LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

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Epidemiology of Hepatitis E in Bavaria Germany

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Introduction

- Hepatitis E virus (HEV) is a non-enveloped, single-stranded RNA virus
- Genotype 3 is the most widespread genotype in Germany
- The prevalence of antibodies against HEV in Germany is 16,8%
- Genotype 3 has a zoonotic character and has been detected in several animal species (e.g. pigs, wild boars, deer and rabbits) and humans

Objectives

- Describe the population diagnosed with HEV in Bavaria
- Identify the most common subgenotypes of HEV circulating in Bavaria
- Identify the risk factors associated with transmission of HEV genotype 3

Data Collection HEV cases

All laboratory confirmed infections reported to LGL (n=558)

Stool and serum samples (n=145), food samples sent to LGL (n=6)

HEV patients filled out the questionnaire (n=167) → Patients with not fully completed questionnaire (n=5)

Patients with completed questionnaire (n=162) → Patients traveled to non-genotype-3 endemic countries (n=27)

Number of questionnaires available for descriptive analysis (n=135)

Figure 1: Recruitment of hepatitis E patients

Data Collection Healthy Population (DEGS1)

Healthy population[1] A dataset from RKI (DEGS1) was used to compare food habits of Bavarian HEV cases in 2017 with the general healthy population participating in the RKI survey. Inclusion criteria:

- Food Frequency Questionnaire (FFQ) was filled out
- Living in western federal states
- No previous diagnosis of Hepatitis

Methods

- Descriptive analysis for Bavarian's HEV cases
- Sequencing to subgenotypes
- Univariable analysis and Logistic Regression

Results

Gender and age
- Women (n=66) mean age 46 years (20-74)
- Men (n=69) mean age 47,5 years (20-85)

Comparison between men and women
- No significant difference in the mean age between men and women (t-test and ANOVA)

Symptoms
- Cases with symptoms (n=79/59%)
- No significant difference in the presence of symptoms between women and men (Chi-square-test)

Subgenotyping

- Stool and serum samples sequenced (n=145)
- Food samples sequenced (n=6). All were negative
- In most of the stool samples the HEV-RNA was not detectable (n=122), because collection of samples was delayed

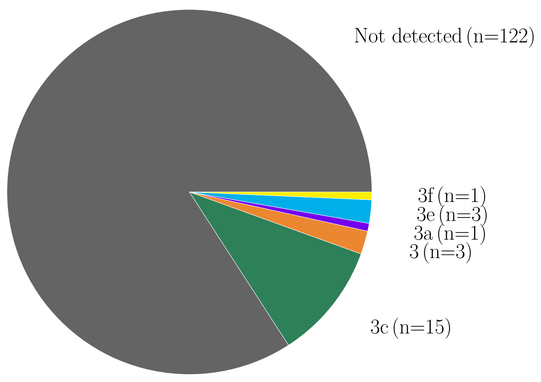

Figure 2: Subgenotype distribution

Risk factors I

Positively associated with hepatitis E:
- Consumption of sausages (e.g. salami, liver sausages)
- Consumption of fish (e.g. pollack, trout)
- Owning a cat

Protective factor for hepatitis E:
- Consumption of raw vegetables

No association with hepatitis E:
- Consumption of meat like pork, beef and wild meat
- Consumption of ham
- Owning a dog

Risk factors II

Risk factors	Cases (n = 135)		Healthy population (n = 4.512)		Multivariable Analysis	
Variable	**Yes**	**%**	**Yes**	**%**	**ORs**	**95% CI**
Sausages consumption	133	98,5%	4.037	89,7%	**9,6****	1,3 - 70,1
Fish consumption	123	91,8%	3.811	84,8%	**2,2****	1,1 - 4,4
Cat possession	39	31,2%	676	15,4%	**1,9*****	1,3 - 3,0
Raw vegetable consumption	121	90,3%	4.245	95,3%	**0,4****	0,2 - 0,8
Meat consumption	131	97,0%	4.326	96,2%	*NA*	
Ham consumption	120	89,6%	3.828	85,0%	*NA*	
Dog possession	20	16,1%	608	13,9%	*NA*	

Table 1: Risk factors. Comparison of the HEV cases and the DEGS1 population (*NA* - the effect of the variable is not significant; ** p-value < 0,05; *** p-value < 0,01)

Conclusion

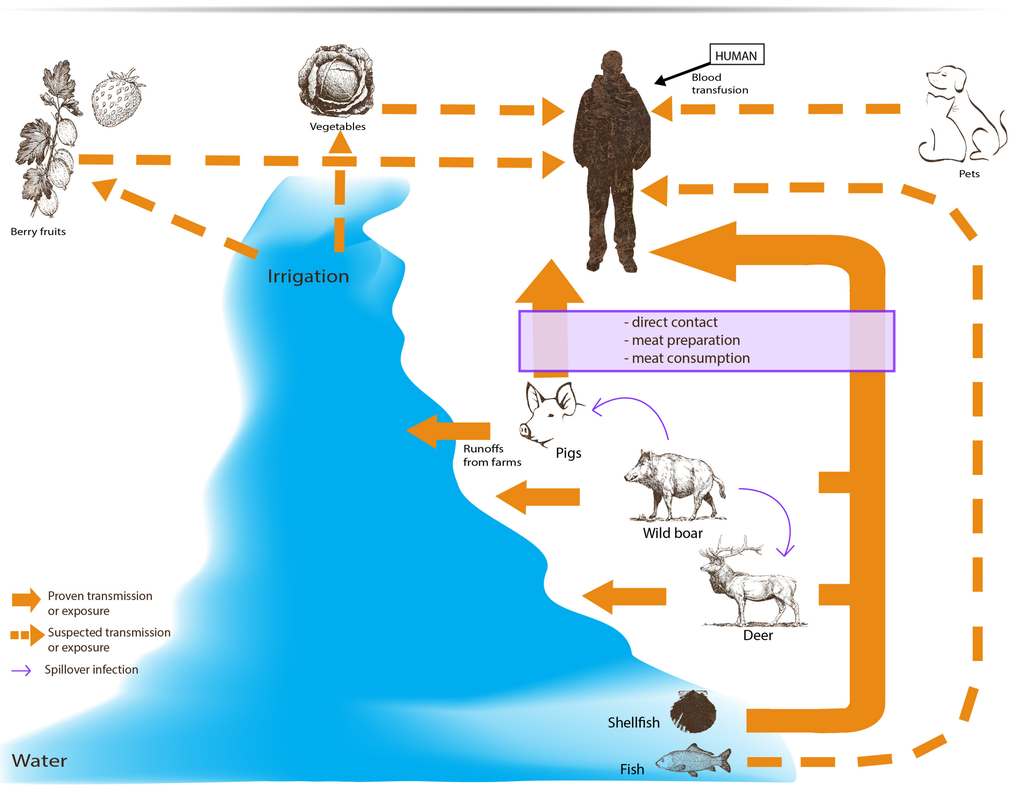

Figure 3: Summary of known and suspected transmission routes of HEV genotype 3 in the literature

- Pigs, wild boar and deer have been identified as reservoir of HEV in Germany
- Runoff from animal manure and faeces, containing HEV, could contaminate irrigation or coastal waters and these could contaminate shellfish and possibly fish
- In our study fish was identified as a new risk factor
- Dogs and cats have been found seropositive for HEV in Germany
- In our study cat ownership was positively associated with HEV
- Furthermore, women with cat ownership have a higher risk than men owning a cat
- It is tempting to hypothesize that women living in a shared household are more likely to care for their pets (feeding and cleaning) and are therefore more exposed

References

[1] Robert-Koch-Institute.
German health interview and examination survey for adults (degs1).
Robert Koch Institute, Department of Epidemiology and Health Monitoring, 2015.

Acknowledgements

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** This work was submitted to "Food and Environmental Virology" and is currently under consideration.*

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