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	~82-87%***	5%	Nuchal	CRL between	Early screening test	Lower detection rate	Abnormal screen (NT and/or final
Trisomy 18	(trisomy 21, singletons)	(trisomy 21, singletons)	translucency	45-84 mm			FTS), recommend genetic counseling
	singletons)	singletons)	(NT)		Single test	NT required	for review of options including
			measurement +	(~11 – 13			diagnostic testing
			PAPP-A + hCG +	6/7 wks)	Analytes provide		
			DIA		possible		If declines diagnostic testing, non-
					assessment of		invasive prenatal screening and level
					other adverse		II ultrasound at approximately 18-20
					outcome		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	~95% ***	5%	First trimester:	First	Higher detection	Two samples needed	Abnormal screen (NT and/or screen
Trisomy 18	(Final 2 nd	(trisomy 21,	NT	trimester:	rate than FTS alone		results), recommend genetic
Open neural	Trimester	singletons)	measurement +	CRL between		NT required	counseling for review of options
tube defects	detection rate)		PAPP-A + hCG	45-84 mm	Screens for ONTDs		including diagnostic testing
(2 nd tri only)	(trisomy 21,			(~11 – 13			
	singletons)		Second	6/7 wks)	Analytes provide		If declines diagnostic testing, non-
			trimester:		possible		invasive prenatal screening and level
			hCG + AFP +	Second	assessment of		II ultrasound at approximately 18-20
			uE3 + DIA	trimester:	other adverse		weeks gestation offered
				~15-22 wks	outcome		

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

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 (2 nd 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 1 st Tri	Abnormal screen recommend genetic counseling for review of options including diagnostic testing If declines diagnostic testing, noninvasive 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	99%	~1%	Cell free DNA is	Any time	Highest	Typically NOT covered	Recommend genetic counseling for
Trisomy 18	**Please note,		measured from	after ~10	detection rate	by insurance	review of options including diagnostic
Trisomy 13	this is not the	Negative	the <i>placenta</i>	week	for trisomy 21		testing and level II ultrasound
Sex	likelihood a	predictive		gestation		Higher false positive rate	
Chromosome	pregnancy is	value (NPV)	(**NT		Can be	in average risk	
Aneuploidy	affected,	ranges	measurement is		performed any	population	
	Positive	depending	NOT needed,		time after 10		
(*Deletion	Predictive	upon	nor		weeks	Higher false positive rate	
analysis is not recommended)	Value (PPV)	condition and	recommended)			for conditions outside of	
recommended	assesses	PPV				trisomy 21	
	likelihood of						
	affected					Results do not represent	
	pregnancy					fetal DNA	
						NPV and PPV not clearly reported	
						Higher non-reportable rate for women with	
						obesity	
						Analytes for assessment of adverse outcomes not	
						provided	

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

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

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Minnesota Perinatal Physicians

To connect with a provider: 612-863-4502, option 2

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	After 15 weeks gestation	Diagnostic results for pregnancy management	<0.2% risk for complication such as miscarriage, preterm	Depending upon patient's decision on pregnancy management, follow up level II ultrasound and/or fetal
			laboratory for chromosome analysis, FISH optional	*Later gestation in the case of unfused	Answer known, not relative risk	delivery or infection	echocardiogram, fetal care coordination as indicated
			Ориона	membranes			

^{***}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***

