METABOLIC PHENOTYPING BY ^{1}H-NMR SPECTROSCOPY DETECTS LUNG CANCER VIA A SIMPLE BLOOD SAMPLE

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CONTENT

- Lung cancer
- Research topic
- Results
- Future perspectives

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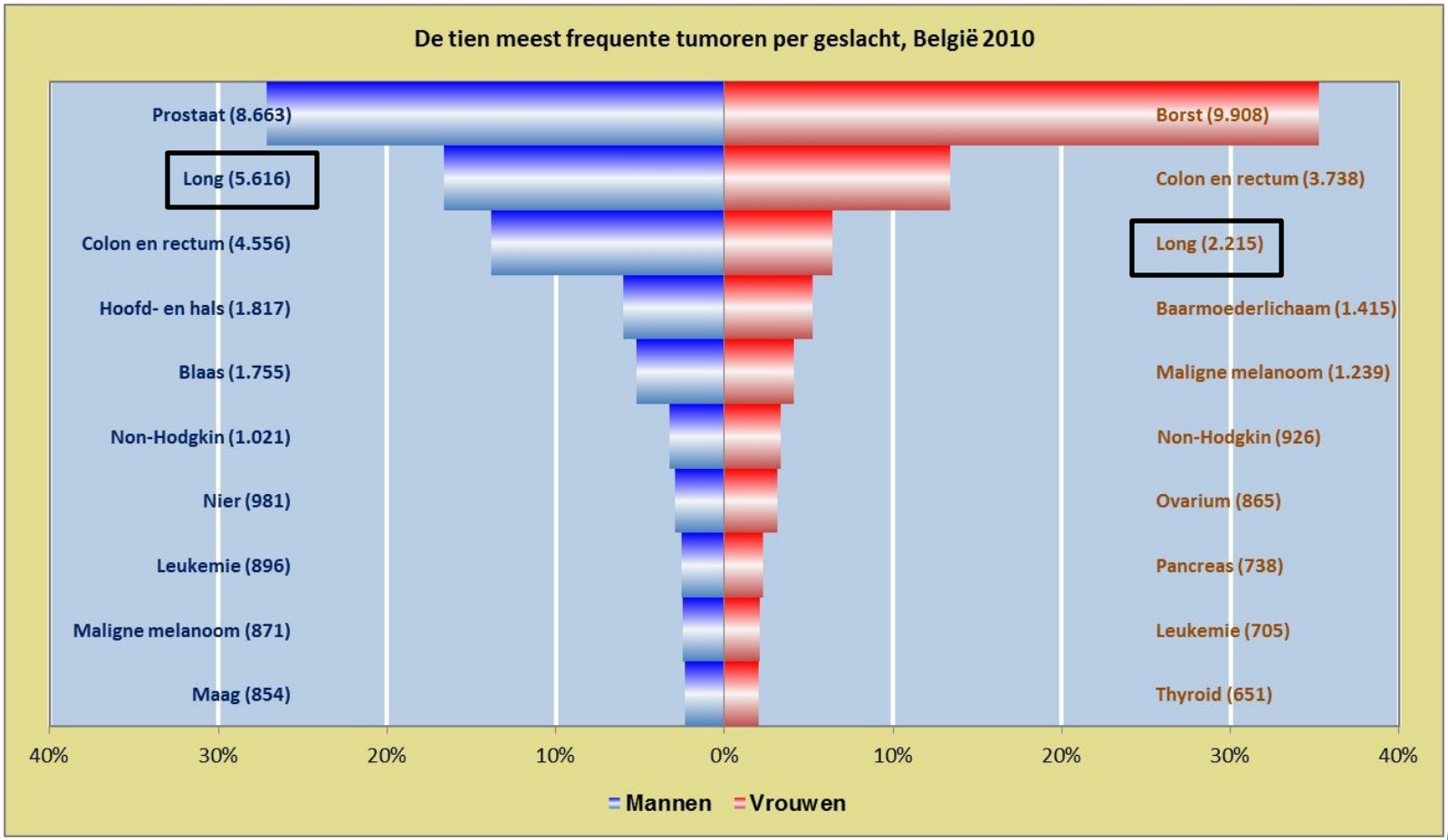
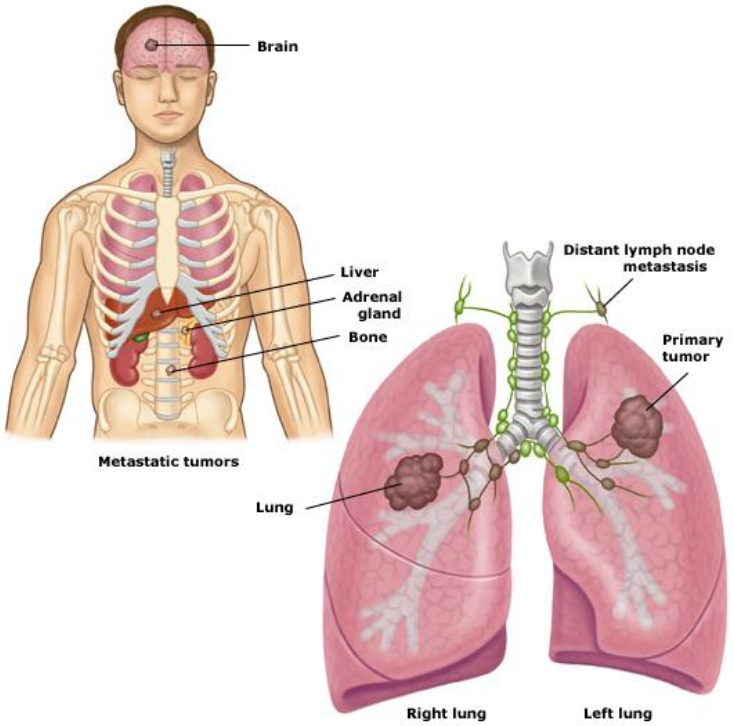
NUMBERS IN BELGIUM



Belgian Cancer Registry

LUNG CANCER

- Average 5-year survival of 15%
- Diagnosed in a metastatic stage
- Harmful and expensive chemotherapies



LINK BETWEEN TUMOR STAGE AND PROGNOSIS

FIGURE 70 - LUNG CANCER: RELATIVE SURVIVAL BY STAGE IN MALES (BELGIUM, 2004-2008)

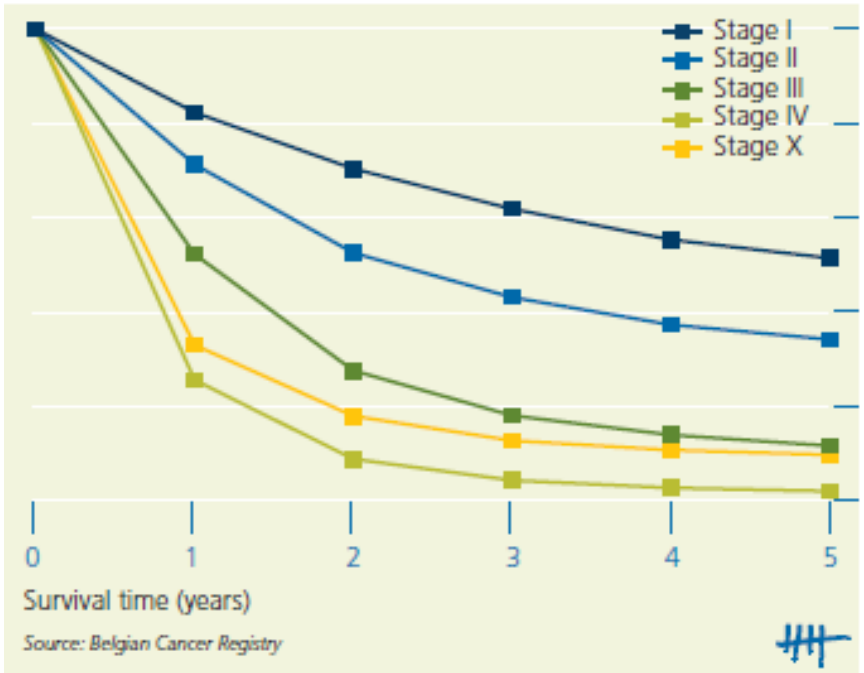
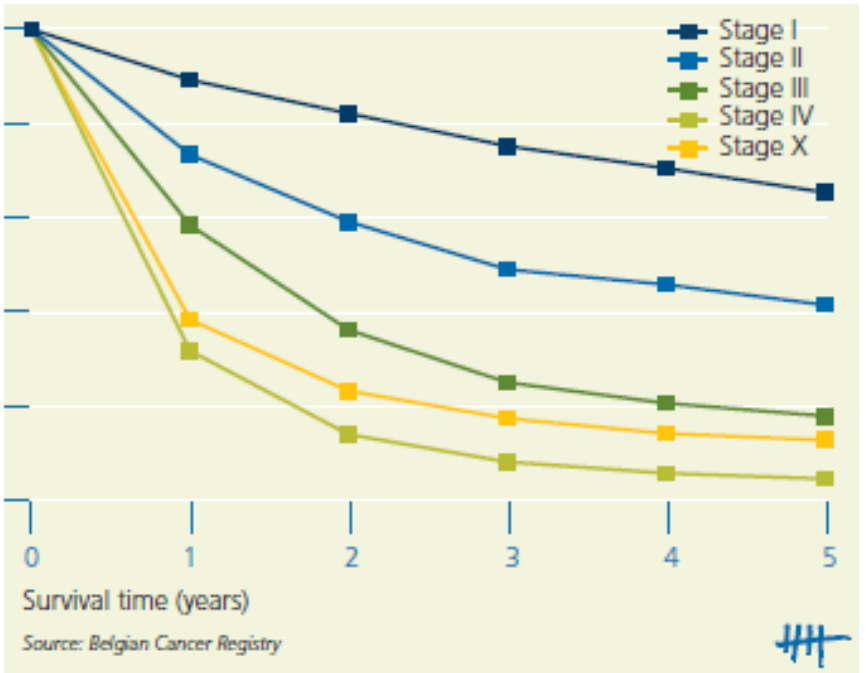


FIGURE 71 - LUNG CANCER: RELATIVE SURVIVAL BY STAGE IN FEMALES (BELGIUM, 2004-2008)



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RESEARCH TOPIC

- Problem:

Urgent need of effective methods to detect lung cancer in an early stage

- Hypothesis:

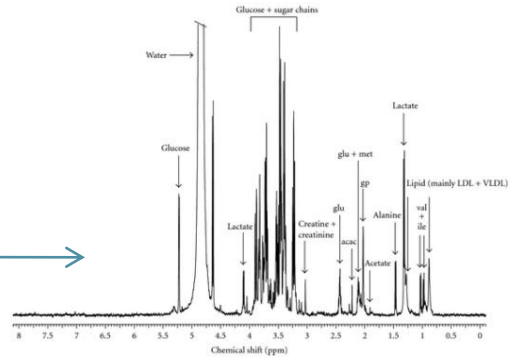
Analyses of the metabolic composition of blood plasma by ^{1}H-NMR spectroscopy allows to detect lung cancer

RESEARCH TOPIC

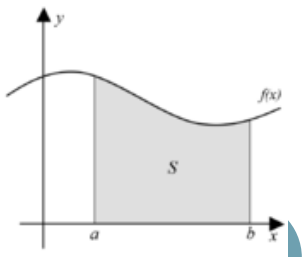
Control subjects

Lung cancer patients

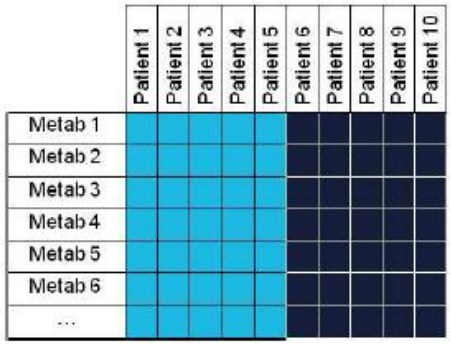
Analysis by ^{1}H-NMR spectroscopy

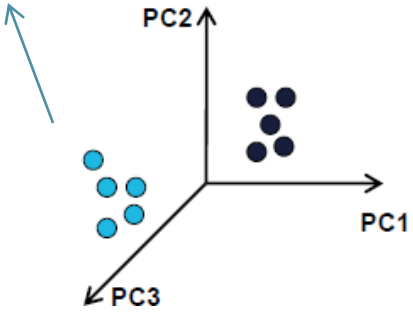


^{1}H-NMR spectrum



110 integral segments





Statistical analyses

Metabolic interpretation

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SUBJECT CHARACTERISTICS

	Lung cancer patients	Control subjects
Number	78	78
Gender	Male: 53 (67%) Female: 26 (33%)	Male: 45 (58%) Female: 33 (42%)
Average age	68 ± 9	64 ± 13
Smoking habits	Active: 50 Stopped > 6m: 25 Never: 3	Active: 19 Stopped > 6m: 27 Never: 32

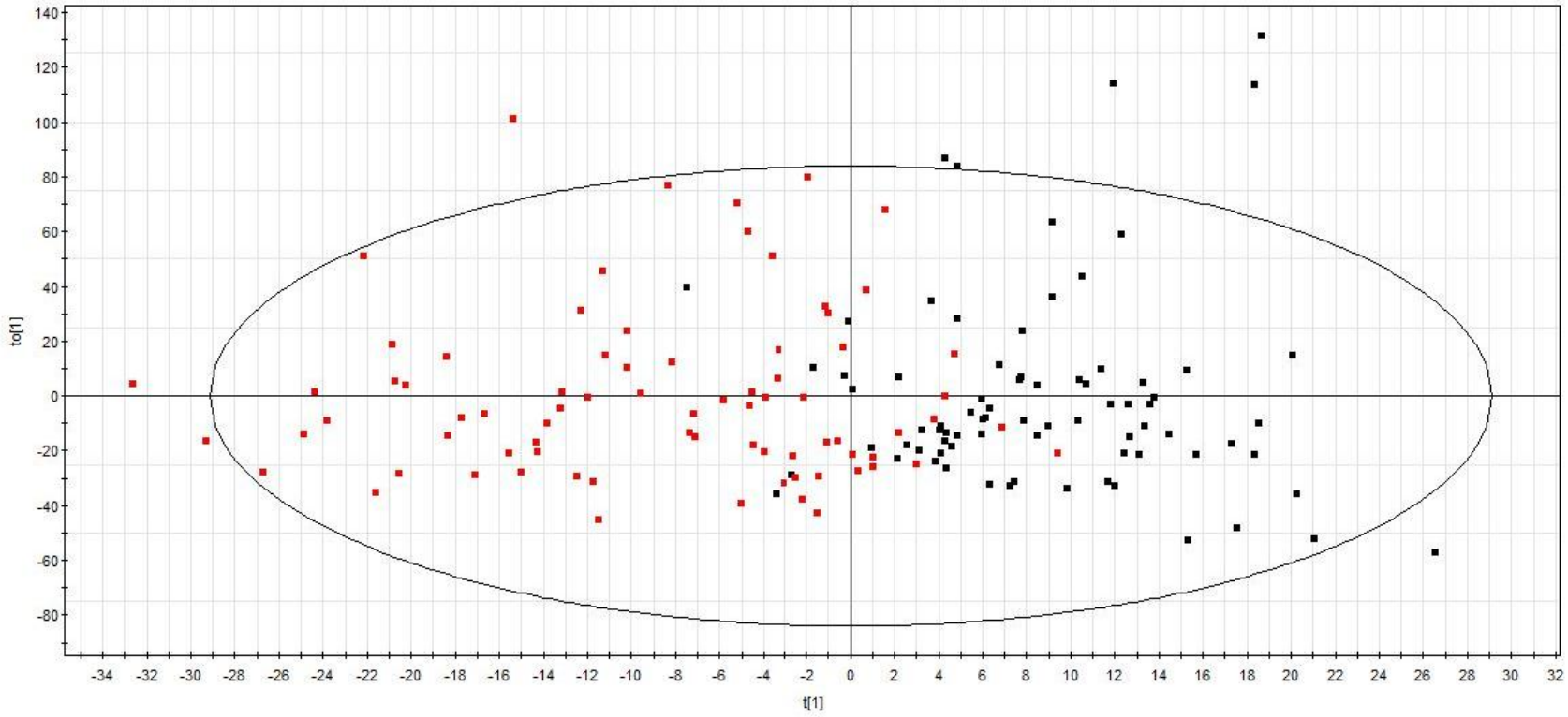
HISTOLOGY AND STAGE - 83 LUNG TUMORS

Non-small cell lung cancer or NSCLC (59)	Adenocarcinoma (29)
	Spinocellular carcinoma (22)
	Large cell carcinoma (4)
	Adenosquamous carcinoma (3)
	Carcinoid (1)
Small cell lung cancer or SCLC (14)	
Unknown histological diagnosis (10)	

<table>
<tr><td rowspan="5">Lung tumors (83)</td><td colspan="2">Stage I (25)</td><td colspan="2">Stage II (7)</td></tr>
<tr><td>IA (20)</td><td>IB (5)</td><td>IIA (5)</td><td>IIB (2)</td></tr>
<tr><td colspan="2">Stage III (30)</td><td colspan="2" rowspan="2">Stage IV (21)</td></tr>
<tr><td>IIIA (17)</td><td>IIIB (13)</td></tr>
</table>

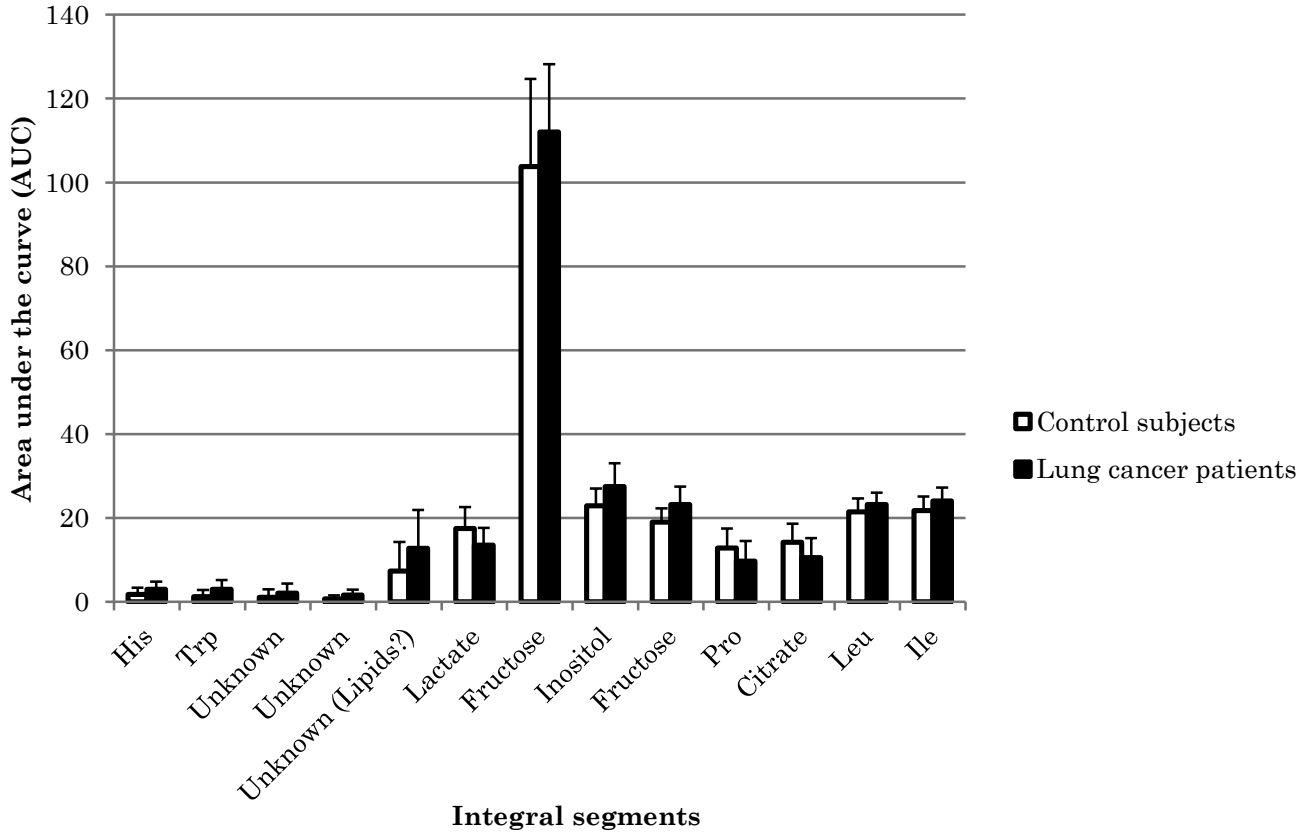
MULTIVARIATE DATA ANALYSIS – ALL 110 INTEGRAL SEGMENTS

■ = Control subjects
■ = Lung cancer patients



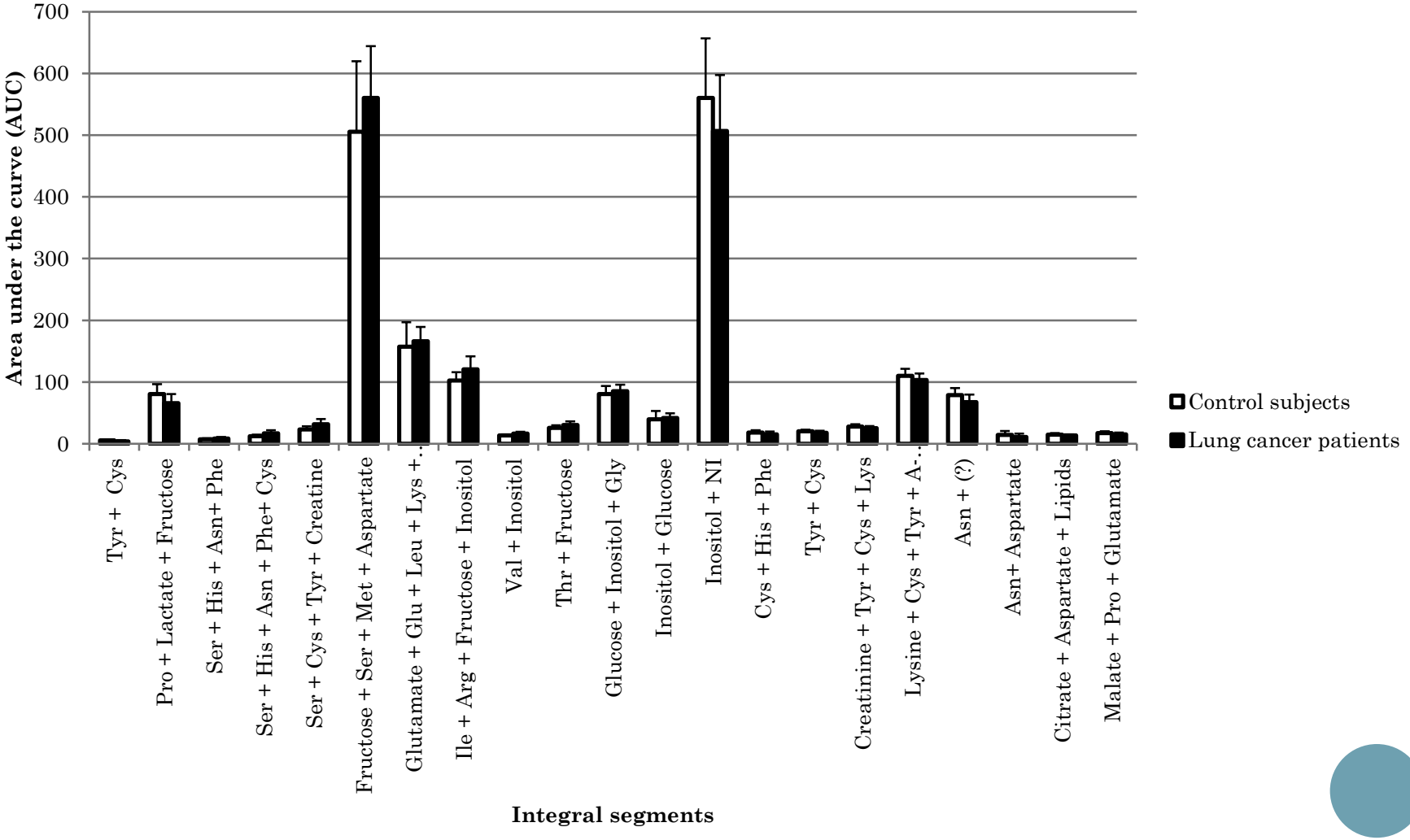
Specificity: 92% (72/78)
Sensitivity: 83% (65/78)

SIGNIFICANTLY DIFFERENT INTEGRAL SEGMENTS



13 integral segments with peaks of one metabolite

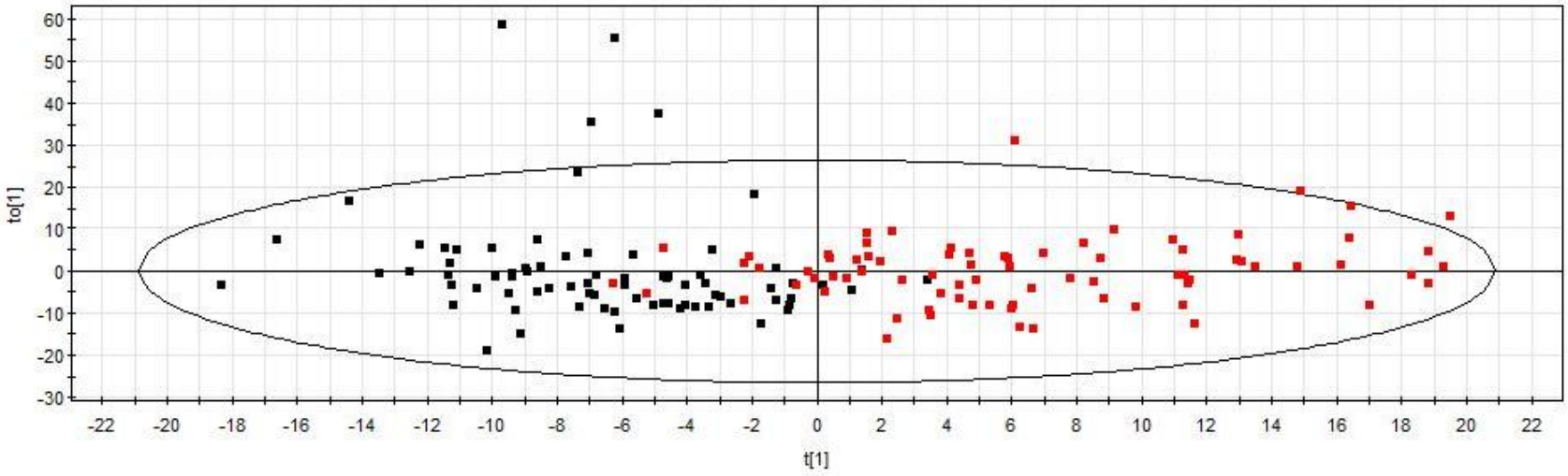
SIGNIFICANTLY DIFFERENT INTEGRAL SEGMENTS



21 integral segments with peaks of 2 or more metabolites

MULTIVARIATE DATA ANALYSIS – SIGNIFICANTLY DIFFERENT INTEGRAL SEGMENTS

■ = Control subjects
■ = Lung cancer patients



Specificity: 95% (74/78)
Sensitivity: 87% (68/78)

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FUTURE PERSPECTIVES

- Investigate the impact of gender, age, weight and smoking habits on the build model (classifier)

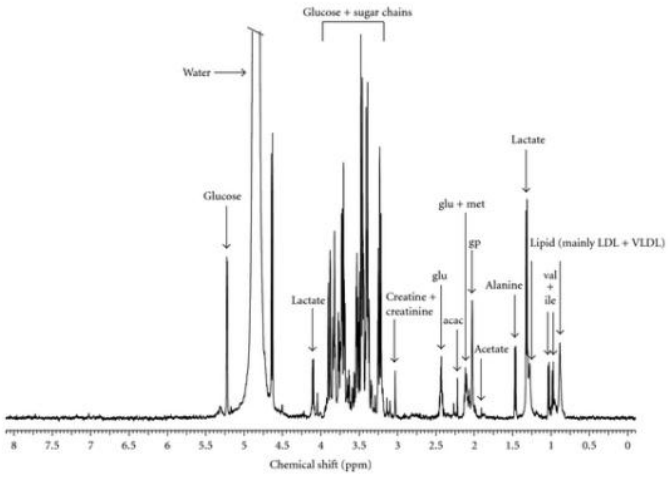
- **Validation** of the classifier in an independent study population
  - Aim: 250 lung cancer patients - 250 control subjects

- Current situation

Number of lung cancer patients (Limburg)	92
Number of lung cancer patients (Leuven)	68
Number of lung cancer patients	160/250
Number of control subjects	119/250

FUTURE PERSPECTIVES

- Investigate whether the metabolic changes in the blood correlate with metabolic changes in the tumor, visible on a **PET/CT-scan**



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