

20/20 VISION FOR ECD CANADIAN ECD RESEARCH IN 2003

by Richard E. Tremblay, CEECD Director

In 1981, Canadian-born David Hubel won a Nobel Prize for his pioneering neurological work. With his colleague, Swedish-born Thorston Wiesel, he worked with cats and monkeys at Harvard University for 22 years, trying to understand how the brain processes visual information so that a person is able to see.

Twenty-three years later, we celebrate a McMaster University graduate student and his supervisor, originally from the United States, for their work on children deprived of visual input in early infancy. In the prestigious journal *Nature Neuroscience*, they described the experiments that led them to conclude that visual experience during infancy is essential for learning to recognize faces. I can hear my "psycho-social" guardian angels asking me: "Why is that important for psycho-social development?" Well, simply think of the handicap you would be under if you could not perceive and differentiate your mates' happy, sad and angry faces.

Richard Le Grand and his colleagues not only showed that early experience was important, they also showed that only the right side of the brain could use the early experience to develop expert face-process-

ing. This important detail is a good illustration of how, with patience, sound knowledge converges. Indeed, the 1981 Nobel Prize was also given to Roger Sperry for his pioneering work on the different functions of the right and left hemispheres of the brain.

This issue of the CEECD Bulletin is our third annual Top Ten. Using the same methodology as the two previous years,¹ we selected 10 of the best scientific papers published on Early Childhood Development in 2003 by teams of investigators that included at least one based in a Canadian institution. Note that McMaster University and the University of Toronto each had at least one author on four of the 10 papers selected for 2003.

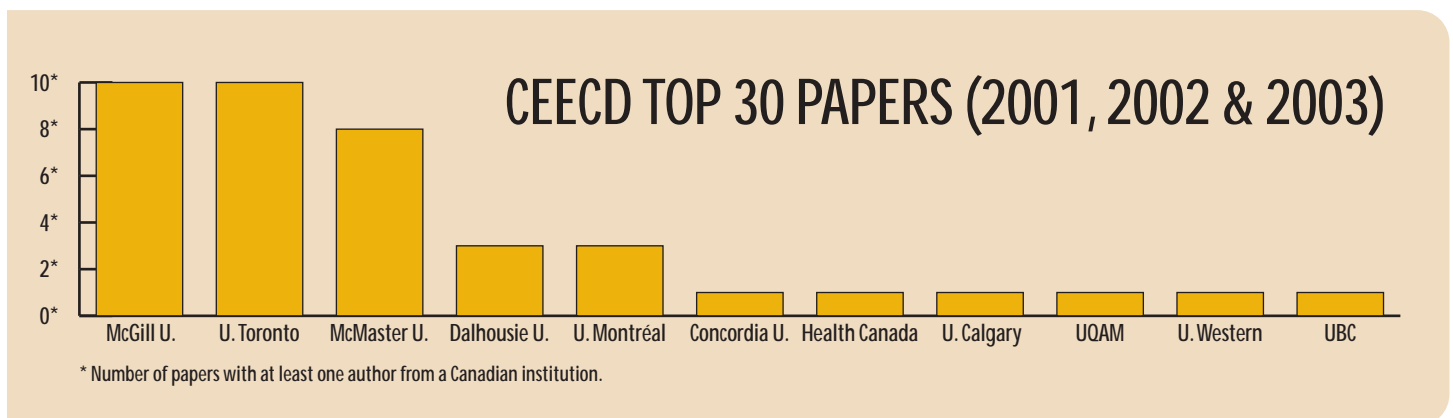
Thirty papers have now been selected over the past three years for our yearly Top Ten. In each case, the judges did not know

the names of the authors nor their university affiliations. To a certain extent, these 30 papers give an indication of which Canadian institutions are producing "excellence" in ECD research. The figure at the bottom of the page shows the distribution of authors among institutions. For example, McGill University and the University of Toronto had at least one author on 10 of the 30 articles, while McMaster University had one author on at least eight.

The 2003 crop of articles shows that Canadian investigators are involved in a large variety of early childhood topics, including genetics (3), neurosciences (4), nutrition (2), poverty (1), pregnancy (3), prematurity-low birth weight (3), prevention (2), screening-prediction (3) and service delivery (2).

The investigators producing the best publications are clearly working in inter-institutional and international teams. Of the Top Ten publications, not one had authors from only one institution, and seven came from international teams. These dedicated investigators are creating the knowledge that will help us deliver better Early Childhood Services and give 20/20 vision to children all around the world. 🌍

(1) CEECD Bulletins, vol.1, No. 3, December 2002; vol.2, No. 3, November 2003



HELPING CHILDREN BY MENTORING A NEW GENERATION OF RESEARCHERS

by Liz Warwick

Daphne Maurer still remembers the exhilaration she experienced while studying child development in the honours program at Swarthmore College in Pennsylvania. Students were expected to pursue their questions, do as much research as possible, write up papers and lead class discussions. *"It allowed you to focus on learning,"* says the McMaster University professor, who has developed an expertise in visual development. Today, Maurer takes a similar approach with her graduate students, helping them to develop their knowledge about the healthy and optimal growth of children.

Maurer's work focuses on vision pathways and what happens when children are deprived of visual input in early infancy. She has closely followed over 100 children who, as babies, had cataracts that blocked their vision for several months. Despite having their eyesight restored, these children show a lack in certain kinds of visual skills: being able to detect small details and certain kinds of motion, as well as identifying faces based on the distance between facial features.

RECOGNIZING FACES: A COMPLEX TASK

The face-recognition research was carried out with Richard Le Grand, who completed his PhD under Maurer and is now a post-doctoral fellow at the University of Victoria. Together, they designed a study that tested how well people could identify faces using either the features themselves, the contours of the face or the distance between features such as the nose and eyes.

Through their work, Maurer and Le Grand showed that children who had cataracts in their left eye had significantly diminished ability to recognize facial distances. In young babies, unlike adults, each eye sends



Daphne Maurer



Richard Le Grand

"She has a nice balance between giving critical feedback and letting me try out my ideas"

information mainly to the opposite side of the brain. Maurer and Le Grand suggest that unless the right hemisphere receives visual input early on, a critical window closes for learning how to recognize the distance between facial features.

INTERVENING TO HELP CHILDREN WITH AUTISM

Today, Le Grand is building on this work with a study focusing on how children with autism perceive faces. The new project includes a series of games and exercises that may actually help the children improve their face-processing skills. He and Maurer continue to collaborate on a study that will use a technique called functional magnetic resonance imaging to pinpoint areas in the brain involved with facial recognition.

Maurer describes the experience of leading a graduate student through his or her PhD as a mentoring relationship. She may start off as a supervisor, but hopes that in the end they will be working as colleagues. *"I expect to learn from them,"* she says.

Le Grand feels that working with Daphne Maurer enabled him to refine his ideas and then develop and pursue his research. *"She*

has a nice balance between giving critical feedback and letting me try out my ideas," he says. *"She was always available and I think she really knew my research as well as I did."* Le Grand, who will one day supervise a new generation of researchers, says Maurer taught him well. From her, he learned that a senior researcher must be *"involved, patient and committed"* when working with students.

BUILDING BETTER VISION THROUGH REHABILITATION

Whether she is doing her work or helping young researchers to do theirs, Maurer takes great pleasure in knowing that these vision studies could one day help improve the outcome for children who lose their sight temporarily as infants. Being able to recognize people and to correctly interpret their changing facial expressions is key to any social interaction. Babies who start life with vision problems may one day find themselves at a disadvantage in social situations as well. *"By understanding the neural pathways involved in vision, we may be able to design interventions to improve their vision,"* she says. 🦋

DOES MEN'S AGE IMPACT THEIR OFFSPRING?

by Liz Warwick

Every parent wants a healthy baby, and most try very hard to ensure their child gets the best possible start in life. For women, one way to promote healthy babies is by considering age when making childbearing decisions. The risks of pregnancy complications and birth defects increase as women grow older, so some may choose to have babies earlier in life or, if over 35, demand more prenatal testing. However, a recent animal study suggests that men may also need to think about age when considering having children.

The study's researchers knew from previous experiments that older animals tend to have offspring with more defects. They wanted to know why. So they looked at a process called methylation that occurs in DNA, the code or building block for all organisms. Methylation happens when small "tags", called methyl groups, attach themselves to part of the DNA. The tags can modify how the DNA works, potentially creating changes to the cells and ultimately to the organism. Methylation has been linked to genetic diseases, cancer and abnormal development in humans. It is a powerful process with potentially long-term effects on the body.

Changes to DNA methylation have been observed in the body cells of mammals with aging, but researchers wanted to see if sperm cells would also show these changes. They compared DNA methylation patterns of sperm and liver cells of young and old Brown-Norway rats. Through a special screening process, they were able to find specific areas in the DNA of sperm and liver cells where there was an increase in methylation, called hypermethylation, as the rats aged.

Dr. Jacquetta Trasler, Director of the Developmental Genetic Laboratory at the Montreal Children's Hospital Research Institute and one of the study's researchers, notes, "There have been lots of studies focusing on the mother, on the quality of the eggs, for example. But we haven't worried as much

about men." Trasler adds that what is needed now is longitudinal studies of men to examine the relationship among growing older, decreased fertility and an increase in birth defects in offspring.

LONG-TERM STUDIES OF AGING MALES ARE NEEDED

Dr. Cheri Deal, Associate Professor of pediatrics at the *Université de Montréal*, calls the study "highly relevant." "There are ani-

mal studies that clearly show that aging rodents produce offspring with birth defects." Deal praises the study for finding the specific areas of the sperm and liver cells that have hypermethylation. "Now, it's time for more studies, starting with other kinds of rats and then with humans", she adds. As Deal notes, there is a small concern that the hypermethylation seen as the rats age may be specific to the kind of rat used.

"Ultimately, the goal will be to apply the research methods and techniques to human males, ideally through longitudinal studies", she adds. The information gleaned from those studies will help mothers and fathers evaluate the risks involved with delaying pregnancy and childbirth into the later years. 🦁

Ref.: Oakes CC, Smiraglia DJ, Plass C, Trasler JM, Robaire B. Aging results in hypermethylation of ribosomal DNA in sperm and liver of male rats. *Proceedings of the National Academy of Sciences of the United States of America* 2003;100(4):1775-1780.



"There are animal studies that clearly show that aging rodents produce offspring with birth defects"

WOMEN BENEFIT FROM EARLY DETECTION OF BIRTH DEFECTS

by Liz Warwick

To ensure a healthy start for their baby, most women undergo some form of prenatal screening. Results from these tests allow doctors to intervene earlier if a problem is discovered. Currently, many women are offered a blood screening test to detect the Down syndrome (Trisomy 21) and spina-bifida in the second trimester. This test calculates the risk of a baby being born with certain defects, based on a woman's age and the levels of three different hormones found in her blood.

This screening test is not infallible. It identifies about 65% of Down syndrome cases, with a false-positive rate of about 5%. When a fourth substance, inhibin A, is also added to the screen, detection rates rise to 75%.

However, testing in the second trimester means that women must live with uncertainty over their baby's health for many weeks. Should a defect be found and a decision made to terminate the pregnancy, the emotional impact is greater.

ULTRASOUND PLUS BLOOD TEST EFFECTIVENESS

A recent study involving over 8,000 pregnant women suggests that a blood test combined with measurements of the fetus's neck-fold thickness via an ultrasound would allow detection during the first trimester of Trisomies 21 and 18 (another defect usually resulting in death of the baby in the first months of life).

The women in the study had blood tests and underwent an ultrasound performed by a specially trained technician. Each woman was then followed to the end of her pregnancy, whether it resulted in a live birth, miscarriage or an abortion. Researchers found that the first-trimester screening detected 85.2% of Down syndrome, with a false-positive rate of 9.4%. At a false-positive rate of 5%, the detection rate was 78.7%. The detection rate for Trisomy 18 was 90.9%, with only a 2% false-positive rate.

The researchers concluded that *"this first-trimester screening is accurate and efficient in clinical practice"* and, even more im-



"The first trimester screening offers patients greater privacy, earlier results and safer reproductive alternatives than second-trimester screening"

portantly, *"it offers patients greater privacy, earlier results and safer reproductive alternatives than second-trimester screening."*

EMPOWERING PREGNANT WOMEN

Dr. Cheryl Levitt, Chair of the Department of Family Medicine at McMaster University, says earlier screening would benefit pregnant women enormously. *"Knowledge is power,"* she says. Currently, many women only find out about a birth defect around 20 weeks, after the fetus has started moving. Levitt calls the decision to terminate a pregnancy at that stage *"extremely difficult and emotionally wrenching"* for women. Levitt notes that some women turn to amniocentesis or to chorionic-villus sampling, another method for detecting birth defects in the first trimester, but the

test carries with it a risk for miscarriage and other complications.

However, Levitt cautions that family doctors must be provided with as much information as possible so they can properly describe the blood test and ultrasound procedures as well as the risks and results of the screening to their patients. In fact, the study's researchers note that proper neck-fold measurements by ultrasound can only be done by technicians with stringent training and regular evaluation. 🐾

Ref.: Wapner R, Thom E, Simpson JL, Pergament E, Silver R, Filkins K, Platt L, Mahoney M, Johnson A, Hogge WA, Wilson RD, Mohide P, Hershey D, Krantz D, Zachary J, Snijders R, Greene N, Sabbagha R, MacGregor S, Hill L, Gagnon A, Hallahan T, Jackson L. First-trimester screening for trisomies 21 and 18. *New England Journal of Medicine* 2003;349(15):1405-1413.

BETTER DETECTION: BETTER CARE FOR CHILDHOOD EYE CANCER

by Liz Warwick

The effects of retinoblastoma, a childhood cancer of the eye, extend beyond the physical realm. The disease has a tremendous impact on the entire family, who must make arrangements for treatment while coping with the stress and uncertainty of the diagnosis. In addition, the siblings and close relatives of the child with retinoblastoma will be asked to undergo long-term testing and surveillance to ensure they do not have it.



“Genetic testing to a high degree of sensitivity allows families to make decisions from a position of knowledge”

The testing process includes many clinical exams as well as eye exams under anesthesia. Families find the testing process to be stressful and costly, putting additional strains on those who are already facing an overwhelming situation. However, a team of world-renowned Canadian scientists has developed new genetic testing strategies that will enable doctors to detect retinoblastoma earlier and faster, thus improving care and avoiding unnecessary follow-up exams for children who prove not to be at risk for the disease.

TRACKING RB1 GENE MUTATIONS

Retinoblastoma arises from changes to a specific gene, called RB1. The mutations in RB1 may be inheritable in about 40% of cases, or may show up in families with no known history of the disease. Unfortunately, there is not one simple mutation of RB1 that leads to retinoblastoma. Each family may have a change in a different area, making genetic testing complex and difficult.

The Canadian team has developed a series of screening tests that detect 89% of the RB1 mutations. In a study examining the efficacy of these screening methods, the researchers estimate that the testing enabled 97 at-risk children from 20 representative families to avoid 313 eye exams under anesthetic and 852 clinic visits.

The researchers also have found a way to complete the test rapidly, under three weeks, another major advance for families who have sometimes waited up to a year for genetic testing results. The screening methods can also be performed prenatally to determine if a baby is at risk and, if necessary, to induce delivery and start treatment for the cancer right away.

Brenda Gallie, Cancer Informatics at Toronto's Princess Margaret Hospital and one of the study's researchers, notes, *“The implications for the families are huge because they can avoid invasive and dangerous procedures.”* If a sibling doesn't have a RB1 mutation, then he or she won't need to be followed so closely over the first three to five years of life. Gallie adds that the sensitivity of the testing procedures has improved and is now at about 94%.

SIGNIFICANT IMPACT FOR FAMILIES

Peggy Gronsdahl, President of the Canadian Retinoblastoma Society, whose son has retinoblastoma, says these new screening tests help families better manage the

disease and its impact. *“Genetic testing to a high degree of sensitivity allows families to make decisions from a position of knowledge.”*

The trauma to a family of having a child diagnosed with cancer is tremendous, Gronsdahl adds. Being told that the cancer is genetically linked and there is a possibility that other children are also at increased risk for this rare disease compounds the stress faced by these families still further. Almost immediately upon diagnosis, other children in the family begin the invasive retinoblastoma screening process.

Gronsdahl notes that the work done by Dr. Gallie and her team of researchers allows the vast majority of families to know with certainty who in the family is at risk within a relatively short period of time. 🦋

Ref.: Richter S, Vandezande K, Chen N, Zhang K, Sutherland J, Anderson J, Han LP, Pantou R, Branco P, Gallie B. Sensitive and efficient detection of RB1 gene mutations enhances care for families with retinoblastoma. *American Journal of Human Genetics* 2003;2(2);253-269.

FORTIFYING FOOD WITH FOLIC ACID PREVENTS BIRTH DEFECTS

by Heather Pengelley

There is little doubt that taking folic acid tablets in early pregnancy helps to prevent severe neural tube defects, such as spina bifida and anencephaly, a lack of brain growth. Yet, the crucial time when a developing fetus needs folic acid is between 22 and 28 days after conception, before many women even know they are pregnant. In January 1998, Canada began to fortify basic foodstuffs with folic acid to try to cut the rate of severe birth defects. Was the gamble worthwhile?

Today, Canada fortifies most of its cereal grain products with folic acid, adding 0.2 mg/day to Canadians' diets. This passive form of folic-acid delivery has paid off. Since the introduction of folic acid fortification, a study of 336,963 Ontario women has found that the rate of neural tube defects has dropped by nearly half, from 1.13 per 1,000 pregnancies to 0.58 per 1,000 pregnancies.

Led by Dr. Joel G. Ray, a clinician-scientist at St. Michael's Hospital, Toronto, this study examined the monthly rate of neural tube defects among live births, stillborn births and terminated pregnancies in Ontario, from January 1994 to May 2000.

"We saw a statistically significant decline of about 50% from the pre-fortification to post-fortification period," says Ray. "We believe that decline is most likely related to a change that occurred in early 1998, which was the Canadian Folic Acid Fortification Program."

"Isn't that incredible?" observes Dr. Christine Derzko, a reproductive endocrinologist at St. Michael's Hospital, and

Associate Professor of Obstetrics and Gynecology and Internal Medicine at the University of Toronto.

"It isn't the outcome of folic acid supplementation that's surprising. It's the fact that this degree of food fortification is adequate to prevent neural tube defects. Those few extra milligrams make such an enormous difference. A daily intake of 0.3 to 0.4 mg of folic acid is probably sufficient to prevent spina bifida and other neural tube defects, but many

lack of knowledge of having conceived, it's most practical to deliver folic acid through a safe, commonly ingested food source, such as flour," says Ray.

In countries with no fortification program, the reduction in neural tube defects is insignificant compared to what Canada has achieved, adds Derzko. "By making this small change, we've reaped tremendous benefits."

The Ontario study shows that a fortification program can make a real difference,

"A daily intake of 0.3 to 0.4 mg of folic acid is probably sufficient to prevent spina bifida and other neural tube defects, but many women don't know when to take folic acid supplements or how much is enough"

women don't know when to take folic acid supplements or how much is enough," she adds.

The important time for folic acid supplementation is in the first 28 days after conception. "If you start any time after that, you've missed the boat," she emphasizes. In unplanned pregnancies, a conscious decision to take folic acid tablets may come too late to do any good.

"While most Canadian women plan their pregnancies, we owe something to the 25% of women who don't have a planned pregnancy. With the realities of family planning and the

even in places where advertising and public education programs have raised women's awareness that taking folic acid tablets in early pregnancy can prevent serious birth defects.

At home, this evidence has bolstered support for Canada's folic acid fortification program. Internationally, it has helped to convince other countries that passive supplementation is a good idea. 🦋

Ref.: Ray JG, Meier C, Vermeulen MJ, Boss S, Wyatt PR, Cole DEC. Association of neural tube defects and folic acid food fortification in Canada. *Lancet* 2002;360(9350):2047-2048.

EATING WELL BEFORE PREGNANCY MAY BENEFIT BABY

by Liz Warwick



"It suggests that dieting before and at the beginning of pregnancy is to be avoided"

Everyone benefits when a baby is born full-term. The earlier the gestational age of the baby, the greater the effects –physical, emotional, financial– will be. Premature infants often face a host of health problems that may extend into the adult years. Scientists are finding links between prematurity and coronary heart disease, diabetes and obesity. Unfortunately, rates of preterm births are increasing, putting ever more babies at risk.

Now, a new animal study suggests that part of the puzzle may rest in a mother's diet prior to becoming pregnant. Researchers restricted the diet of a group of female sheep from 60 days before until 30 days after conception. They discovered that the undernourished sheep delivered babies earlier than a control group which had been fed normally. When researchers measured levels of two hormones (fetal cortisol and adrenocorticotropin) in the sheep, the fetuses of the undernourished mothers showed higher levels earlier on. They suggest that rising levels of these hormones may, in a sense,

fool the body into thinking it is time to start labour, despite the fact that the fetus is not fully developed.

CAUTION WHEN DIETING

Dr. John Challis, Vice-President, Research and Associate Provost at the University of Toronto and one of the study's researchers, says the study could have significant implications for women considering giving birth. *"It suggests that dieting before and at the beginning of pregnancy is to be avoided,"* says Challis. *"We hear anecdotally that women sometimes diet before getting pregnant because they are worried about the weight gain*

in a normal pregnancy. This is not a good strategy." He adds that women who are on a severely restricted diet, for whatever reason, may need to consider carefully the idea of trying to become pregnant.

Challis also notes that the study will enable researchers to look at how restricted diets in the pre-pregnancy period affect the development of certain organs and systems in the body. Other studies have suggested that poor maternal diets have a negative long-term impact on a child's cardiovascular and pancreatic systems.

STARTING GOOD NUTRITION EARLY

Although more research on the topic is needed, Dr. Alan Bocking, Chair of the Department of Obstetrics & Gynaecology at the University of Toronto, calls the study *"very exciting."* He notes that there is a huge cost to babies, families and society as a whole when an infant is born premature. The study suggests that counselling women to eat well once they find themselves pregnant is not enough. Good nutrition needs to begin prior to conception. Bocking adds that additional research is needed on women who become pregnant while following so-called fad diets that tend to restrict certain kinds of food. *"We need to know more about the effects of the various components of a diet,"* he says. 🦋

Ref.: Bloomfield FH, Oliver MH, Hawkins P, Campbell M, Phillips DJ, Gluckman PD, Challis JR, Harding JE. A periconceptional nutritional origin for noninfectious preterm birth. *Science* 2003;300(5619):606.

CHILDREN'S MEMORY PROBLEMS

by Liz Warwick

Small children tend to remember certain things easily –the name of their favourite cookie, for example– and others with great difficulty, such as the face of a distant relative they see only once a year. But for some children, day-to-day memory tasks pose a huge challenge. While these children often read and learn at a normal level, they simply cannot keep straight events in everyday life. They suffer from developmental amnesia. A new Canadian study suggests that one key cause may be underdeveloped hippocampi.

Located on each side of the brain, the two hippocampi play a role in acquiring memories and storing and retrieving spatial information. In the study, researchers used magnetic resonance imaging (MRI) to measure the volume of the hippocampus in three different groups of children: those who had been diagnosed with developmental amnesia (DA), a group

who had been born prematurely with a very low birth weight (LBW) and a control group. The researchers found that the DA and LBW groups had smaller hippocampi, with the DA group having the smallest ones.

The cognitive tests results showed that the DA and LBW groups varied anywhere from low-average to average levels for intelligence, literacy and mathematical tasks. Significant differences emerged in memory-related tests. The DA group showed great impairment, while the LBW group had problems in a few specific areas.

MANY CHILDREN RECEIVE LATE DIAGNOSIS

This study suggests that there is an association between a 20 to 30% reduction in bilateral hippocampal volume and developmental amnesia. In the LBW group, the researchers found an association between an 8 to 9% reduction in the hippocampal volume and memory disruptions in a few key areas.

Dr. Elizabeth Isaacs of the MRC Childhood Nutrition Centre in London, England, one of

the researchers, notes that because children with developmental amnesia are able to learn, their memory problems are often not diagnosed until late childhood. Thus, these children spend years struggling when an earlier diagnosis and appropriate interventions could have made their lives easier.

“Even subtler are the effects displayed by children in the LBW group whose memory deficits may be blamed on inattentiveness or deliberate naughtiness,” Isaacs adds. The study highlights the need for earlier screening to determine if a child suffers from reduced hippocampal volume. Isaacs suggests that at-risk children, those born prematurely, for example, could one day routinely receive an MRI scan. *“Once alerted to the possibility of this development, earlier identification and earlier introduction of remediation would be possible,”* she says.

Dr. Annette Majnemer, Associate Professor at McGill University’s School of Physical and Occupational Therapy, notes that: *“early identification of brain abnormalities in children with memory difficulties may also be helpful in counselling families more effectively about the causes of the memory deficits,”* as well as helping clinicians provide more realistic expectations to parents on the long-term outcome for the children.

Early identification also allows for earlier intervention, Majnemer adds. *“Therapeutic strategies could focus initially on facilitating the acquisition of memory skill so as to maximize skill development. However, adaptive approaches may be necessary in the long term to compensate for persisting memory difficulties and to ensure that these children are able to cope with everyday challenges and carry out activities independently.”* 🦋

Ref.: Isaacs EB, Vargha-Khadem F, Watkins KE, Lucas A, Mishkin M, Gadian DG. Developmental amnesia and its relationship to degree of hippocampal atrophy. *Proceedings of the National Academy of Sciences of the United States of America* 2003;100 (22):13060-13063

“Early identification of brain abnormalities in children with memory difficulties may also be helpful in counselling families more effectively about the causes of the memory deficits”

Hippocampi 



PREMATURE BABIES' HEALTH

by Heather Pengelley

Predicting how a very premature baby will fare in early childhood helps doctors to counsel parents and anticipate special needs. Yet, doctors are still uncertain how major health complications will affect the future of these newborns. Recent evidence suggests that three common risk factors—bronchopulmonary dysplasia, brain injury and severe retinopathy—can better predict which very premature babies will do well and which ones will face a bleaker future.



"Extremely low birth weight infants are a vulnerable group at significant risk of poor outcomes, including death and neurodevelopmental and sensory impairments," says Dr. Diane Moddemann, Associate Professor, Department of Pediatrics and Child Health, University of Manitoba. *"Parents of these infants want to know what the risks for poor outcomes are for their child and the anticipated issues they and their children will have to face once discharged home."*

Doctors need tools to assess these risks with reasonable accuracy. The international trial in preterms studied 910 preterm babies, weighing from 500 to 999 grams, at 32 neonatal intensive care units in Canada, the United States, New Zealand and Hong Kong. Investigators tracked complications in babies who survived longer than 36 weeks. They were particularly interested in the 18-month outcome of preterm babies with underdeveloped lungs, brain injury or severe eye problems.

Very premature babies without complications had a lower than average (18%) risk of death or severe impairment. In babies who developed one complication this like-

lihood increased to 42%. In those with two complications, the risk rose to 62%. Babies with all three complications were 88% more likely to have poor outcomes.

"This was the first study to look at the combined effect of newborn complications," says Dr. Barbara Schmidt, an investigator and Professor of Pediatrics and Clinical Epidemiology and Biostatistics, McMaster University, Hamilton. *"If you try to predict what will happen down the road on the basis of individual risk factors, your predictions will not be very accurate. In the big picture, these neonatal morbidities are roughly of equal importance. Together, their effects are additive."*

Just by counting these three risk factors, doctors can predict the likelihood of poor outcomes. *"It adds more accuracy and puts more clarity into the baby's prognosis. This will help parents to prepare for the good or bad that lies ahead,"* says Schmidt.

"This research provides a simple model to physicians to discuss the risks of poor outcomes," says Moddemann.

One obvious question is whether birth weight influences the risk of poor outcome. Investigators found that only 27% of infants weighing from 500 to 749 grams stayed

"This research provides a simple model to physicians to discuss the risks of poor outcomes"

complication-free, compared to 51% of 750 to 999 grams newborns. However, at 18 months, the rates of poor outcome were similar in both groups.

"These findings will help doctors to reassure the families of very preterm babies who come through neonatal intensive care without any problems that their risk of poor outcome is much lower than average," says Moddemann. 🐾

Ref.: Schmidt B, Asztalos EV, Roberts RS, Robertson CMT, Sauve RS, Whitfield MF. Impact of bronchopulmonary dysplasia, brain injury, and severe retinopathy on the outcome of extremely low-birth-weight infants at 18 months – Results from the trial of indomethacin prophylaxis in preterms. *JAMA-Journal of the American Medical Association* 2003;289(9):1124-1129.

DON'T BLOCK THAT VIEW

by Liz Warwick

Someone enters a room where a child is playing. The little girl looks up to see who it is. Figuring out whether this person is Mom, Dad, Grandma or a stranger will require the child to collect and process all kinds of visual information. Most likely, she will focus on the face, examining the features and shape, as well as the spacing between the features.

Scientists who study human vision have shown that this skill –identifying, for example, the space between the two eyes– is especially important for recognizing faces. Now, new research shows that babies who have impaired vision in either both eyes or in the left eye during the

first six months of life have great trouble acquiring this skill.

In the study, which won the Brain Star Award from the Canadian Institutes of Health Research, scientists selected children who as babies had cataracts that blocked vision in the left, right or both eyes. Vision in babies works differently than in adults. When visual input goes through the left eye of an infant, it is processed by the right side of the brain. Visual input to the right eye is processed by the left side of the brain. The two sides of the brain do not start to “share” visual information until the baby is close to 24 months.

BABIES NEED VISUAL INPUT EARLY ON

To determine the effects of early visual deprivation, the researchers showed the children –who, having had the cataracts removed as babies, had several years’ experience of normal vision– various pairs of

faces. Some of the faces had been modified by changing the facial features, facial contours or the spacing between features. Children with left-eye cataracts (meaning no visual input to the right hemisphere) had significant difficulties in recognizing the spacing of facial features. The researchers concluded that to become true “experts” in face processing, babies need visual input to the right hemisphere during infancy.

Daphne Maurer, professor at McMaster University’s Department of Psychology and one of the study’s researchers, says the work highlights the kinds of “sleeper” or long-term effects that happen when vision is impaired in the very early months. *“Are there visual deficits?” “ Yes,” she says. “This has direct clinical implications for treatment.”* Babies with impaired vision need to have their eyesight restored as soon as possible.

TREAT EYE PROBLEMS SWIFTLY

Dr. Alex Levin, an ophthalmologist at Toronto’s Hospital for Sick Children, strongly concurs. *“The bottom line is that we need to take out the cataracts as soon as possible.”* Levin adds that family doctors should be performing a simple test called red reflex screening, which checks for cataracts and eye tumours. *“The screening should begin in the nursery and continue at every well-child visit,”* he says. If a problem is detected, prompt referral to a specialist is also key.

While the study focused on babies with cataracts, Levin says the implications extend to many vision problems in babies. Anything that blocks vision, such as a very droopy eyelid (ptosis), must be dealt with swiftly so that babies receive that all-important visual input. *“The vision pathways are dependent on visual input so we have to ensure that everything is functioning right.”* 🐾

Ref.: Le Grand R, Mondloch CJ, Maurer D, Brent HP. Expert face processing requires visual input to the right hemisphere during infancy. *Nature Neuroscience* 2003;6(10):1108-1112.

“The screening should begin in the nursery and continue at every well-child visit”



NOT ALL POOR ARE EQUAL IN HEALTH CARE

by Hélène Katz

Sub-Saharan Africa is the poorest region in the world. About 173 children per 1,000 live births die by the age of five, and that figure is growing. This is nearly 30 times higher than the rate in developed countries.

A group of researchers looked at whether there were inequalities in the use of health-care services for children below the age of five in a poor rural area of southern Tanzania. The researchers examined the issue based on child gender and family socio-economic status.

Don de Savigny, who is affiliated with Ottawa's International Development Research Centre, was part of a group of researchers who surveyed 2,500 Tanzanians households as part of this research project.

Caregivers of every child under the age of five were asked about their level of education and any illness the child had had during the two weeks before the survey. They were also asked what action had been taken when a child was sick. For children who had been ill (52%), the study examined whether children had been taken to appropriate health-care providers, what care they had received and any other treatments the child had been given.

Among those who had been ill, 41% had been taken to an appropriate health-care provider. Caregivers and health-care workers treated boys and girls the same way.

However, there were differences according to socio-economic status. Although all caregivers' knowledge of which signs were dangerous was poor, it was slightly better among people of higher socio-economic status. This study suggests that the poorest children are not more likely to become ill. Rather, caregivers of children from wealth-



"A mother from the poorest segment of the population is most likely malnourished"

ier families were more likely to know the danger signs, bring their children to a health facility when ill, and have a shorter journey to get there than poorer families. Their children were more likely to have received anti-malarial drugs for malaria and antibiotics for pneumonia and were more frequently admitted to a hospital.

"There are important inequities among the poor in their access to health care, even within relatively homogeneous poor rural areas," explains Don de Savigny. This is despite the Tanzanian government's efforts to design an equitable health-care system. "One must resist the interpretation that this suggests we need to target interventions only on the poorest, since all are poor in these rural settings. It is more important to find ways in which our interventions don't miss out the poorest," he emphasizes.

Conrad Mbuya, from Tanzania's Ministry of Health, agrees. "It is crucial to realize that policies developed to address health inequities must also address income inequities." Health inequities have a broader impact on children and their families. "A mother from the poorest segment of the population is most likely malnourished. When pregnant, she is even more malnourished. The child born of such a mother is likely to be underweight with inadequate body resistance, therefore more vulnerable to infections and premature death. If such a child survives, his entire childhood will be riddled with ill health." 🦋

Ref.: Schellenberg JA, Victora CG, Mushi A, De Savigny D, Schellenberg D, Mshinda H, Bryce J. Inequities among the very poor: health care for children in rural southern Tanzania. *Lancet* 2003;361(9357):561-566.

CAUSES OF CHILDHOOD ASTHMA

by Hélène Katz

Why does some children's asthma persist into adulthood or come back after being in remission? In their study, Dr. Malcolm R. Sears and his team assessed more than 1,000 children born in Dunedin, New Zealand, between 1972 and 1973. The children were repeatedly assessed for lung function and tested for a variety of allergies, between the ages of 9 and 26.

More than one in four children in this study had asthma that persisted from childhood to adulthood or that returned after being in remission. By age 26, 14.5% of the study's participants had had persistent asthma since childhood, 15% were in remission, and 12.4% had experienced remission but their asthma had returned. Those with persistent or relapsing asthma tended to be more sensitive to house dust mites, allergic to cats, and had hyper responsive airways and lower lung function than people whose asthma did not persist or return. Being female and a smoker at the age of 21 were also risk factors for participants who had persistent asthma.

Dr. Allan Becker, a pediatrician at Winnipeg's Health Sciences Centre, says chronic illnesses like asthma have a "huge" impact on children's psycho-social development. *"They self-restrict activities because they recognize that they can't compete at the same level as kids without asthma. That happens early in life, by kindergarten."*

"This strongly suggests the loss of lung function occurred very early in childhood"

Study members with asthma that persisted throughout childhood and into adulthood had consistently lower lung function than study members who never reported wheezing. *"The question was when did lung function deteriorate. We plotted back to age nine and found that they were never on the same curve as those who did not develop asthma,"* Dr. Sears explains. *"This strongly suggests the loss of lung function occurred very early in childhood."* 🐾

Ref.: Sears MR, Greene JM, Willan AR, Wiecek EM, Taylor DR, Flannery EM, Cowan JO, Herbison GP, Silva PA, Poulton R. A longitudinal, population-based, cohort study of childhood asthma followed to adulthood. *New England Journal of Medicine* 2003;349(15):1414-1422.

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