For Healthcare Providers: Non-invasive Prenatal Testing (NIPT) Factsheet

What is NIPT?
Non-invasive prenatal testing (NIPT) is a new way to *screen* for specific chromosome aneuploidies (Down syndrome, and sometimes trisomy 18 and trisomy 13) by analyzing circulating cell free fetal DNA (ccffDNA) that is present in maternal blood. ccffDNA comprises approximately 10-15% of the cell-free DNA circulating in maternal blood. Unlike fetal cells, ccffDNA clears from maternal circulation just hours after delivery; therefore, the ccffDNA used for screening represents that of the current fetus.

What information can NIPT provide?
NIPT currently provides information about specific chromosome aneuploidies, with Down syndrome being the most common. The detection rate for Down syndrome using NIPT is approximately 98-99% with a false positive rate of <2%. NIPT for trisomy 18 is slightly less accurate than for Down syndrome. There is currently less confidence in NIPT as a screen for trisomy 13 due to technical issues and the infrequency of the condition. NIPT can also provide false negative results. NIPT does not screen for open neural tube defects (ONTDs) and does not provide information regarding early fetal health and development that can be currently ascertained from the 11 to 14 week ultrasound.

How is NIPT different from the currently available prenatal screening?
Current prenatal screening options involve one or two blood samples with or without a nuchal translucency ultrasound. Depending on the type of screen, information about the *chance* for having a baby with Down syndrome, trisomy 18 and sometimes trisomy 13 and open neural tube defects (ONTDs) is provided. Current prenatal screening options are less accurate than NIPT for Down syndrome and have detection rates of approximately 80-90% and false positive rates of 2-9% compared to a detection rate of approximately 98-99% and a false positive rate of <2% for NIPT. NIPT does not screen for ONTDs.

How and when is NIPT done?
NIPT is performed using a maternal blood sample obtained starting at 10 weeks gestation. A dating ultrasound is required prior to the drawing the blood to ensure viability, an accurate gestational age and to exclude multiple pregnancies.

Are there any risks of NIPT to the baby?
Unlike invasive prenatal testing (CVS and amniocentesis), NIPT is not associated with a risk of miscarriage and cannot cause harm to the baby.

Does NIPT replace CVS/amniocentesis?
No. At the present time, NIPT is a *screening test,* meaning that it should not be used to diagnosis Down syndrome. If NIPT is screen positive for Down syndrome (or trisomy 18 or 13), this result should be confirmed by one of the diagnostic tests: chorionic villus sampling (CVS) or amniocentesis, both of which would give close to a 100% accurate answer. However, each of these diagnostic tests is associated with a small chance of miscarriage. Similarly, NIPT can provide false negative results; therefore, if the suspicion for a chromosome aneuploidy is high based on other findings, invasive diagnostic testing should be considered.

Indications for NIPT
Currently, NIPT has mainly been studied in singleton pregnancies at high risk for Down syndrome due to: advanced maternal age, an abnormal serum screen, personal or family history of aneuploidy, or abnormal ultrasound findings. There is limited data available about how accurate this test will be in women with a lower chance of Down syndrome, though studies are currently underway. NIPT cannot be used in multiple pregnancies, pregnancies with a “vanishing twin” noted on early ultrasound, or donor-egg pregnancies.

Is NIPT available in Ontario?
Since NIPT is a new test, it is not widely available in Ontario and is not presently covered by OHIP. Women who would like to have NIPT must pay for the test and have their blood sent to the US for testing

by a physician/center offering to facilitate NIPT. A list of providers is currently not available. The Prenatal Screening Subcommittee is currently working in its advisory capacity to recommend the incorporation of NIPT into an evolved and updated provincial prenatal screening program. Until then, it is recognized that the availability of and use of NIPT will be inconsistent throughout Ontario. The Prenatal Screening Committee will strive to inform patients and providers of updates regarding NIPT in Ontario.

What is the Prenatal Screening Subcommittee recommending?
At the present time, the Prenatal Screening Subcommittee is recommending that all women be offered prenatal screening as it exists presently (First Trimester Screening, Integrated Screening, Serum Integrated Screening or Quad Screening). If they are screen positive or at high risk for other reasons, NIPT may be considered if a woman is willing to pay for the test and consults with a physician/center offering to facilitate the test. It is recommended that positive NIPT results be confirmed by diagnostic testing (CVS or amniocentesis). Until studies are completed, NIPT is not being recommended as a first line screening test for low risk women.

Reference:

Ashoor G, Syngelaki A, Wagner M, Birdir C, Nicolaides KH. Chromosome-selective sequencing of maternal plasma cell-free DNA for first-trimester detection of trisomy 21 and trisomy 18. Am J Obstet Gynecol 2012;206:322.e1-5.

Nicolaides KH, Syngelaki A, Ashoor G, Birdir C, Touzet G. Noninvasive prenatal testing for fetal trisomies in a routinely screened first-trimester population. Am J Obstet Gynecol 2012 Nov;207(5):374.e1-6. doi: 10.1016/j.ajog.2012.08.033. Epub 2012 Sep 19.