

Biomedical Sensors Foresight Workshop

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HOSPITAL LABORATORY OF THE FUTURE

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History

B.C.: Physicians have always examined bodily fluids ("humours") for diagnostic purposes.

800: The Salerno School; the colour of the urine decisive for diagnosis

18th and 19th century:

Establishment of hospital laboratories under clinical department.

1950 - : Establishment of independent laboratory departments (central laboratories) in hospitals

1960 - : Division and specialization according to function and diagnostic speciality.

Hospital laboratory specialities today

- Clinical Biochemistry (~ Chemistry)
 - Clinical Genetics
 - Clinical Immunology (~ Blood Banks)
 - Clinical Microbiology (~ Bacteriology and Virology)
 - Clinical Pathology (~ Pathological Anatomy)
 - Clinical Pharmacology
 - Clinical Physiology
- and unclassifiable hospital laboratories for research and development

**During the last part of the
19th century a revolution has characterized
basic biosciences and technologies:**

- Molecular Biology
- Cell Biology
- Information Technology
- Imaging Technologies
- Automation Technology
- Drug Development

MAJOR SYNERGY EFFECTS

Changing concepts of diagnosis and disease by

- Molecular genetics
- DNA arrays
- Protein arrays



- New diseases
- Stratification of known diseases
- Early diagnosis
- Safe diagnosis
- Individual (and better) therapy
- Accurate Prognosis

FUTURE I

”The key to the future of laboratory specialities in the hospitals is to see them as intellectual disciplines rather than as services”.

After Robert Williamson
Clinical Chemistry
32;2165:1989

FUTURE II

The future of hospital laboratories
is

MOLECULAR

MOLECULAR

MOLECULAR

MOLECULAR

MOLECULAR

MOLECULAR

MOLECULAR

MOLECULAR

MOLECULAR

MOLECULAR

FUTURE III

In order to translate the revolutionary progress in basic sciences and in technology to the benefit of man and society – the future requires close collaboration and integration of laboratory specialities in the individual hospital and between hospitals – regional, national and international.

Perhaps a local return to the central laboratory with intellectual and technical resources in close proximity. Such development requires intellectual openness – and economical investments.

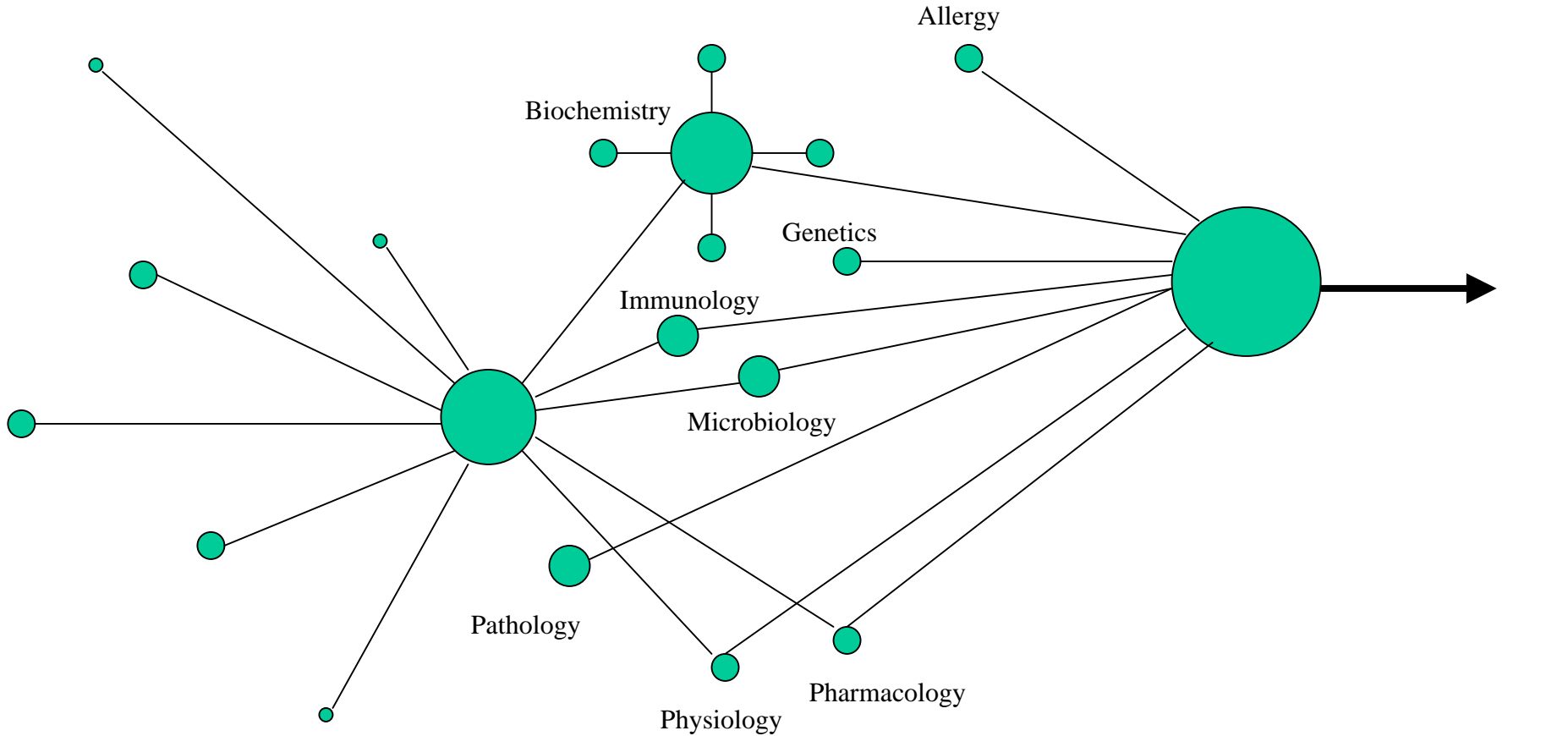
FUTURE IV

In order to translate the revolutionary progress in basic sciences and in technology to the benefit of man and society – the future requires close association between

- basic research
- pathogenetic and diagnostic research
- analytical development
- the daily routine production of analytical results.

The beauty of modern biological sciences (molecular and cellular biology) is the short distance between basic research and diagnostic utility.

The hospital laboratory



•1900

- Laboratories under
- clinical departments

1950

The central laboratory
(and pathology)

2000

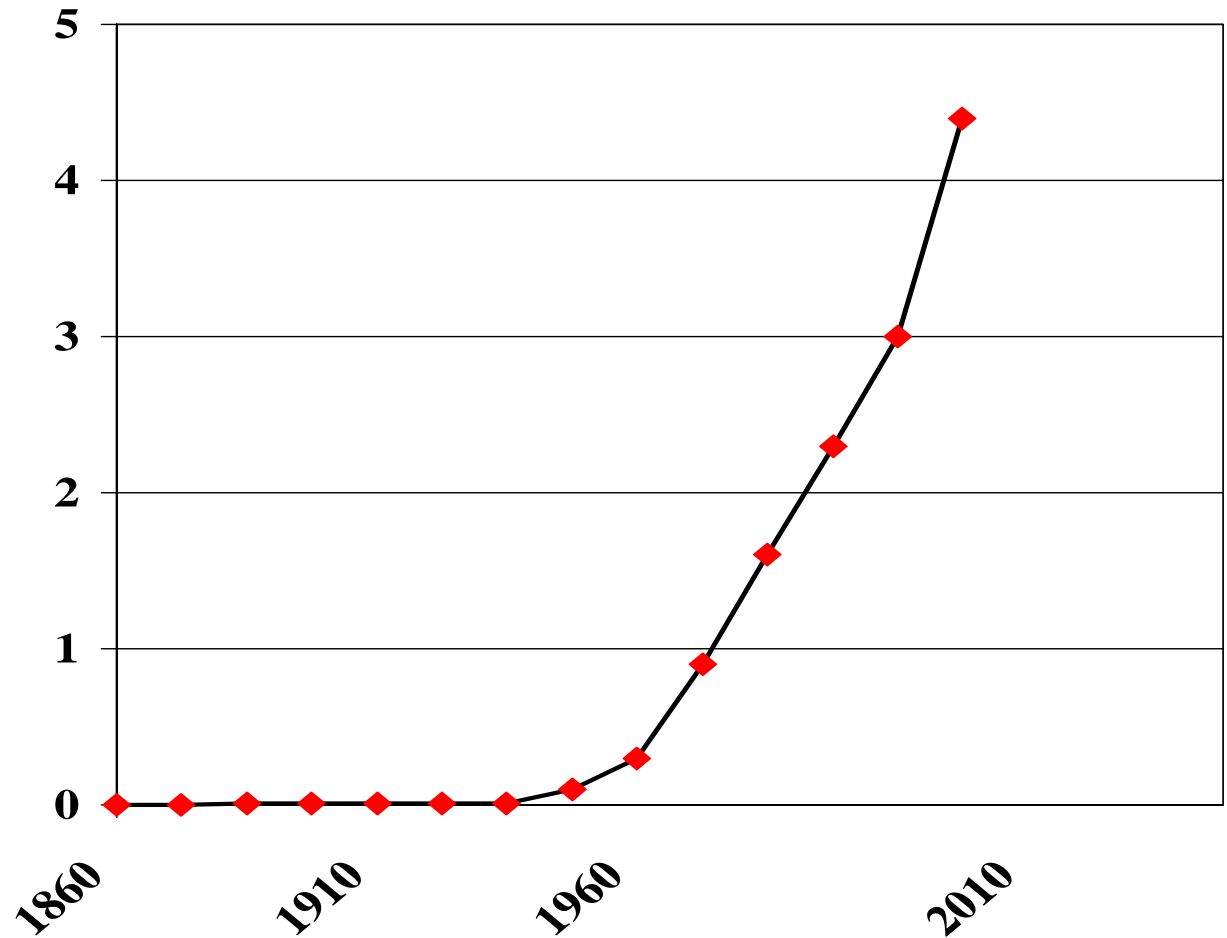
The specialized
laboratory departments

2050

The Center for
molecular diagnostics

Analyses x 10⁶ per year at

Dept. of Clin. Biochemistry,
Rigshospitalet,
Copenhagen,
Denmark



Conclusion

- The hospital laboratory of the future is part of a larger center for molecular diagnostics in the hospital.
- In the center, physical design and function should ensure a balance between optimal integration and preservation of specialities.
- The common denominator for the laboratories is the term "molecular" in thought, and technology irrespective of whether the laboratory is biochemical, genetic, microbial or imaging.
- The center ensures a close link between the production of diagnostic results, research and development.