screening

Screening for chromosomal defects

- *High Risk Pregnancies*

- *Versus*

-*General Population?*

****** *ONLY ABOUT 30% OF CASES HAPPEN IN HIGH RISK GROUPS(EXCEPT FOR MENDELIAN DEFECTS)*

SO

Screening is offerred to all pregnant women

American College of Obstetricians and Gynecologist (2007b) recommends that all women who present for prenatal care before 20 weeks be offered screening. Thus, regardless of age, all women are counseled regarding the differences between screening and diagnostic tests, and they are given the option of invasive diagnostic testing.

Screening for Chromosoaml abnormalities

*First trimester Versus Second trimester

***Sonography**

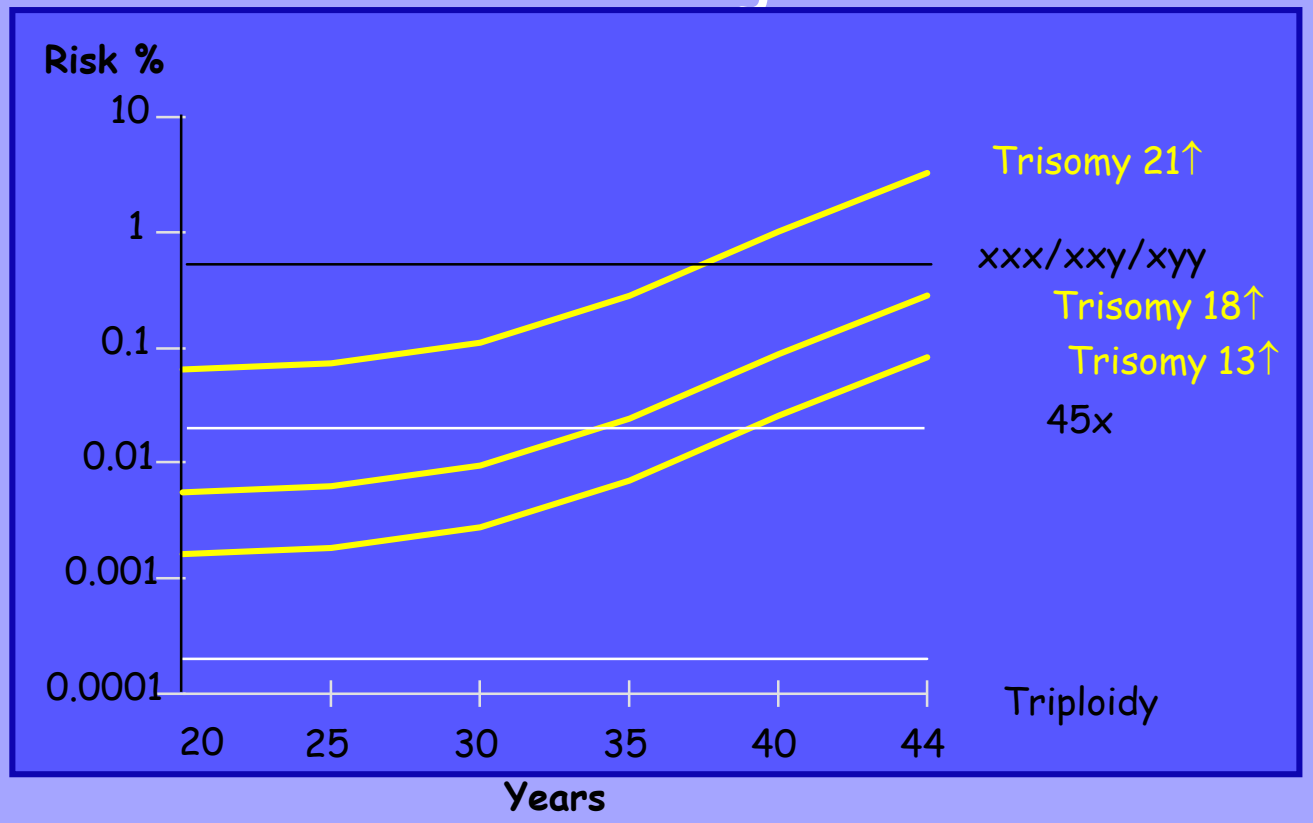
***Biochemistry**

***Combined sonography and biochemistry**

Method of screening	DR (%)
Maternal age (MA)	30
MA and maternal serum biochemistry at 15–18 weeks	50–70
MA and fetal nuchal translucency (NT) at 11–13^{+6} wks	70–80
MA and fetal NT and maternal serum free β-hCG and PAPP-A at 11–13^{+6} wks	85–90
MA and fetal NT and fetal nasal bone (NB) at 11–13^{+6} wks	90
MA and fetal NT and NB and maternal serum free β-hCG and PAPP-A at 11–13^{+6} wks	95

Assessment of Risk

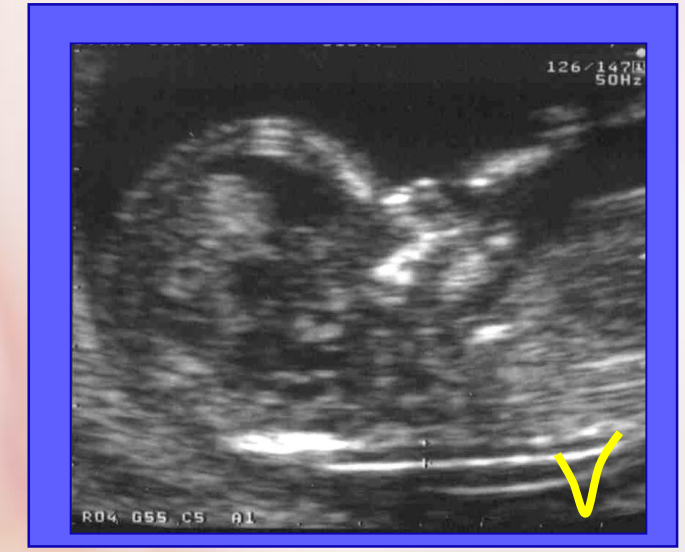
Maternal age

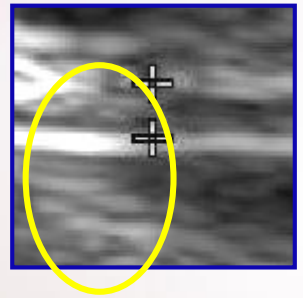


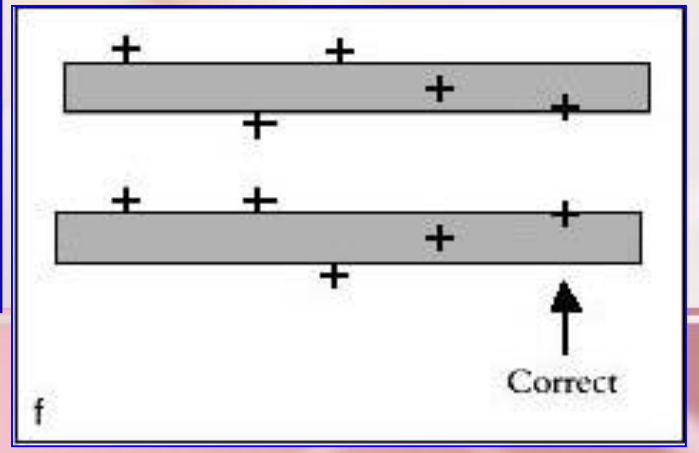
- For every case of trisomy 21 there is one with another defect
- The risk for trisomies increases with maternal age
- The risk for sex chromosome defects and triploidy does not change with maternal age

Measurement of Nuchal Translucency

- Gestation 11-13^{+6} wks
- CRL 45-84 mm
- Mid-sagittal view
- Image size: calipers • 0.1mm
- Neutral position
- Away from amnion
- Maximum lucency
- Callipers on-to-on
- More than one • measurement
- Umblical cord around • the neck

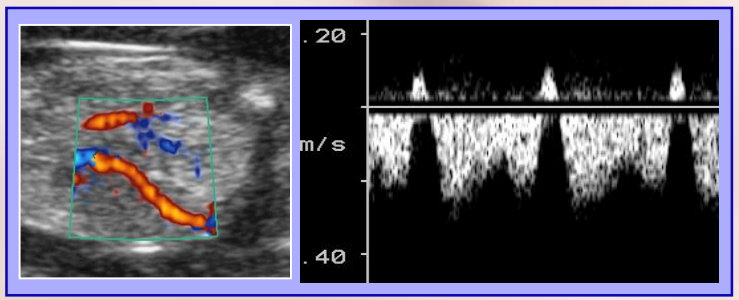


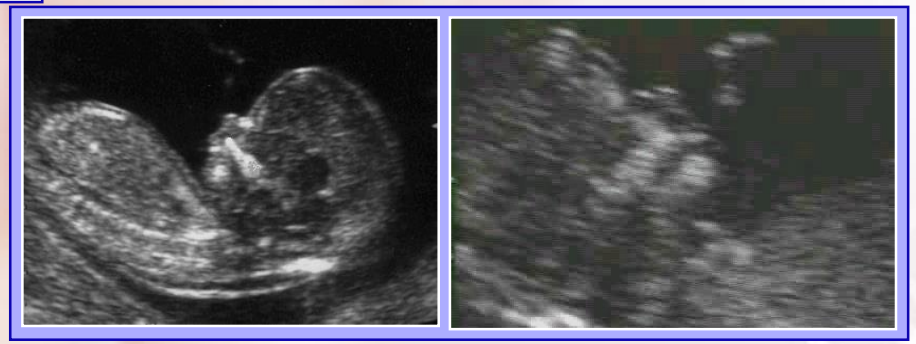


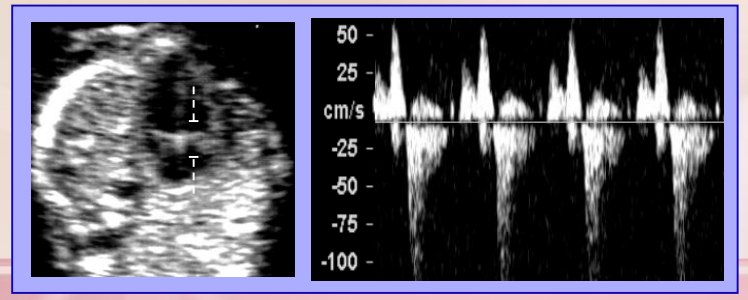


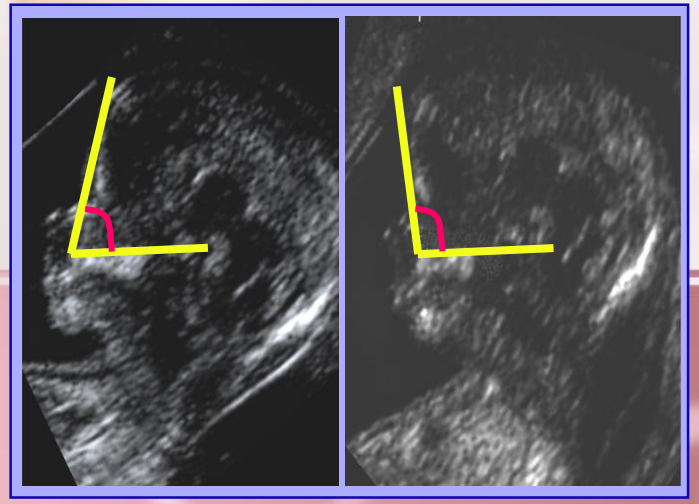
Screening for trisomy 21 at 11-13^{+6} wks

	Trisomy 21	Normal
Absent NB	65%	2%
Abnormal ductus	65%	6%
Tricuspid regurgitation	65%	6%
Wide facial angle	70%	5%









Advantages of first trimester scan

To confirm pregnancy & viability

To confirm GA & Dating if needed

To confirm the number of gestational sacs, fetuses and chorionicity

To check fetal anatomy for structural anomalies

To measure nuchal translucency / screen for chromosomal abnormality

To check uterus & adnexa

First trimester biochemical markers

- *Free beta hCG*
- *Pregnancy associated plasma protein A*

Second trimester biochemical markers

-Beta hCG

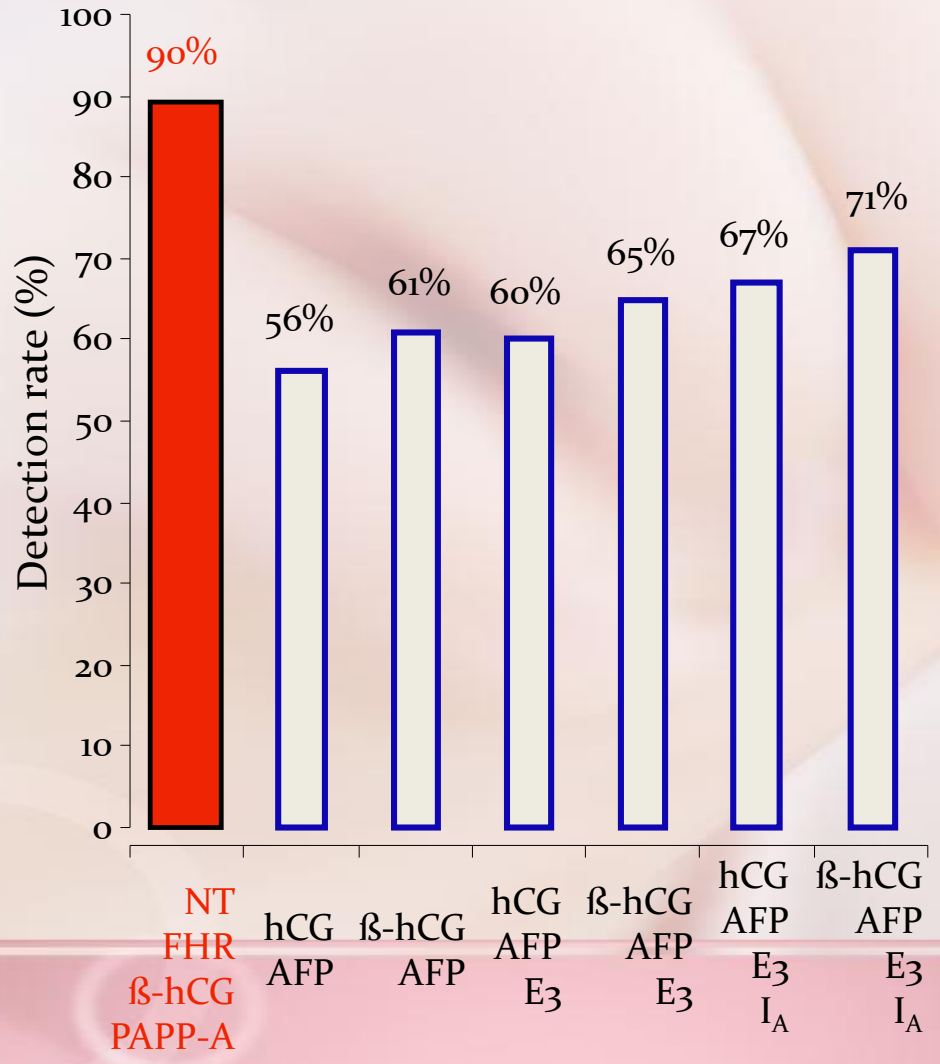
-Alpha fetoprotein

-Unconjugatedestriol

-Inhibin A

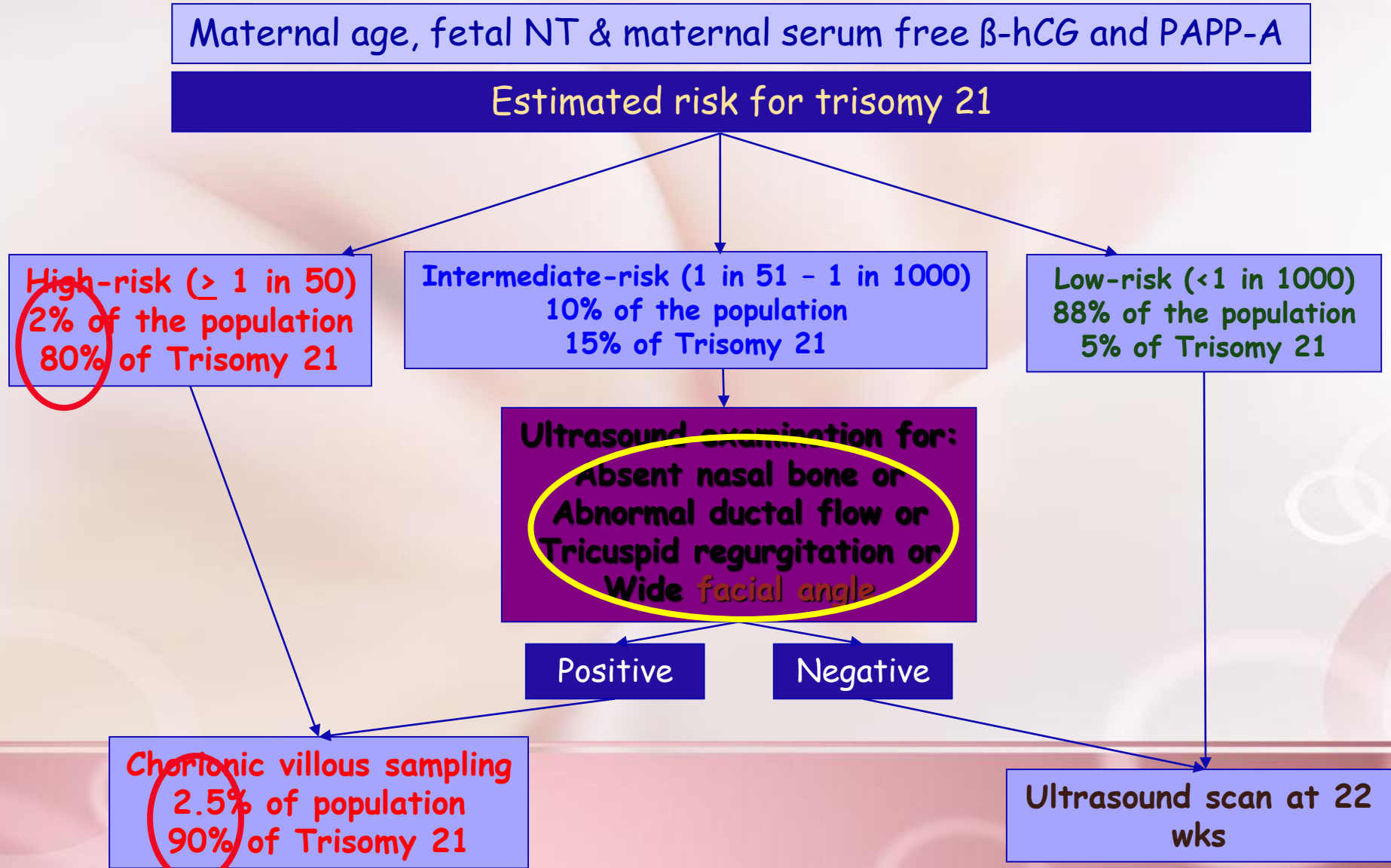
-….

Biochemical markers



Screening in the first trimester by a combination of maternal age, fetal NT, FHR and serum free ß-hCG and PAPP-A identifies about 90% of trisomy 21 pregnancies for a false positive rate of 3%

Patient-orientated, 2-stage, first-trimester screening



Integrated test

All patients have:

First-trimester NT and PAPP-A , freeβ –hCG

Second- trimesterAFP ,uE3,freeβ –hCG and inhibin

The combined results are given on completion of this process so that high-risk patients have second-trimester amniocentesis

Detection rate : 94-96%

Step-wise sequential

All patients have :

First-trimester NT and serum PAPP-A and free β-hCG,

High-risk patients are offered CVS (1%)

Low- or intermediate- risk patients have second-trimester quad test

If the combined risk from first- and second-trimester testing becomes high, the patients have second-trimester amniocentesis

Detection rate= 90-95%

Contingent sequential screening

All patients have:

First trimester NT and free beta hCG and PAPP-A

High risks are offerred iagnostic test (1%)

second-trimester biochemical testing only in those with an intermediate risk after first-trimester screening (15%)

Detection rate= 88-94%

Serum integrated screening

All patients have:

First-trimester PAPP-A , freeβ –hCG

Second- trimesterAFP ,uE3,freeβ –hCG and inhibin

Detection rate is less than integrated

Conclusion

Screening for chromosomal defects should be offered to all pregnant ladies who attend at < 20 weeks

Proper counselling must be done with parents

Screening strategy must be chosen accordning to:

- *Gestational age*
- *Available certified sonographer*
- *Availabe certified Laboratory*
- *Affordable cost*

Risk and counselling after result must be done accurately by physician NOT Laboratory or even sonographer unless sonographer is perinatalogist

The final decision must be from parents not the physician which is possible if counselling is effective.

...Conclusion

NT is the best marker As a single marker IF...

Combination of NT with biochemistry will increase the detection rate and may decrease false positive rate

Training programs for sonographers (www. Fetalmedicine.com)

Increase the number of certified Laboratory with proper softwares , machines and trained technician)

Establish multicenter studies to find out our normal ranges (MoMs)

Cell-free DNA

This was introduced in 2011 and has completely changed the prenatal screening paradigm. The last works by identifying DNA fragments that derived primarily from apoptotic trophoblasts which are placental cells undergoing programmed cell death.

Indication

1-woman who will be 35 years or older at delivery
2-A positive first- or second-trimester analyte-based screening test.
3-sonogram with a minor aneuplpidy marker.
4- prior pregnancy with autosomal trisomy.
5-known carriage (patient or partner)of a balanced robertsonian translocation involving choromosom 21 or 13.

Limitation

Plasental mosaicism
early demise of an aneuploid co-twin
maternal mosaicism
occult maternal malignancy
twin pregnancy