

Which role for NIPT in the future?

DFMS Course in prenatal Genetic Diagnostics

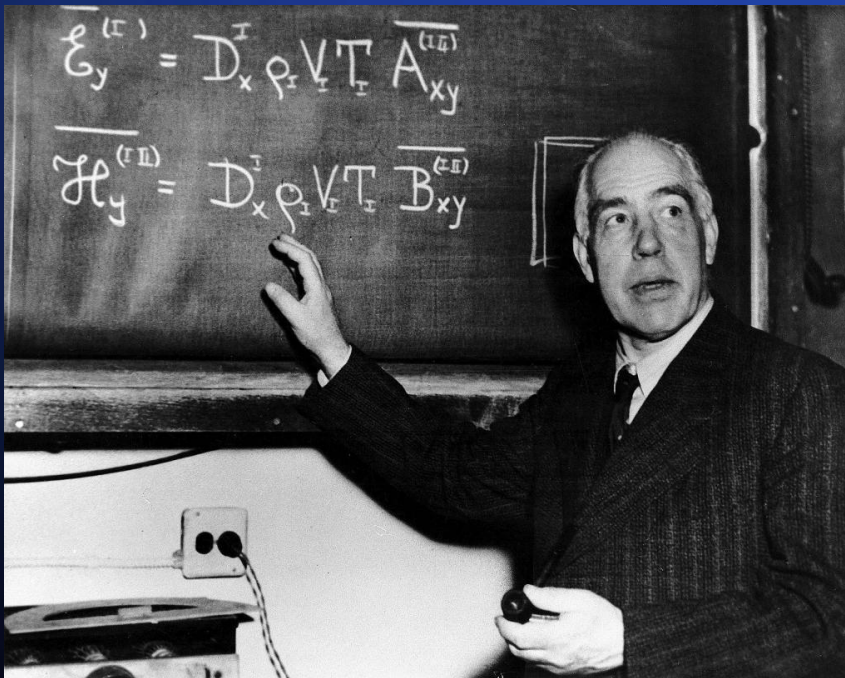
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How to predict the future?

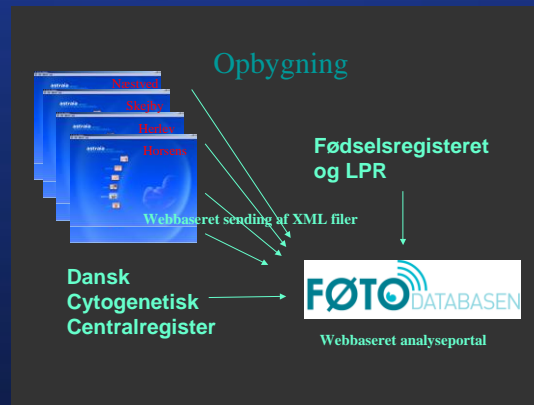
- Prediction is very difficult, especially about the future
- Niels Bohr (1885-1962)



Bohr didn't have FøtoDatabasen..

| Year 2008-2011 | Patients (N) | Karyotype (N) | Abnormal karyo (N) |
|--------------------------------------|--------------|---------------|--------------------|
| Attending NT scan | 219.324 | 12.378 | 1.476 |
| W/full biochemistry, NT and T21 risk | 193.638 | 10.205 | 1.153 |

- National data, singletons only



How abnormal karyotype?

| 193.638 Risk assessments, | | 10.205 Karyotypes |
|---------------------------|------------------|-------------------|
| Abnormal (N) | Nice to know (N) | Need to know (N) |
| 1.153 | 1.127 | 1.079 |

- **Nice to know, i.e:**
 - **Balanced translocations (45)**
- **Need to know, i.e:**
 - **Trisomies (689)**
 - **Unbalanced translocations (18)**
 - **Mosaicism (11)**

Can NIPT detect all abnormal?

| 193.638 Risk assessments, | | 10.205 Karyotypes |
|---------------------------|--------------------------|--------------------------|
| Need to know (N) | Detected by ff-DNA + Sex | Detected by ff-DNA - Sex |
| 1.079 | 815 (75,5%) | 689 (63,9%) |

NIPT would detect all trisomies (689)

But only 3 out of 4 "Need to know"

Something special about Denmark?

- > 90% Attend first trimester screening
- Well-organized combined screening program
- Thorough quality control programs
- How to replace this concept??



Suggested strategies

- NIPT to all
- Contingency screening
 - **Continue combined screening to all**
 - NIPT to high risk group (1:1.000)
 - CVS to highest risk group (1:10-100)

Strategies and performance

| Strategy | CVS (N) | NIPT (N) | DR T21 (%) | DR Need (%) |
|-------------------------|--------------|----------|-------------|-------------|
| CVS>1:300 | 8.018 | 0 | 87,2 | 70,0 |
| | | | | |
| NIPT to all | 0 | 193.638 | 100 | 75,5 |
| NIPT to >1:1.000 | 0 | 19.153 | 93,4 | 66,5 |
| | | | | |
| CVS>1:10, NIPT>1:1.000 | 734 | 18.419 | 93,4 | 67,8 |
| CVS>1:20, NIPT>1:1.000 | 1.182 | 17.971 | 93,4 | 68,4 |
| CVS>1:50, NIPT>1:1.000 | 2.422 | 16.731 | 93,4 | 70,4 |
| CVS>1:100, NIPT>1:1.000 | 4.002 | 15.151 | 93,4 | 72,6 |
| CVS>1:300, NIPT>1:1.000 | 8.018 | 11.135 | 93,4 | 76,8 |

Strategies and performance

| Strategy | CVS (N) | NIPT (N) | DR T21 (N) | DR Need (N) |
|-------------------------|--------------|----------|------------------|------------------|
| CVS>1:300 | 8.018 | 0 | 436 (Ref) | 755 (REF) |
| | | | | |
| NIPT to all | 0 | 193.638 | +64 | +60 |
| NIPT to >1:1.000 | 0 | 19.153 | +31 | -37 |
| | | | | |
| CVS>1:10, NIPT>1:1.000 | 734 | 18.419 | +31 | -24 |
| CVS>1:20, NIPT>1:1.000 | 1.182 | 17.971 | +31 | -17 |
| CVS>1:50, NIPT>1:1.000 | 2.422 | 16.731 | +31 | +5 |
| CVS>1:100, NIPT>1:1.000 | 4.002 | 15.151 | +31 | +28 |
| CVS>1:300, NIPT>1:1.000 | 8.018 | 11.135 | +31 | +74 |

But...

- Will women at risk accept the contingency concept?
- Limit of surgical TOP in DK: Week 14+0
- Economy??

Economic considerations

- Saved costst from reduced CVS can be used for NIPT
- DAGS value for CVS (2013): 1.257 Eur (DKK: 9.377),-
- NIPT:???
- At what price for NIPD will which strategy be cost-neutral?

Costs

| Strategy | CVS (N) | NIPT (N) | DR ₂₁ (%) | DR _{Need} (%) | Costs _{total} (EUR) | Additional costs/ women screened (EUR) |
|-------------------------------------|--------------|----------|----------------------|------------------------|------------------------------|---|
| CVS>1:300 | 8.018 | 0 | 87,2 | 70 | 10.078.626 | Reference |
| CVS>1:20, NIPT>1:1.000 | 1.182 | 17.971 | 93,4 | 68,4 | 14.964.024 | 25 |
| CVS>1:50, NIPT>1:1.000 | 2.422 | 16.731 | 93,4 | 70,4 | 15.592.704 | 28 |
| CVS>1:100, NIPT>1:1.000 | 4.002 | 15.151 | 93,4 | 72,6 | 16.393.764 | 33 |
| CVS>1:300, NIPT>1:1.000 | 8.018 | 11.135 | 93,4 | 76,8 | 18.429.876 | 43 |
| Cost_{of} CVSE (EUR) | 1257 | 9377 | | | | |
| Cost_{of} NIPT (EUR) | 750 | 5595 | | | | |

NIPT would detect all trisomies (689)

More "Costs"

| Strategy | CVS(N) | NIPT(N) | Additional diagnosed (N) | Costs/Additi onal diagnosed (EUR) | Additional diagnosed (N) | Costs/Additional diagnosed (EUR) |
|------------------------|--------------|----------|--------------------------------|--|--------------------------------|--|
| CVS>1:300 | 8.018 | 0 | Reference | 0 | Reference | 0 |
| CVS>1:20,NIPT>1:1.000 | 1.182 | 17.971 | 31 | 157.593 | -17 | -287.376 |
| CVS>1:50,NIPT>1:1.000 | 2.422 | 16.731 | 31 | 177.873 | 5 | 1.102.816 |
| CVS>1:100,NIPT>1:1.000 | 4.002 | 15.151 | 31 | 203.714 | 28 | 225.541 |
| CVS>1:300,NIPT>1:1.000 | 8.018 | 11.135 | 31 | 269.395 | 74 | 112.855 |

Thanks

