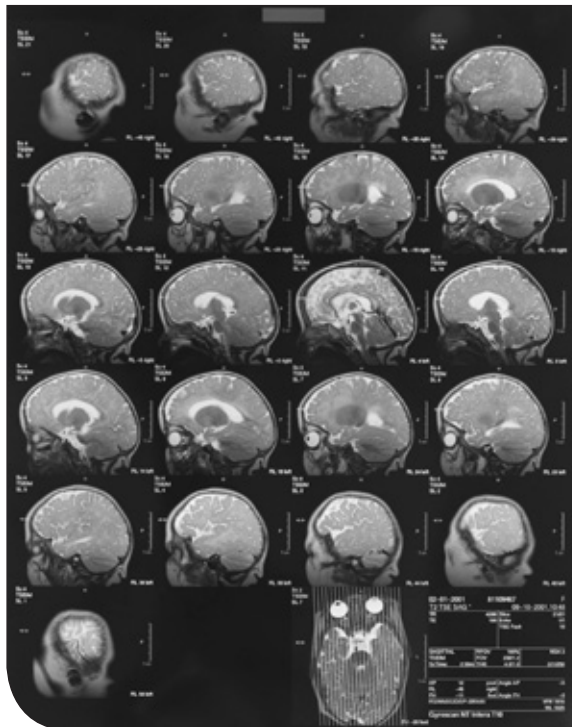
be doing harm. For instance, it was once routine to put preemies on intensive mechanical ventilation, until imaging studies revealed that this can actually contribute to brain damage. So, ventilation was toned down, and outcomes improved. Brain imaging studies have also demonstrated that babies born at term with congenital heart disease are at surprisingly high risk for developing white matter injury in the brain. Making sure these babies receive the treatment they need to support their blood pressure and the flow of blood to their brains may help prevent this

injury. Brain imaging has also helped reveal how important it is to reduce and treat infections in newborns.

"In an ICU, everything is monitored, the heart rate, the respiratory rate," says Dr. Miller. "But the brain is the black box that isn't really looked at. Now that we have noninvasive ways to look at the brain, both with imaging and intensive care monitoring, with things like infrared spectroscopy and amplitude-integrated EEG [electroencephalography], the brain is now becoming a focus of critical care medicine." Monitoring the brain with these technologies is becoming the standard of care in modern hospitals.

"The message that needs to go out to neonatologists is that there are better ways than cranial ultrasound of imaging the brain, and that there may be subtle injuries they're not picking up on," says Dr. Shevell. As technology advances, the ability to peer into babies' brains and detect injury in both structure and function will continue to improve. 🦋

BY ALISON PALKHIVALA



*"Imaging has provided the opportunity to better determine which interventions are most helpful and which might actually be doing harm."*



## FOR BETTER OR WORSE, STRESS HELPS MOULD THE BRAIN

The brain is a dynamic organ that is sensitive to its environment. Individual regions undergo rapid development at different stages in life, during which time they are particularly vulnerable to environmental stress. Dr. Sonia Lupien, scientific director at the Fernand-Seguin Research Centre and director of the Centre for Studies on Human Stress in Montreal, explains the implications of these findings in a seminal review paper published in 2009 in *Nature Reviews Neuroscience*.

**T**he three brain regions that are the most important for stress are the hippocampus, the amygdala, and the prefrontal cortex," says Lupien. "The hippocampus starts developing at birth and finishes up around two years of age. ... The amygdala starts developing at birth and goes on until the late 20s, and the frontal lobe starts at around age eight and continues until late puberty. If you have a stressor or an adverse experience at one year of age, the major impact should be on the hippocampus. If you have a major stress at age 11, it may have a significant impact on your amygdala and your frontal lobe. And since these three regions do not process the same type of information, you will not develop the same type of stress-related disorder."

The prenatal period is an even more crucial time for brain development, and a stressed mother will have a stressed fetus. "The fetus is in what we call an organizational mode, so its brain is being programmed," says Lupien. "... The effects of prenatal stress on development are quite nonspecific, and they are very large. Animal studies have shown that if you have prenatal stress, you will be more reactive to stress for the rest of your life."

### WHEN STRESS IS GOOD

But not all stress is damaging. Dr. Laura Ghali, an expert in child development at the University of Calgary, says it is helpful to think of stress as coming in one of three types: positive, tolerable and toxic. Positive stress is necessary for normal functioning. For example, when



a young child is separated from his mother to go to a nurturing daycare, he has the opportunity learn to soothe himself in a supportive environment and develop independence.

Too little positive stress can even be detrimental. "Overprotecting our children, as we do now, may be decreasing their capacity to develop their resistance to stress," says Lupien.

Tolerable stress refers to life's unavoidable difficulties. "Parents need to know that kids can get over things like a divorce, a death in the family, or a bullying incident, if adults intervene," says Ghali.

### CALL TO ACTION

Toxic stress is long-term, chronic stress, such as ongoing poverty, social isolation, or abuse, that occurs in the absence of a support system. "This is the sort of stress that damages fragile, developing brains, requiring a call to action," says Lupien. Social policy must address the needs of stressed-out caregivers, children and adolescents. "We have to do something when it happens, not 25 years later, because once it has

*"If you have prenatal stress, you will be more reactive to stress for the rest of your life."*

been programmed in the brain, it may be too late," says Lupien.

Ghali agrees. Important questions for social policy makers, she says, are: "Can you help alleviate the causes of stress? And if you can't, can you at least put the support in place to help people deal with it as best they can?" 🐾

BY ALISON PALKHIVALA

## RECOGNIZING, RESPONDING TO AND PREVENTING CHILD MALTREATMENT: A SHARED RESPONSIBILITY

**Child maltreatment includes physical, sexual or psychological abuse, neglect and exposure to intimate-partner violence. Recognizing and responding to child maltreatment is important to protect not only the children's physical safety, but also — and more often — their emotional development and well-being, through the provision of preventive, supportive, protective or therapeutic interventions.**

**"P**eople have to acknowledge child maltreatment as a major public health problem and be educated about it," says Dr. Harriet MacMillan, a professor in both the departments of Pediatrics and of Psychiatry and Behavioural Neurosciences at McMaster University. MacMillan co-authored two reviews on child maltreatment, the first on issues surrounding the recognition of and response to child maltreatment and the second on interventions to prevent child maltreatment and associated impairment.

Professionals in primary care, mental health, schools, social services and law enforcement all have a role to play in recognition and response, she says. Yet in all sectors, children suspected of being maltreated are under-reported to child protection agencies. This may be in part because of a lack of training or knowledge of the signs of maltreatment and of the processes for reporting to child protection agencies.

MacMillan believes that all clinicians working with children should be better educated in child maltreatment. "You don't have to be an expert, but you should be able to recognize the signs and symptoms and know when to ask for help." One emerging strategy for improving recognition and response to maltreatment in pediatric care is the production of evidence-based guidelines for who should be assessed by child-protection specialists. Enhancing processes for interviewing children and parents is another potential avenue.



*“We need to share information and responsibility to ensure continuity of care and long-term planning.”*

#### DOES REPORTING HELP?

However, there is also a common perception that reporting a suspected case to authorities can do more harm than good.

In some countries, such as Canada, professionals are legally bound to report suspected cases of child maltreatment. This system has benefits and disadvantages. On one hand, mandatory reporting clearly states that governments take child abuse seriously. It encourages early notification to protect children and prevent child deaths, it raises awareness about the issue, and it addresses some of the legal and ethical obstacles to reporting. On the other, the proportion of cases substantiated is only about 50%. This can lead to children and families being investigated but not receiving the services they need. As well, even when maltreatment is confirmed, some children may not receive appropriate interventions. Finally, child welfare services have a limited capacity to respond adequately to increased recognition of maltreatment.

*“The system needs to be looked at,” says MacMillan. “What happens when a report is made to a child protection agency? In many cases, child protection workers investigate, but then don’t necessarily provide additional services. Maybe we need a more supportive approach. More research is needed in this area.”*

Dr. Jaswant Guzder, head of Child Psychiatry and director of Child Day Treatment at Montreal’s Jewish General Hospital, says MacMillan’s paper is an incentive for dialogue among the many partners who intersect with child health, from health care professionals to schools, social service agencies and law enforcement. *“We need to share information and responsibility to ensure continuity of care and long-term planning,”* she says.

From the earliest years of prenatal and postnatal primary care and later, Guzder notes, schools and daycares have a huge role to play. *“Daycare is another opportunity where people have a chance to do prevention, to recognize that something is not going right with a child’s development,”* she says. But child maltreatment is a complicated issue. *“You’re dealing with a need for compassion, private–public boundaries, stigma and fear, while trying to maintain a positive relationship with the parents.”*

#### EFFECTIVE PREVENTIVE INTERVENTIONS

When it comes to preventing child maltreatment, many programs exist, but evidence on outcomes is sparse. MacMillan and her co-authors reviewed what is known about approaches to reduce the five major types of child maltreatment (physical abuse, sexual abuse, psychological abuse, neglect and exposure to intimate-partner violence) at three levels: prevention before the maltreatment occurs, prevention of recurrence and prevention of adverse outcomes associated with maltreatment.

For the most part, says MacMillan, *“programs that have worked are based on strong theoretical models, and have an intensity to the intervention, both in terms of frequency and duration.”* For example, while not all home-visiting programs are equally effective, two specific programs have been shown to prevent child maltreatment and associated outcomes such as injuries: the Nurse–Family Partnership (U.S.A.) (best evidence) and Early Start (New Zealand) (promising).

In the Nurse–Family Partnership, well-trained nurses visit low-income, first-time mothers, beginning prenatally and continu-

ing until the children are two years old. The program is based on theories of human ecology, self-efficacy and human attachment. The Early Start program begins postnatally, targeting high-risk families. Services are tailored to meet the needs of each family. Families are seen over 50 times in the first year, and services continue for up to five years.

In terms of other potential avenues, the Triple P – Positive Parenting Program has also shown some positive effects on maltreatment and associated outcomes, but needs to be replicated. Hospital-based educational programs to prevent abusive head trauma and enhanced pediatric care for families of children at risk of physical abuse show promise.

Preventing impairment associated with child maltreatment requires a thorough assessment of the child and family. Cognitive-behavioural therapy shows benefits for sexually abused children with post-traumatic stress symptoms. There is also some evidence for child-focused therapy for neglected children and for mother–child therapy in families with intimate-partner violence.

#### LONG-TERM PLANNING

One finding that debunks popular myths is that, for maltreated children, foster care placement can lead to greater benefits compared with young people who remain at home or those who reunify from foster care. To Guzder, this is not surprising. *“We know that our genes can turn on or off depending on what our environment is providing or not. People think placement is a terrible thing to do, but a positive environment is a hugely important protective factor. These children can blossom in placement.”*

Ultimately, Guzder views child maltreatment as a partnership issue. *“If we want to interrupt child maltreatment, we have to reach out to community partners,”* she says. Uncovering a problem is not enough in itself. *“There’s a pressure to be ‘quick and dirty,’ and to limit the number of interventions, but when you have children with attachment disorders or serious cumulative damage, short interventions simply do not work.”* 🦋

BY EVE KRAKOW



# WHEN SHY KIDS NEED OUR ATTENTION

## Why do some shy children grow up just fine while others experience low self-esteem, school difficulties, anxiety or depression?

Historically, much attention has been paid to children who act out. *"Now we've come to see that children who are quiet in school or off by themselves deserve equal attention,"* says Robert J. Coplan, professor in the Department of Psychology at Carleton University and co-author of a review on social withdrawal in childhood.

Social withdrawal refers to a child's isolating himself or herself from the peer group, most typically out of social fear and anxiety (i.e., shyness) or because of a preference for solitude (i.e., unsociability). Brain research suggests that biological factors may underlie shyness and social withdrawal. However, parenting style, the quality of the parent-child

relationship, and the quality of the children's peer relationships all play a role in the development, moderation and outcomes of these behavioural tendencies.

Shy and withdrawn children rarely initiate contact with their peers; when they do interact with others, they appear less socially competent. They are more likely to experience peer exclusion and rejection and are at higher risk for peer victimization. From the earliest years, social withdrawal is associated with loneliness, anxiety, depressed affect and low self-esteem. It can also cause problems in school: shy children tend to participate less in the classroom and may become overly stressed by test or performance situations.

### PROTECTIVE FACTORS

Of course, many shy and socially withdrawn children do not experience socio-emotional difficulties. Recent research suggests a

number of positive factors that may serve to "protect" these children. For example, a warm, supportive classroom environment can be beneficial. Talents or special skills also serve these children well. Above all, parents who are sensitive to their children's characteristics and needs, who encourage independence and who provide opportunities for peer interaction (e.g., arranging play dates) help their children to become less inhibited and more socially skilled during early childhood.

Interventions specifically targeting shy and withdrawn children are just starting to be developed and implemented. *"There's nothing wrong with being shy,"* Coplan emphasizes. *"What we want is to equip these children with coping strategies so that their shyness does not interfere with the important developmental and life tasks they need to do."*

BY EVE KRAKOW

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## BULLETIN

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