Minnesota Perinatal Physicians
Aneuploidy Screening Resource Tool for Providers

Women at Average (Low) Risk for Chromosome Aneuploidy

(Women <35 at delivery; Singleton and twin gestation only; higher order multiples, NT measurement only or diagnostic testing offered/available)

First Screen

(nuchal translucency measurement and maternal serum markers in the first trimester only together with maternal age, gestational age, weight and race to estimate patient-specific risks)

Please note, women who undergo FTS should be offered assessment for open neural tube defects with ultrasonography, msAFP screening, or both

Conditions	Detection Rate***	False positive rate	Test Components	Timing	Advantage	Disadvantage	Next steps for high risk result
Trisomy 21 Trisomy 18	~82-87%*** **(trisomy 21, singletons)**	5% **(trisomy 21, singletons)**	Nuchal translucency (NT) measurement + PAPP-A + hCG + DIA	CRL between 45-84 mm (~11 – 13 6/7 wks)	Early screening test Single test Analytes provide possible assessment of other adverse outcome	Lower detection rate NT required	Abnormal screen (NT and/or final FTS), recommend genetic counseling for review of options including diagnostic testing If declines diagnostic testing, non-invasive prenatal screening and level II ultrasound at approximately 18-20 weeks gestation offered

Sequential Screen

(nuchal translucency measurement and maternal serum markers in the first trimester and maternal serum markers in the second trimester together with maternal age, gestational age, weight and race to estimate patient-specific risks)

Conditions	Detection Rate***	False positive rate	Test Components	Timing	Advantage	Disadvantage	Next steps for high risk result
Trisomy 21 Trisomy 18 Open neural tube defects (2nd tri only)	~95% *** (Final 2nd Trimester detection rate) **(trisomy 21, singletons)**	5% **(trisomy 21, singletons)**	First trimester: NT measurement + PAPP-A + hCG Second trimester: hCG + AFP + uE3 + DIA	First trimester: CRL between 45-84 mm (~11 – 13 6/7 wks) Second trimester: ~15-22 wks	Higher detection rate than FTS alone Screens for ONTDs Analytes provide possible assessment of other adverse outcome	Two samples needed NT required	Abnormal screen (NT and/or screen results), recommend genetic counseling for review of options including diagnostic testing If declines diagnostic testing, non-invasive prenatal screening and level II ultrasound at approximately 18-20 weeks gestation offered

Serum Integrated Screen

(maternal serum markers *only* in the first and second trimester together with maternal age, gestational age, weight and race to estimate patient-specific risks in the second trimester)

Please note, screen is for individuals in which a nuchal translucency measurement is unable to be obtained due to technical reasons; ***NOT* recommended if NT is outside 45-84mm as patient is outside screen window; if outside 45-84mm NT, the Quad serum screen should be offered after 15 weeks gestation **

Conditions	Detection Rate***	False positive rate	Test Components	Timing	Advantage	Disadvantage	Next steps for high risk result
Trisomy 21 Trisomy 18 Open neural tube defects (2nd tri result only)	~88% *** **(trisomy 21, singletons)**	6% **(trisomy 21, singletons)**	First trimester: PAPP-A + hCG Second trimester: hCG + AFP + uE3 + DIA	First trimester: CRL between 45-84 mm (~11 – 13 6/7 wks) Second trimester: ~15-22 wks	Higher detection rate than Quadruple screen if unable to obtain NT measurement Screens for ONTDs Analytes provide possible assessment of other adverse outcome	Two samples needed One risk provided in the second trimester only	Abnormal screen recommend genetic counseling for review of options including diagnostic testing If declines diagnostic testing, non-invasive prenatal screening and level II ultrasound at approximately 18-20 weeks gestation offered

Quadruple/AFP4/Tetra Screen

(maternal serum markers in the second trimester together with maternal age, gestational age, weight and race to estimate patient-specific risks)

For individuals of average risk presenting after 13 weeks gestation who desire screening

Conditions	Detection Rate***	False positive rate	Test Components	Timing	Advantage	Disadvantage	Next steps for high risk result
Trisomy 21 Trisomy 18 Open neural tube defects (2nd tri only)	70% *** **(trisomy 21, singletons)**	5% **(trisomy 21, singletons)**	hCG + AFP + uE3 + DIA	~15-22 wks	Screens for ONTDs Analytes provide possible assessment of other adverse outcome	Lower detection rate than screening options available in 1st Tri	Abnormal screen recommend genetic counseling for review of options including diagnostic testing If declines diagnostic testing, non-invasive prenatal screening and level II ultrasound at approximately 18-20 weeks gestation offered

Diagnostic testing – Chorionic Villus Sampling

(placental biopsy for chromosome analysis between 11-13 weeks gestation to determine presence or absence of aneuploidy)

Conditions	Diagnostic testing accuracy	False positive rate	Test Components	Timing	Advantage	Disadvantage	Next steps for aneuploidy detected
All chromosomal conditions	98-99% for all aneuploidy	<0.1%	Transcervical or transabdominal placental biopsy sent to Allina lab for chromosome analysis, FISH optional	~11-13 weeks gestation *Call outside this window	Diagnostic results for pregnancy management Answer known, not relative risk	<0.2% risk for complication such as miscarriage, preterm delivery or infection 1-2% risk for placental mosaicism necessitating amniocentesis follow up	Depending upon patient's decision on pregnancy management, follow up level II ultrasound and/or fetal echocardiogram, fetal care coordination as indicated

Diagnostic testing – Amniocentesis

(amniotic fluid obtained with fetal cells for chromosome analysis after 15 weeks gestation to determine presence or absence of aneuploidy)

Conditions	Diagnostic testing accuracy	False positive rate	Test Components	Timing	Advantage	Disadvantage	Next steps for aneuploidy detected
All chromosomal conditions	99% for all aneuploidy	<0.1%	Transabdominal fluid sent to Allina lab for chromosome analysis, FISH optional	After 15 weeks gestation *Later GA in the case of unfused membranes	Diagnostic results for pregnancy management Answer known, not relative risk	<0.2% risk for complication such as miscarriage, preterm delivery or infection	Depending upon patient's decision on pregnancy management, follow up level II ultrasound and/or fetal echocardiogram, fetal care coordination as indicated

Cell free DNA screening is **not recommended** for the average risk population, but is an option
(cell free placental DNA after 10 weeks gestation to estimate risk for aneuploidy)
Please note, women who undergo ccfDNA should be offered assessment for open neural tube defects with ultrasonography, msAFP screening, or both

Conditions	**Detection Rate*** (singletons)**	**False positive rate (singletons)**	**Test Components**	**Timing**	**Advantage**	**Disadvantage**	**Next steps for high risk result**
Trisomy 21 Trisomy 18 Trisomy 13 Sex Chromosome Aneuploidy (*Deletion analysis is not recommended)	99% **Please note, this is not the likelihood a pregnancy is affected, Positive Predictive Value (PPV) assesses likelihood of affected pregnancy	~1% Negative predictive value (NPV) ranges depending upon condition and PPV	Cell free DNA is measured from the ***placenta*** (**NT measurement is **NOT** needed, nor recommended)	Any time after ~10 week gestation	Highest detection rate for trisomy 21 Can be performed any time after 10 weeks	Typically **NOT** covered by insurance Higher false positive rate in average risk population Higher false positive rate for conditions outside of trisomy 21 Results do not represent ***fetal*** DNA NPV and PPV not clearly reported Higher non-reportable rate for women with obesity Analytes for assessment of adverse outcomes not provided	Recommend genetic counseling for review of options including diagnostic testing and level II ultrasound

Detection rate is the ability to correctly categorize an individual at an increased risk, it does NOT equate to the likelihood the test is accurate and the condition at high risk is present

Women at High Risk for Chromosome Aneuploidy

(Maternal age ≥35 at delivery or a previous child with aneuploidy; Singleton and twin gestation only; higher order multiples, NT measurement only or diagnostic testing offered/available)

Cell free DNA screening

(cell free placental DNA after 10 weeks gestation to estimate risk for aneuploidy)

Please note, women who undergo ccfDNA should be offered assessment for open neural tube defects with ultrasonography, msAFP screening, or both

Conditions	Detection Rate*** (singletons)	False positive rate (singletons)	Test Components	Timing	Advantage	Disadvantage	Next steps for high risk result
Trisomy 21 Trisomy 18 Trisomy 13 Sex Chromosome Aneuploidy (*Deletion analysis is not recommended)	99% **Please note, this is not the likelihood a pregnancy is affected, Positive Predictive Value (PPV) assesses likelihood of affected pregnancy	~1% Negative predictive value (NPV) ranges depending upon condition and PPV	Cell free DNA is measured from the ***placenta*** (**NT measurement is **NOT** needed, nor recommended)	Any time after ~10 week gestation	Highest detection rate for trisomy 21 Can be performed any time after 10 weeks	NPV and PPV not clearly reported Higher false positive rate in conditions outside of trisomy 21 Results do not represent ***fetal*** DNA Higher non-reportable rate for women with obesity Analytes detail risk of adverse outcomes not provided	Recommend genetic counseling for review of options including diagnostic testing and level II ultrasound

Diagnostic testing – Chorionic Villus Sampling

(placental biopsy for chromosome analysis between 11-13 weeks gestation to determine presence or absence of aneuploidy)

Conditions	Diagnostic testing accuracy	False positive rate	Test Components	Timing	Advantage	Disadvantage	Next steps for aneuploidy detected
All chromosomal conditions	98-99% for all aneuploidy	<0.1%	Transcervical or transabdominal placental biopsy sent to Allina lab for chromosome analysis, FISH optional	~11-13 weeks gestation *Call outside this window	Diagnostic results for pregnancy management Answer known, not relative risk	<0.2% risk for complication such as miscarriage, preterm delivery or infection 1-2% risk for placental mosaicism requiring amniocentesis f/up	Depending upon patient's decision on pregnancy management, follow up level II ultrasound and/or fetal echocardiogram, fetal care coordination as indicated

Diagnostic testing – Amniocentesis (amniotic fluid obtained with fetal cells for chromosome analysis after 15 weeks gestation to determine presence or absence of aneuploidy)							
Conditions	**Diagnostic testing accuracy**	**False positive rate**	**Test Components**	**Timing**	**Advantage**	**Disadvantage**	**Next steps for aneuploidy detected**
All chromosomal conditions	99% for all aneuploidy	<0.1%	Transabdominal fluid obtained and sent to Allina laboratory for chromosome analysis, FISH optional	After 15 weeks gestation *Later gestation in the case of unfused membranes	Diagnostic results for pregnancy management Answer known, not relative risk	<0.2% risk for complication such as miscarriage, preterm delivery or infection	Depending upon patient's decision on pregnancy management, follow up level II ultrasound and/or fetal echocardiogram, fetal care coordination as indicated

Detection rate is the ability to correctly categorize an individual at an increased risk, it does NOT equate to the likelihood the test is accurate and the condition at high risk is present

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