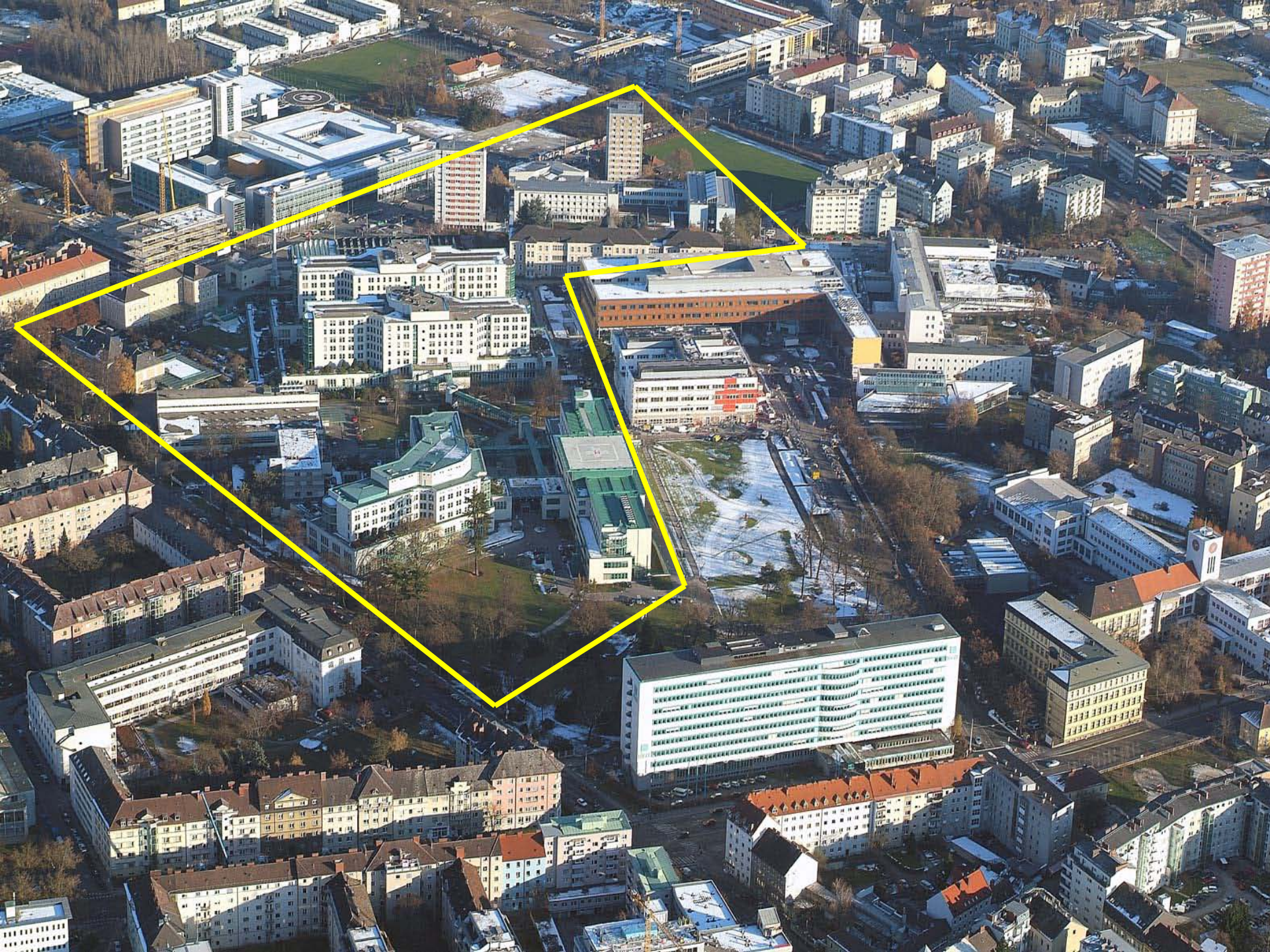


Questions and answers

Herbert Stekel, MD
General Hospital Linz
Austria



General Hospital Linz

- ▶ Owner: City of Linz
- ▶ 60.000 Inpatients / Year
- ▶ 150.000 Outpatients / Year
- ▶ 18 Medical Departments
- ▶ 5 Institutes
- ▶ 2497 Employees
- ▶ 250 Mio € Total cost
- ▶ Teaching Hospital



Central Laboratory

The image shows a large, modern laboratory building with a light-colored facade and a prominent green horizontal band near the roof. The building has multiple stories with numerous windows, some of which have green frames. In the foreground, there is a paved parking lot with several cars parked, including a dark blue car, a silver car, a dark blue car, and a red Mini Cooper. A small green and white structure is visible near the building's entrance on the right. The sky is overcast.

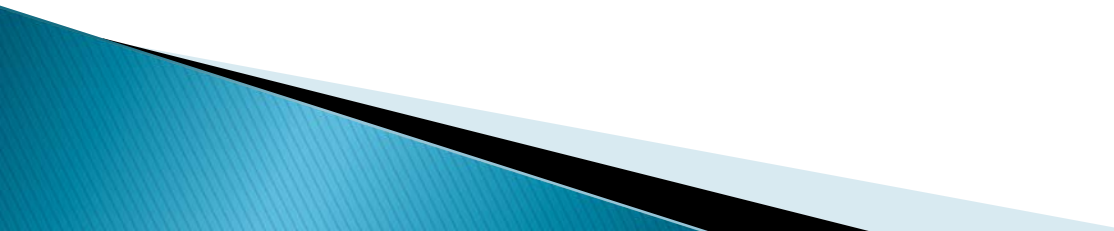
- ▶ ~ 4 Mio Analysis / Year
- ▶ ~ 450.000 Blood Samples / Year
- ▶ Laboratories
 - Clinical Chemistry
 - Haematology and Flow Cytometry
 - Haemostaseology
 - Protein Chemistry and Immunology
 - Autoimmune Diseases
 - Molecular Biology and Human Genetics

Central Laboratory



- ▶ **Staff:**
 - 4 Physicians
 - 1 Biologist
 - 1 IT-Technician
 - 30 Laboratory Technicians
 - 10 Supporting Personnel
- ▶ Located on 3 Floors with about 1500 m²
- ▶ Laboratory Information System SWISSLAB[®] since 1999
- ▶ Order Entry System LAURIS[®]
- ▶ ISO 9001 certified

Questions

- ▶ Am I sick?
 - ▶ What are Laboratories for?
 - ▶ What is the Process in a Laboratory
 - ▶ Where does it start?
 - ▶ When is a Lab a “nice” Lab?
- 

Morbus Bali

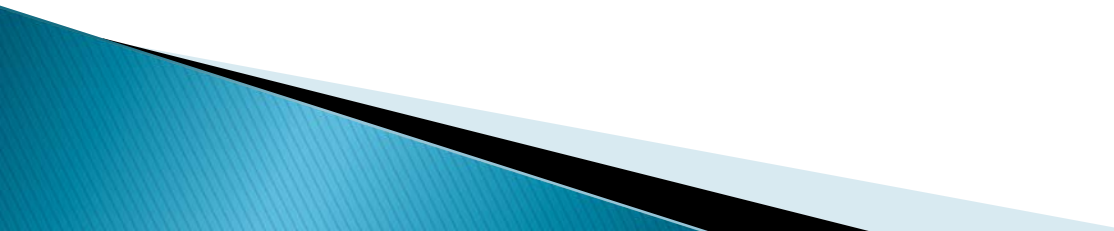
Health is a state of a human being which was not examined as often as it should.

Dirk Maxeiner und Michael Miersch

- ▶ You had a wonderful vacation at a beautiful, exotic island.
- ▶ After your return you are informed that some people are infected with morbus Bali
- ▶ There is a simple laboratory test, the test shows a positive result

Information from the Laboratory

- ▶ This test is really good
 - ▶ Specificity 98%
 - ▶ Sensitivity 99%
 - ▶ One of thousand tourists is infected

 - ▶ Your test is positive – are you suffering from M. Bali?
- 

Probability?

- ▶ 99 %
- ▶ 98 %
- ▶ ~ 95%
- ▶ ~ 70%
- ▶ ~ 50%
- ▶ ~ 5%
- ▶ 2%



The Facts

Values entered:

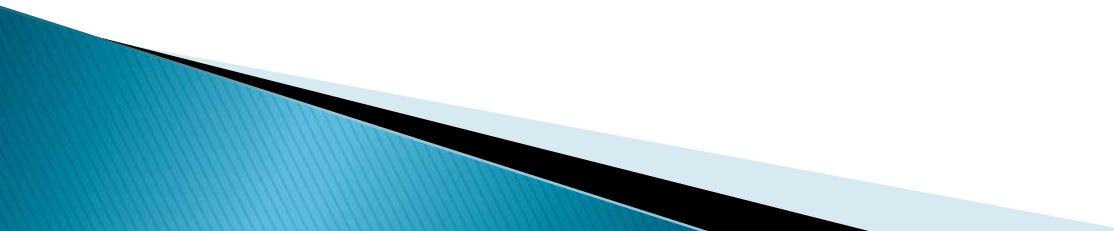
	Condition		Totals
	Absent	Present	
Test Positive	2000	99	2099
Test Negative	98000	1	98001
Totals	100000	100	100100

Basis

	Estimated Value	95% Confidence Interval	
		Lower Limit	Upper Limit
Prevalence	0.000999	0.000817	0.00122
Sensitivity	0.99	0.937588	0.999478
Specificity	0.98	0.979109	0.980854
For any particular test result, the probability that it will be:			
Positive	0.020969	0.020095	0.02188
Negative	0.979031	0.97812	0.979905
For any particular positive test result, the probability that it is:			
True Positive	0.047165	0.038678	0.05735
False Positive	0.952835	0.94265	0.961322
For any particular negative test result, the probability that it is:			
True Negative	0.99999	0.999934	0.999999
False Negative	0.00001	0.000001	0.000066

Second Test?

- ▶ Same Test
 - ▶ Same Laboratory
 - ▶ All positive results are retested

 - ▶ Again: positive
- 

Probability?

- ▶ 99 %
- ▶ 98 %
- ▶ ~ 95%
- ▶ ~ 70%
- ▶ ~ 50%
- ▶ ~ 5%
- ▶ 2%
- ▶ 1%



Facts

Values entered:

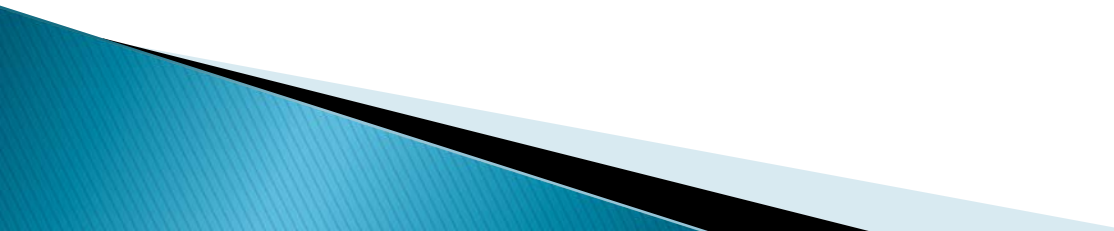
	Condition		Totals
	Absent	Present	
Test Positive	40	98	138
Test Negative	1960	1	1961
Totals	2000	99	2099

Basis

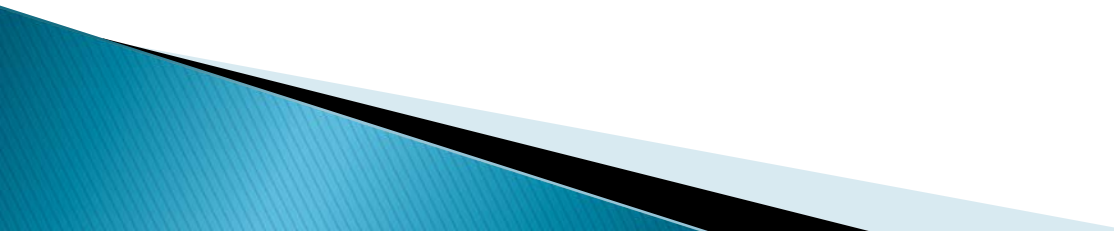
	Estimated Value	95% Confidence Interval	
		Lower Limit	Upper Limit
Prevalence	0.047165	0.038678	0.05735
Sensitivity	0.989899	0.936983	0.999472
Specificity	0.98	0.972595	0.985491
For any particular test result, the probability that it will be:			
Positive	0.065746	0.055696	0.077417
Negative	0.934254	0.922583	0.944304
For any particular positive test result, the probability that it is:			
True Positive	0.710145	0.625783	0.782588
False Positive	0.289855	0.217412	0.374217
For any particular negative test result, the probability that it is:			

Berechnungen

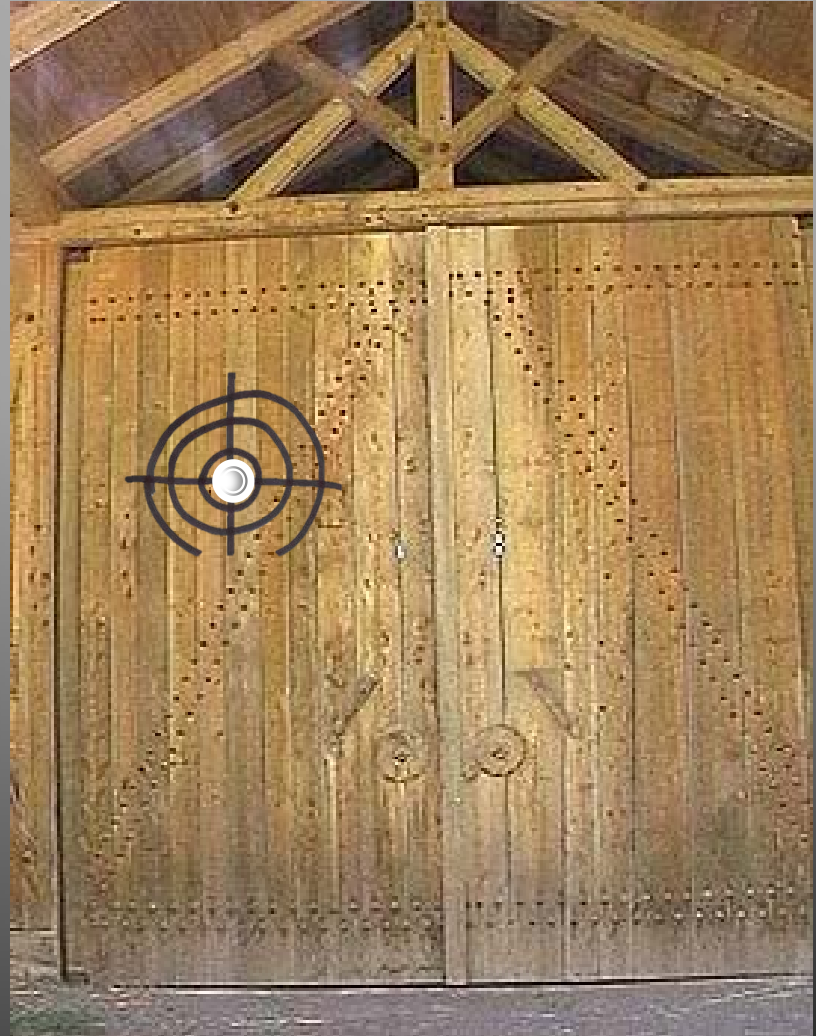
Questions

- ▶ **What are Laboratories for?**
 - ▶ What is the Process in a Laboratory
 - ▶ Where does it start?
 - ▶ When is a Lab a “nice” Lab?
- 

What is Laboratory Medicine for?

- ▶ To verify or to reject a presumption diagnosis
 - ▶ To monitor a therapy
 - ▶ Forensic reasons
 - ▶ Finding out risk factors
 - ▶ **Not for finding answers, when there was no question!**
- 

The Texas Sniper



What is Laboratory Medicine for?

Benefit

~60% of all Diagnosis
come from the Lab

Costs

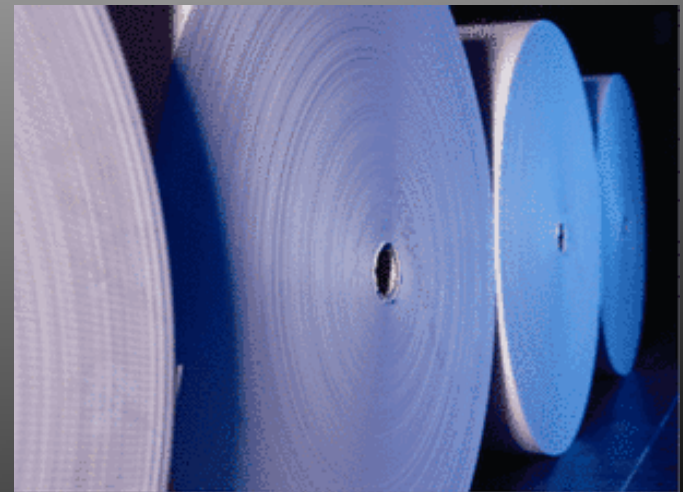
Costs of Laboratories
in Austrian Hospitals
vary between 2,6 and
5,5 %

Tell me about the Laboratory Process!

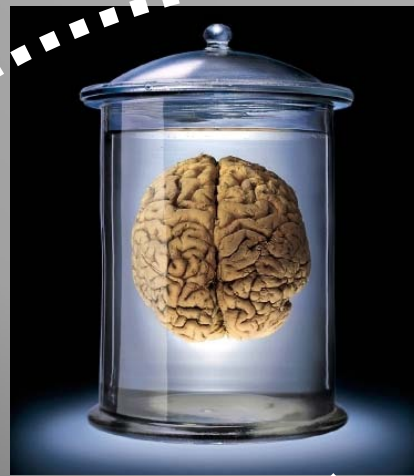
- ▶ Where does the process start?
 - ▶ What is the Product of a Laboratory?
- 



Do we convert
blood into
paper?



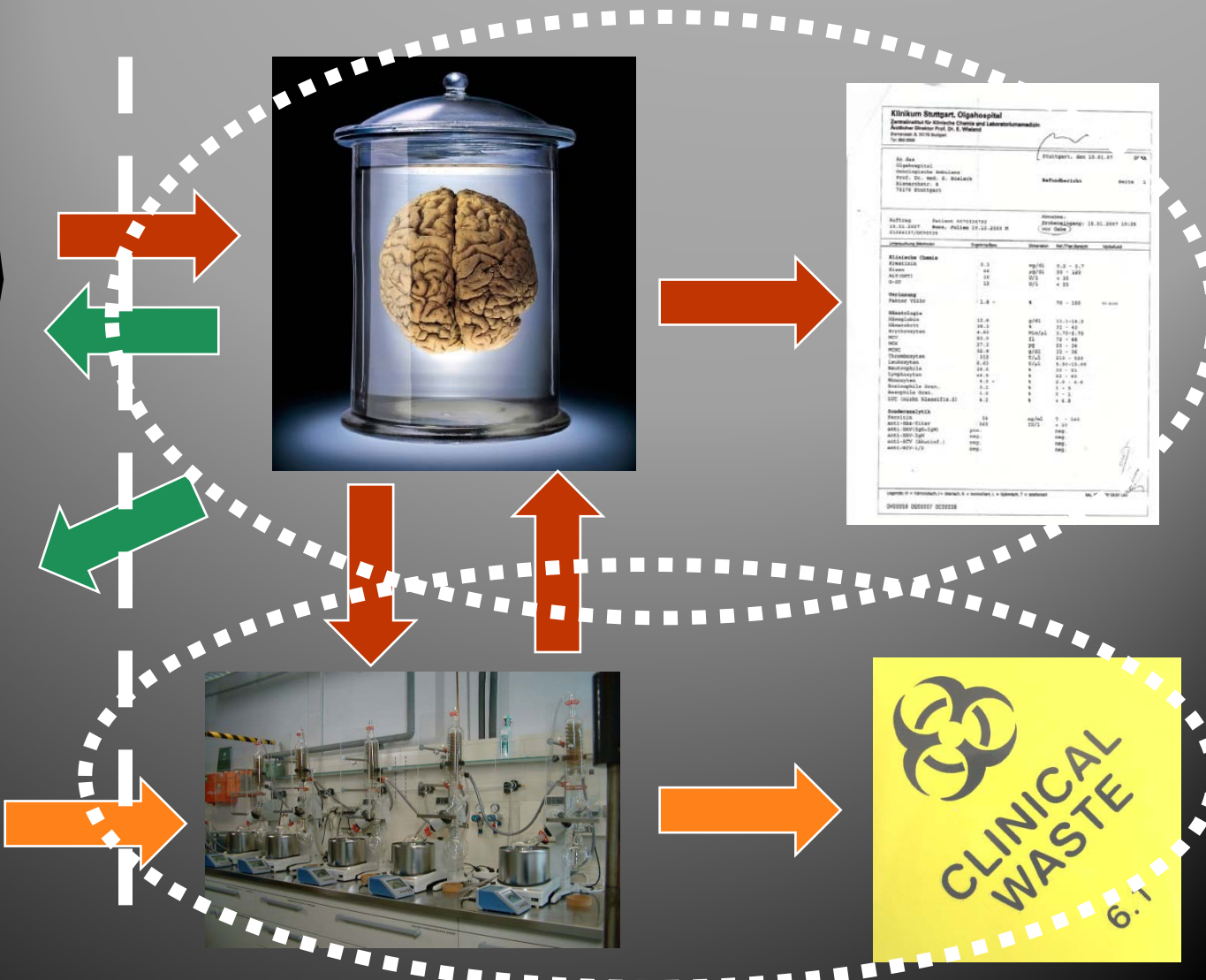
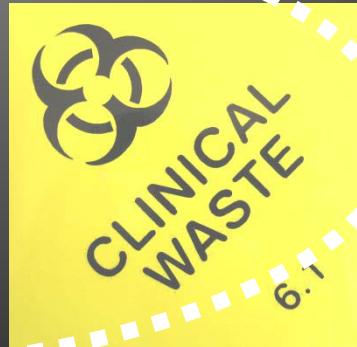
Questions of the requester are answered



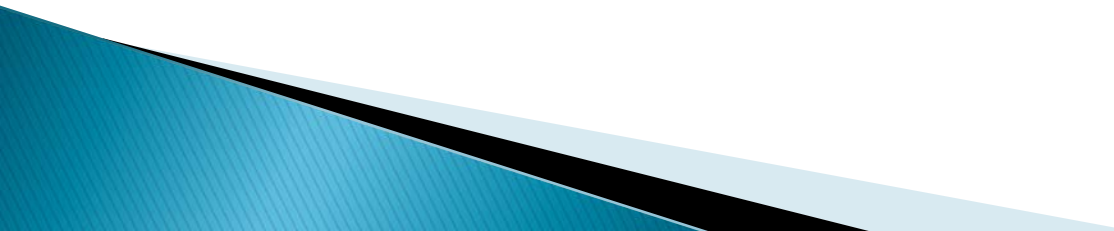
Klinikum Stuttgart, Oligohospital
Zentralinstitut für Klinische Chemie und Laboratoriumsmedizin
Abteilung: Direktor Prof. Dr. E. Weiland
Innovations- & IVD-Manager

Arzt: Dr. med. G. B. Müller
Patienten-Nr.: 123456789
Auftrag: 15.11.2007
Klinische Chemie

Parameter	Ergebnis	Einheit	Referenzbereich
Glucose	5.3	mg/dl	80 - 110
Hämoglobin	14.5	g/dl	13.5 - 15.5
Hämatokrit	44	%	37 - 47
WBC	10	/mm ³	4,000 - 11,000
PLT	250	/mm ³	150,000 - 400,000
Urea	1.8	mg/dl	0.8 - 2.0
Creatinine	0.9	mg/dl	0.6 - 1.2
ALT	25	U/L	0 - 40
AST	30	U/L	0 - 40
ALP	120	U/L	40 - 120
Gamma-GT	15	U/L	0 - 40
LDH	200	U/L	100 - 250
Triglyceride	150	mg/dl	0 - 150
Cholesterol	200	mg/dl	0 - 200
HDL	50	mg/dl	30 - 60
LDL	130	mg/dl	0 - 130
VLDL	30	mg/dl	0 - 30
Total Lipids	350	mg/dl	0 - 350
Urea Nitrogen	1.8	mg/dl	0.8 - 2.0
Creatinine	0.9	mg/dl	0.6 - 1.2
ALT	25	U/L	0 - 40
AST	30	U/L	0 - 40
ALP	120	U/L	40 - 120
Gamma-GT	15	U/L	0 - 40
LDH	200	U/L	100 - 250
Triglyceride	150	mg/dl	0 - 150
Cholesterol	200	mg/dl	0 - 200
HDL	50	mg/dl	30 - 60
LDL	130	mg/dl	0 - 130
VLDL	30	mg/dl	0 - 30
Total Lipids	350	mg/dl	0 - 350



Questions

- ▶ What are Laboratories for?
 - ▶ What is the Process in a Laboratory?
 - ▶ Where does it start?
 - ▶ **When is a Lab a “nice” Lab?**
- 

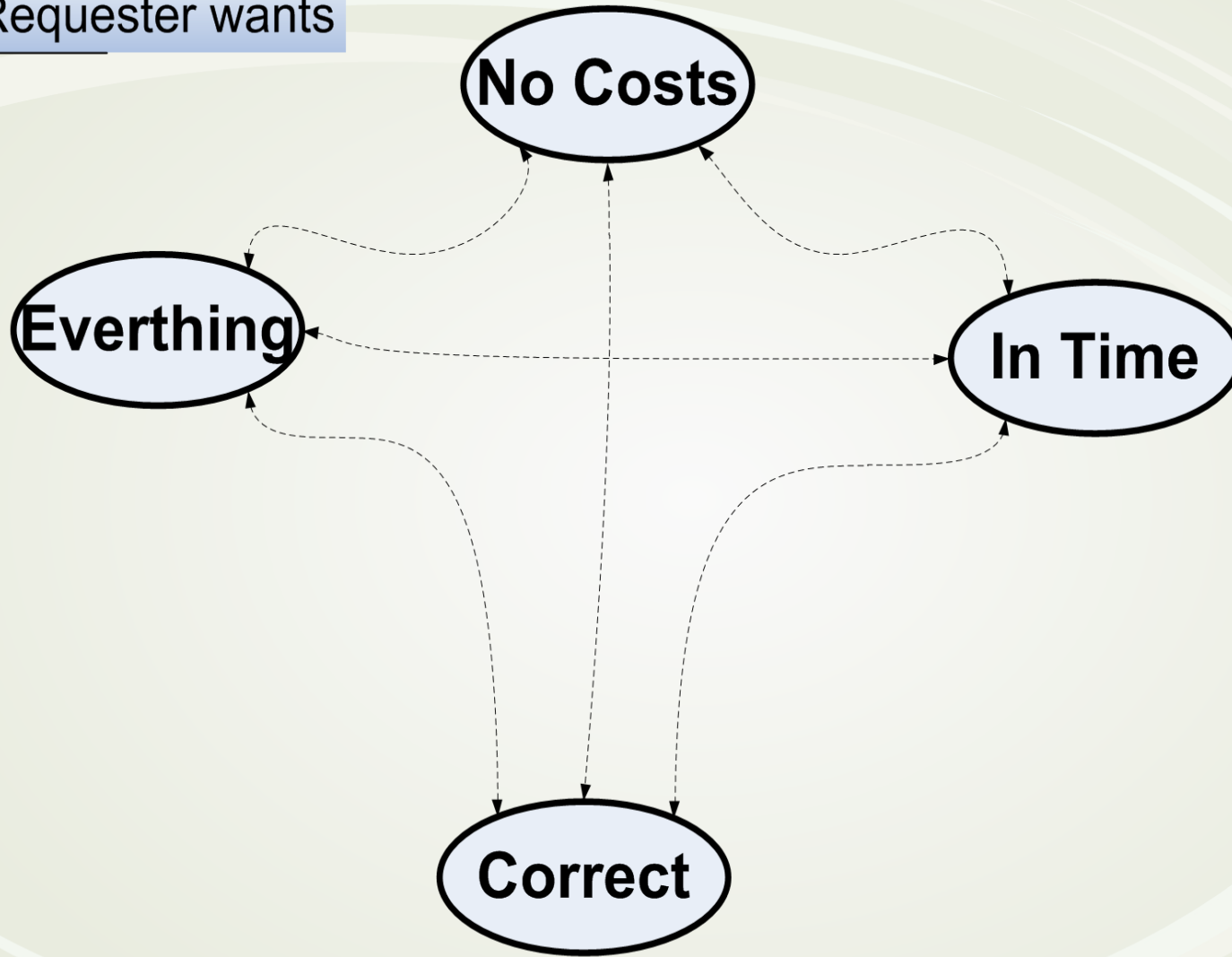
When is a Laboratory nice?

NICE-Concept

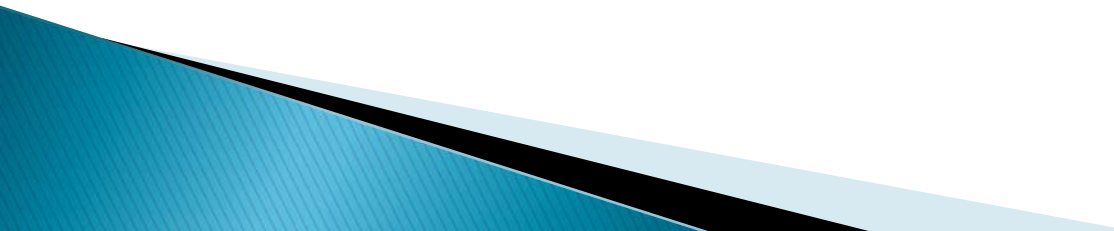
- ▶ **N**o Costs
- ▶ **I**n Time
- ▶ **C**orrect
- ▶ **E**verything

Quality!

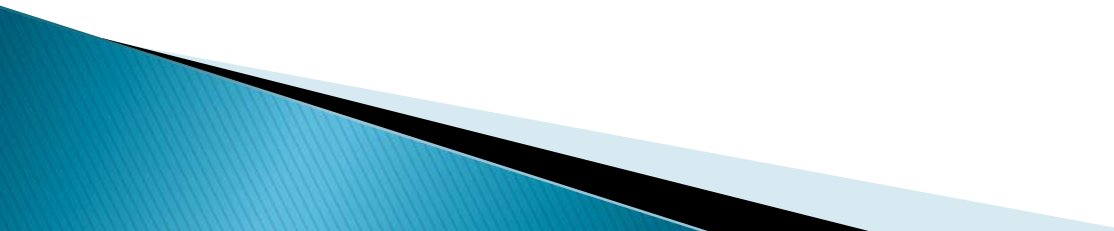
The Requester wants



Key figures – some examples

- ▶ No Costs
 - costs per analysis, investment cost, degree of utilization, costs of personnel
 - ▶ In Time
 - turnaround time
 - ▶ Correct
 - Results of IQC and EQC, number of reruns, qualification of personnel
 - ▶ Everything
 - number of tests sent to foreign labs
- 

Laboratory work is to give answers. Answers to questions of our requesters. And we shall give this answers correct, in time, complete and with low costs.



THANK YOU!

