

Cancer-specific variation in emergency presentation by sex, age and deprivation across 27 common and rarer cancers

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Keywords: emergency; diagnosis; route; age; sex; deprivation; inequalities

Cancer-specific variation in emergency presentation by sex, age and deprivation across 27 common and rarer cancers

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Background: Although overall sociodemographic and cancer site variation in the risk of cancer diagnosis through emergency presentation has been previously described, relatively little is known about how this risk may vary differentially by sex, age and deprivation group between patients with a given cancer.

Methods: Data from the Routes to Diagnosis project on 749 645 patients (2006–2010) with any of 27 cancers that can be either sex were analysed. Crude proportions and crude and adjusted odds ratios were calculated for emergency presentation interactions between sex, age and deprivation with cancer were examined.

Results: The overall proportion of patients diagnosed through emergency presentation varied by cancer site. For men, women were at greater risk for emergency presentation for bladder, brain, rectal, prostate, testicular, thyroid, oesophageal, melanoma and lymphomas and melanoma (e.g., oropharyngeal cancer, odds ratio for women vs men, 1.50; 95% CI 0.32–0.73). Similarly, younger patients were at higher risk for emergency presentation for bladder, brain, rectal, prostate, testicular, thyroid, oesophageal, melanoma and lymphomas and melanoma (e.g., oropharyngeal cancer, odds ratio for younger patients vs older, 1.20; 95% CI 0.12–0.33). Inequalities in emergency presentation by sex, age and deprivation were observed across most cancer sites.

Conclusions: Although overall sociodemographic and cancer site variation in the risk of cancer diagnosis through emergency presentation has been previously described, relatively little is known about how this risk may vary differentially by sex, age and deprivation group between patients with a given cancer.

Why worry about emergency presentation?

- A substantial proportion of cancer patients are diagnosed through an emergency route (*Elliss-Brookes et al, 2012; Gunnarsson et al, 2013*).
 - Emergency presentation –
 - is associated with poorer survival outcomes (*Sjo et al, 2009; Elliss-Brookes et al, 2012; McPhail et al, 2013*).
 - increases stress, anxiety and inconvenience for patients
 - increase pressure on the out-of-hours health service
 - ➔ may contribute to poorer outcomes
- (Iversen et al, 2008; McPhail et al, 2013)

Are emergency presentations avoidable?

Did the patient seek medical help promptly? [†]	Was the patient a 'first presenter'? [‡]	
	Yes	No
	Biological factors (leading to a dramatic clinical presentation with minimal or no prior symptoms) Emergency presentation unavoidable	Atypical symptoms (making suspecting of diagnosis of cancer challenging) Deficient investigation strategy (e.g., wrong or untimely testing, false-negative findings or true-positive findings overlooked) Medical error Emergency presentation potentially avoidable[§]
No	Psycho-social patient factors (lack of knowledge of cancer symptoms, nonconductive beliefs or attitudes about cancer) Healthcare factors (geographical, practical or financial barriers to elective care) Emergency presentation potentially avoidable[¶]	

Why worry about variation?

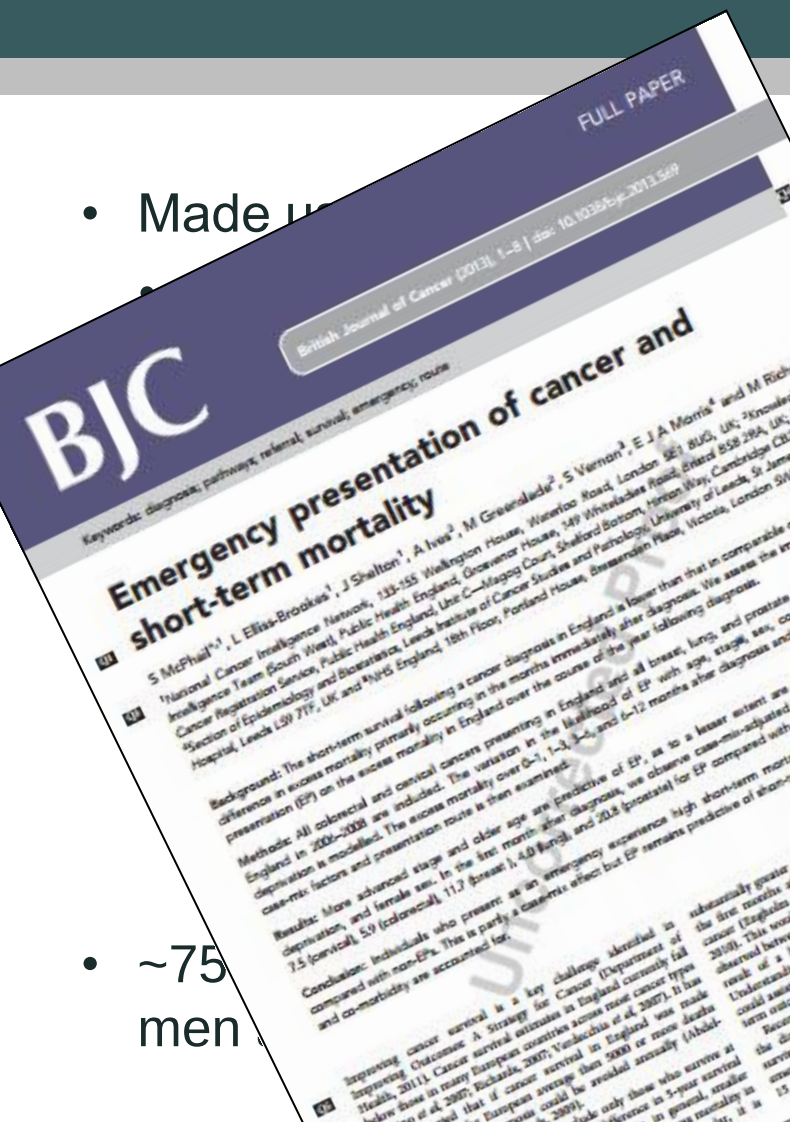
- Understanding stratified risk of emergency presentation may help to identifying underlying mechanisms
- Identifying underlying mechanisms is the first step to developing targeted interventions to reduce emergency presentations

What did we do?

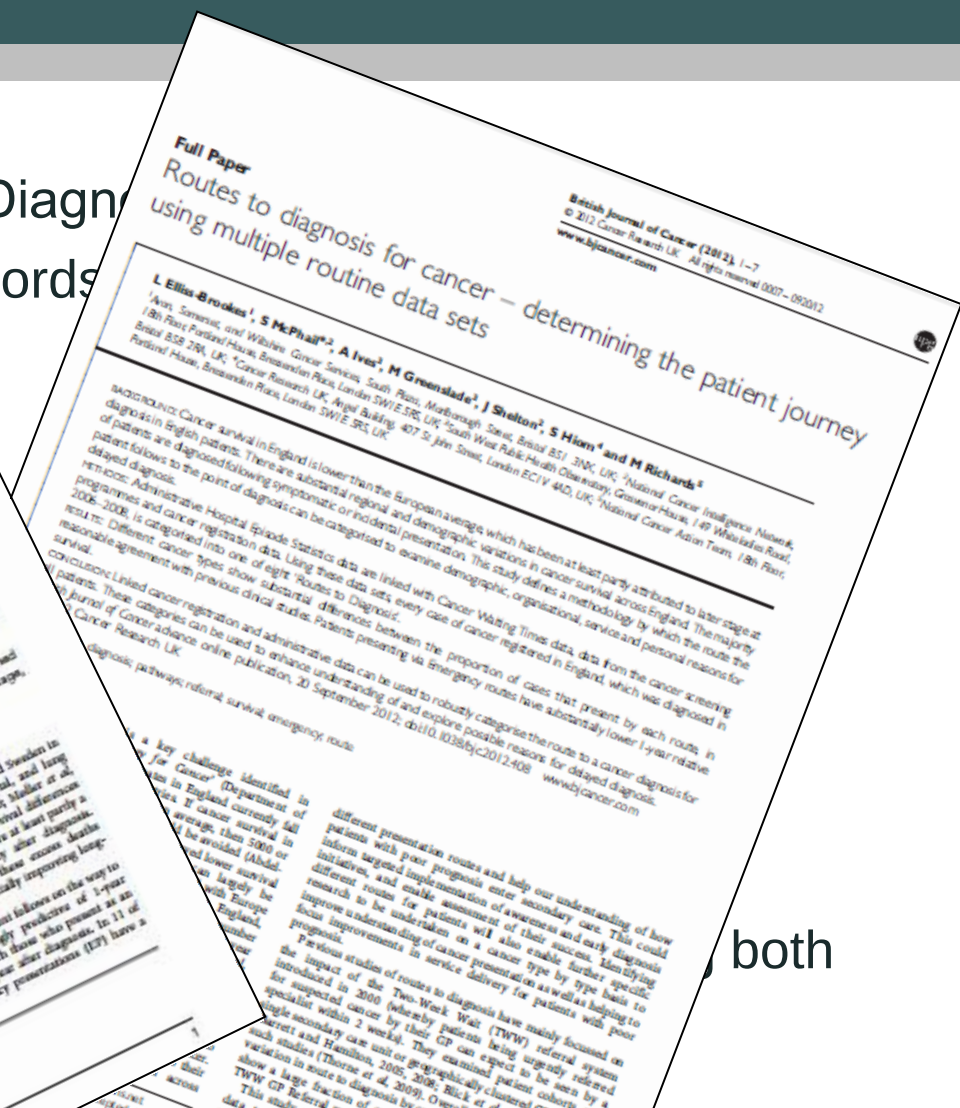
- Made use of the NCIN “Routes to Diagnosis” dataset
 - Based on cancer registration records linked to
 - Hospital Episodes Statistics,
 - National Cancer Waiting Times
 - NHS screening programmes
 - Assigns a route to diagnosis for each person/tumour in dataset
 - Possible routes include
 - Emergency
 - Two week wait
 - Routine referral
 - Screening
- ~750,000 patients between 2006 and 2010 with cancers affecting both men and women

What did we do?

- Made use of multiple data sources to Diagnose and monitor cancer records



- ~75 men



both

What did we do?

- Used logistic regression to investigate variation in emergency presentation by
 - Sex
 - Deprivation
 - Age
- Also adjusting for cancer diagnosis and year of diagnosis
- Use interaction terms to investigate cancer specific variation by socio-demographics



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Results

Additional findings

- Consistent reduction in emergency presentation over 5 years
2006 - 32.8% 2010 - 29.5%

Additional findings

- Consistent reduction in emergency presentation over 5 years
2006 - 32.8% 2010 - 29.5%
- Found substantial differences between different types of bowel cancer often grouped together
Colon - 31.4% Rectal – 15.1%

What did we find? Socio-demographic variation

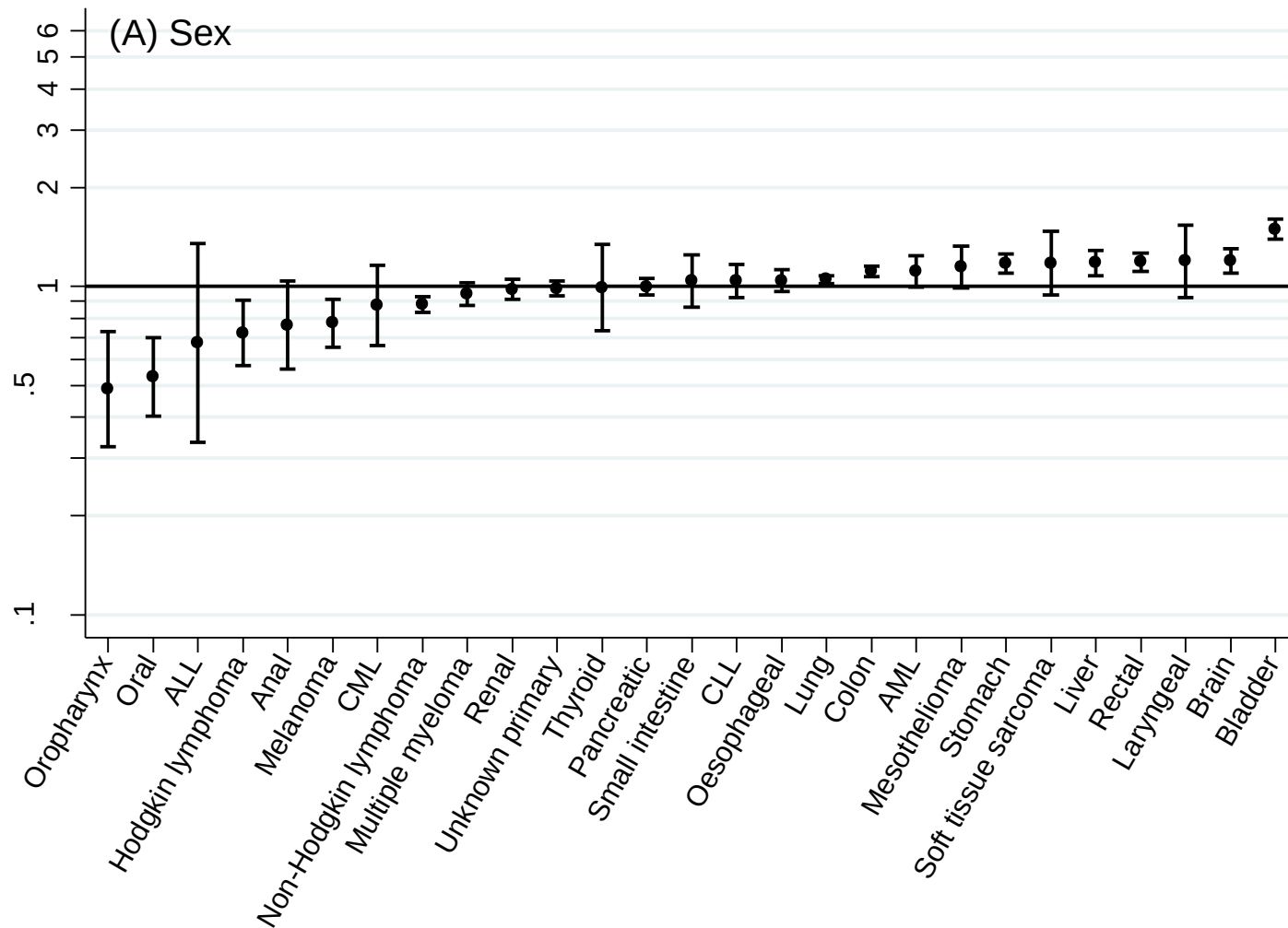
- Emergency presentation risk varied by age, sex, deprivation and cancer
(*Strong evidence i.e. $p < 0.0001$ for all*)
- This variation (age, sex and deprivation) was differential by cancer
(*Strong evidence i.e. $p < 0.0001$ for all*)

Variation in emergency presentation by **sex**

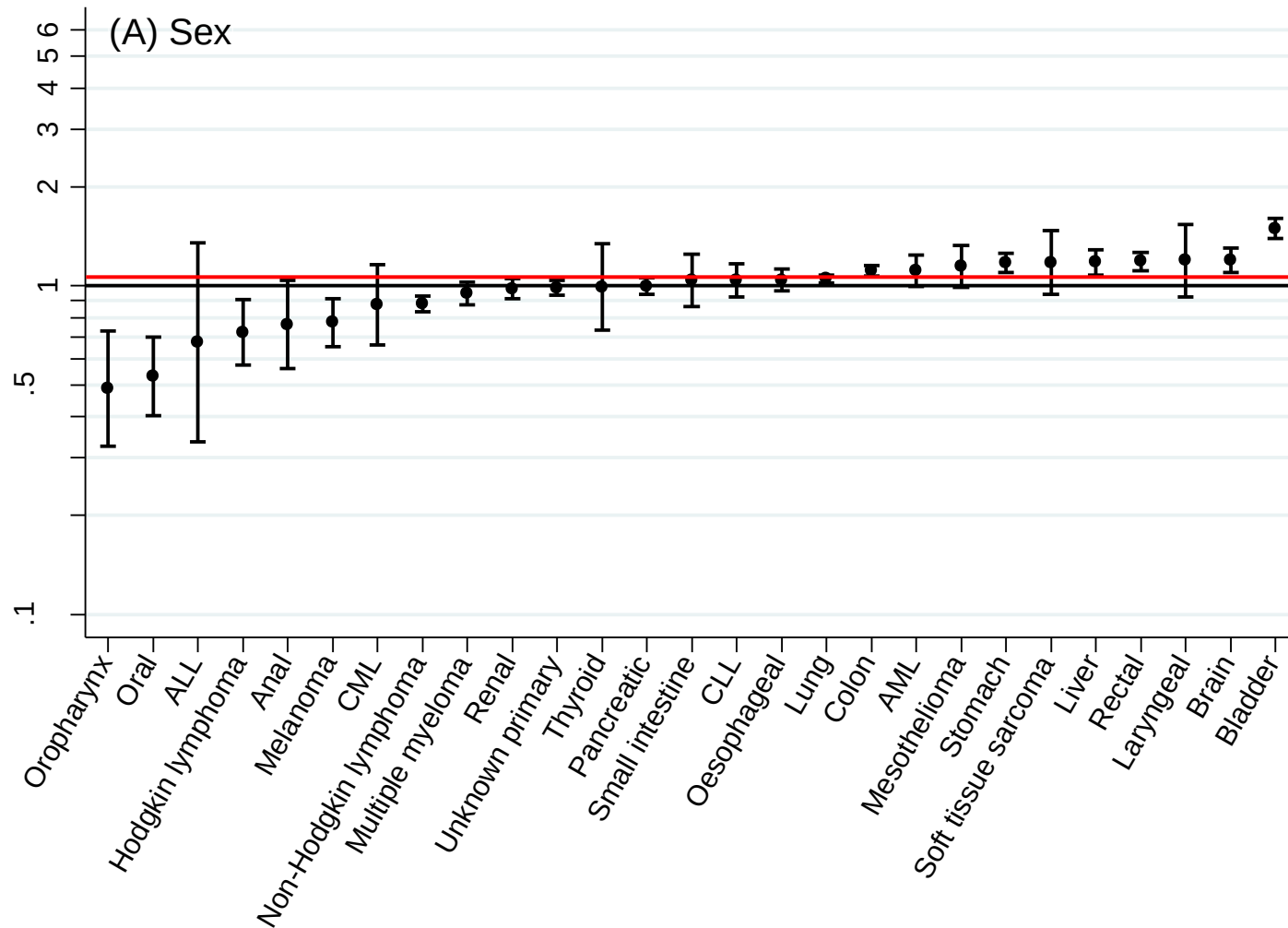
Overall women are more likely to
have an emergency presentation

OR=1.06 (95%CI 1.04-1.08)

Variation in emergency presentation by **sex**



Variation in emergency presentation by **sex**

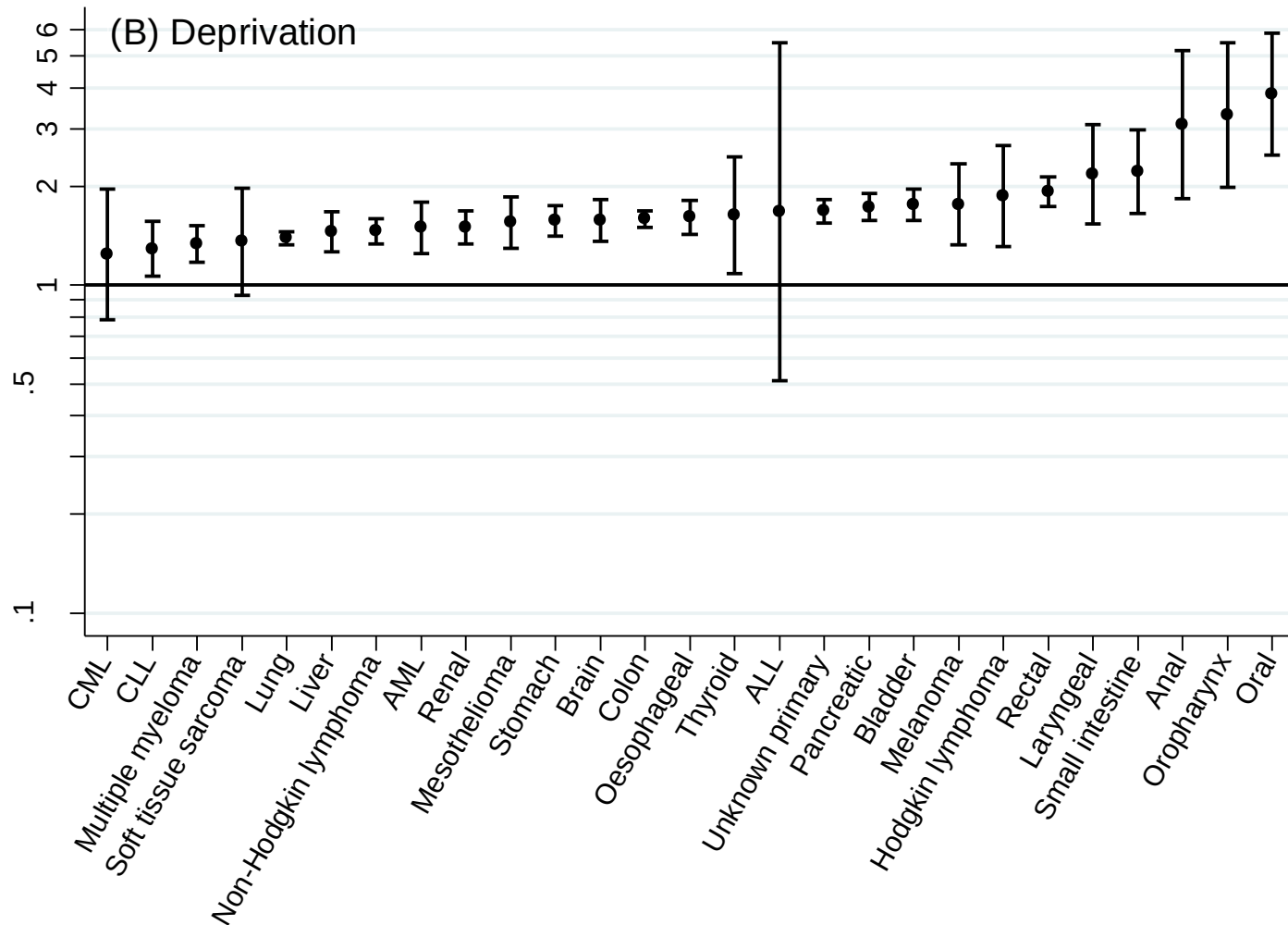


Variation in emergency presentation by deprivation

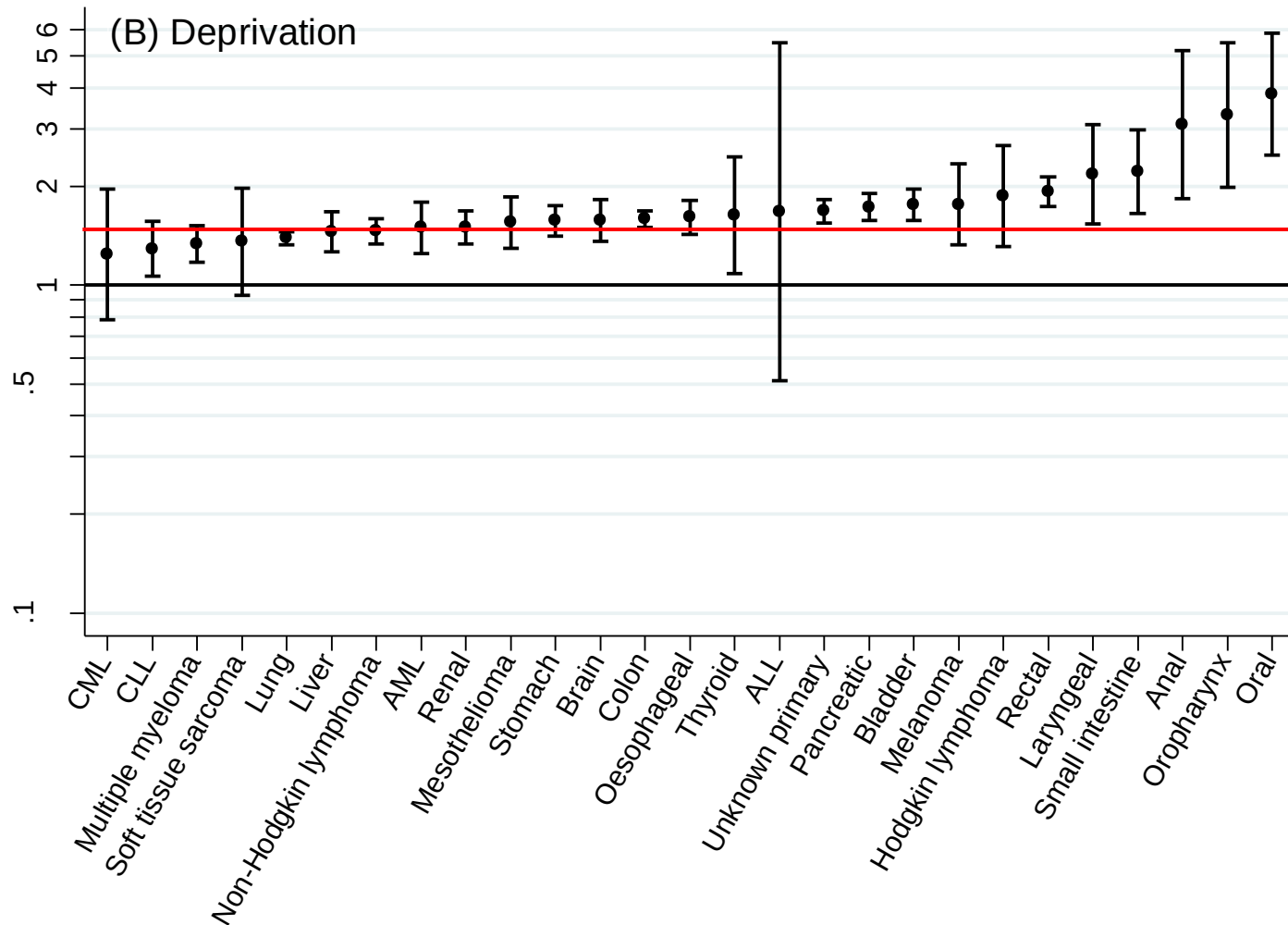
Overall people from more deprived
Backgrounds are more likely to
have an emergency presentation

Comparing most/least deprived quintile
OR=1.55 (95%CI 1.51-1.59)

Variation in emergency presentation by deprivation



Variation in emergency presentation by deprivation



Variation in emergency presentation by **age**

Overall older people are more likely to
have an emergency presentation

Comparing 65-74 yrs and 75-84 yrs
OR=1.47 (95%CI 1.45-1.50)

Variation in emergency presentation by **age**

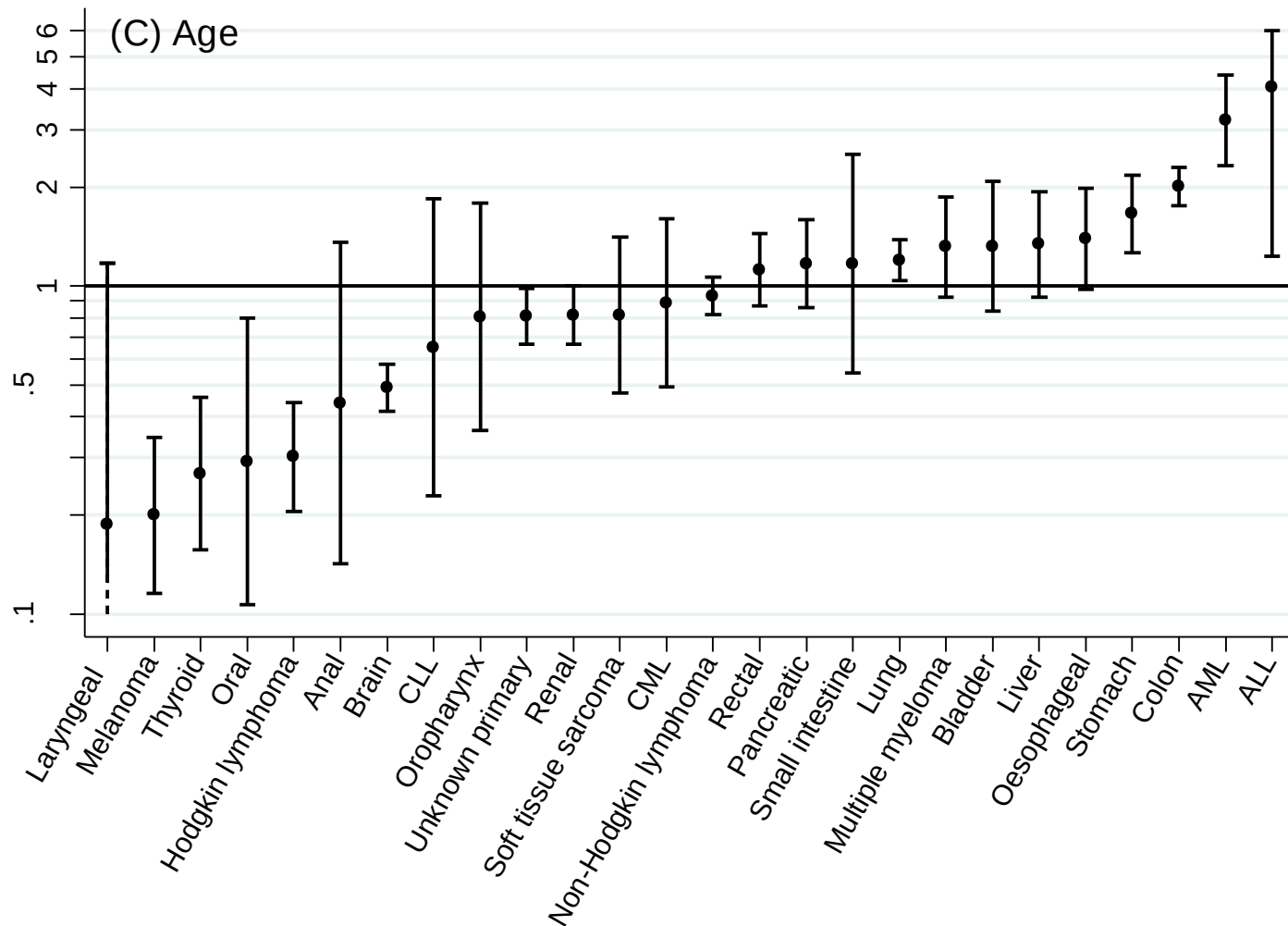
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Comparing 65-74 yrs and 75-84 yrs
OR=1.47 (95%CI 1.45-1.50)

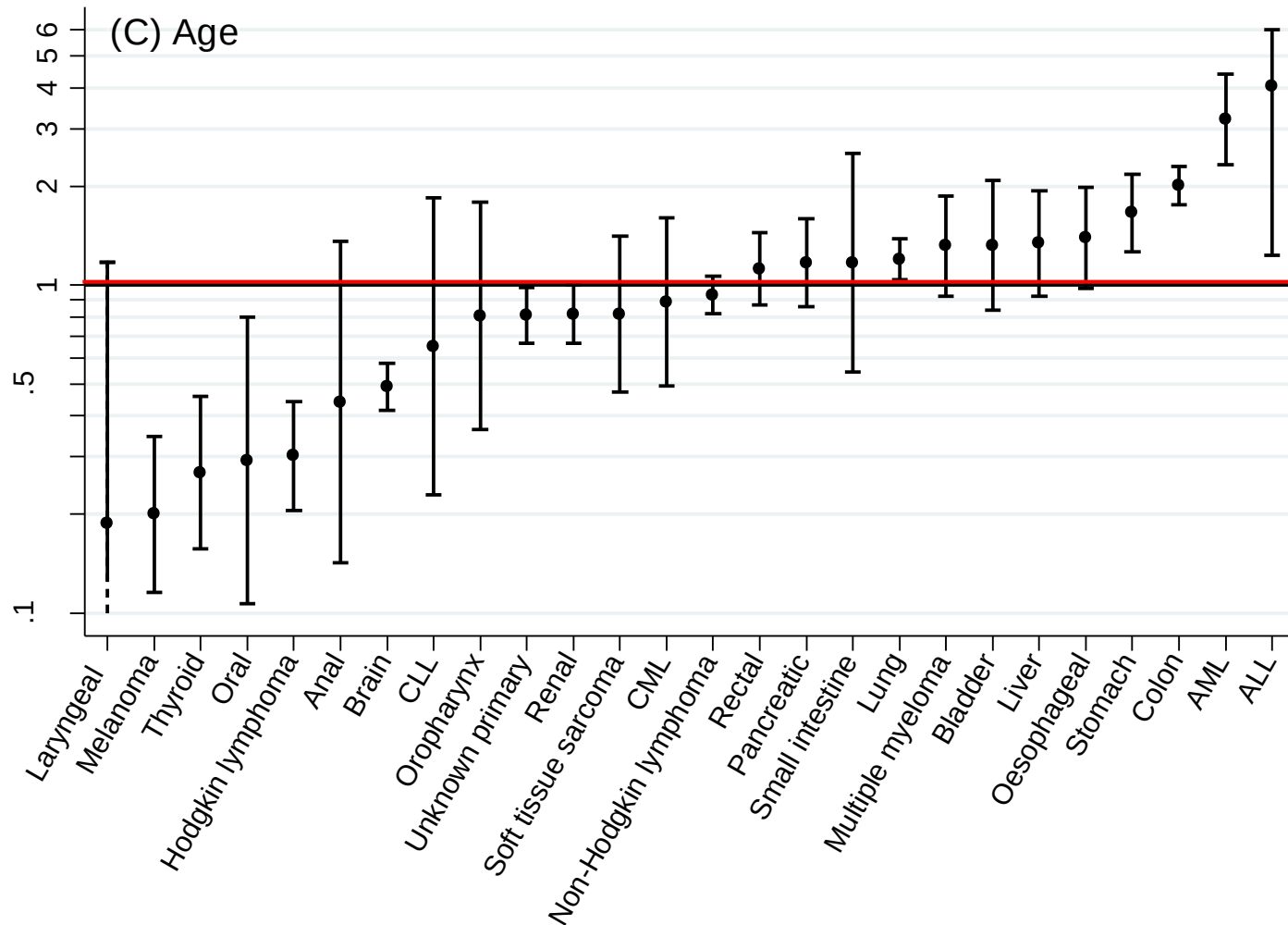
But small variation at younger ages

Comparing 65-74 yrs and 35-44 yrs
OR=1.01 (95%CI 0.95-1.07)

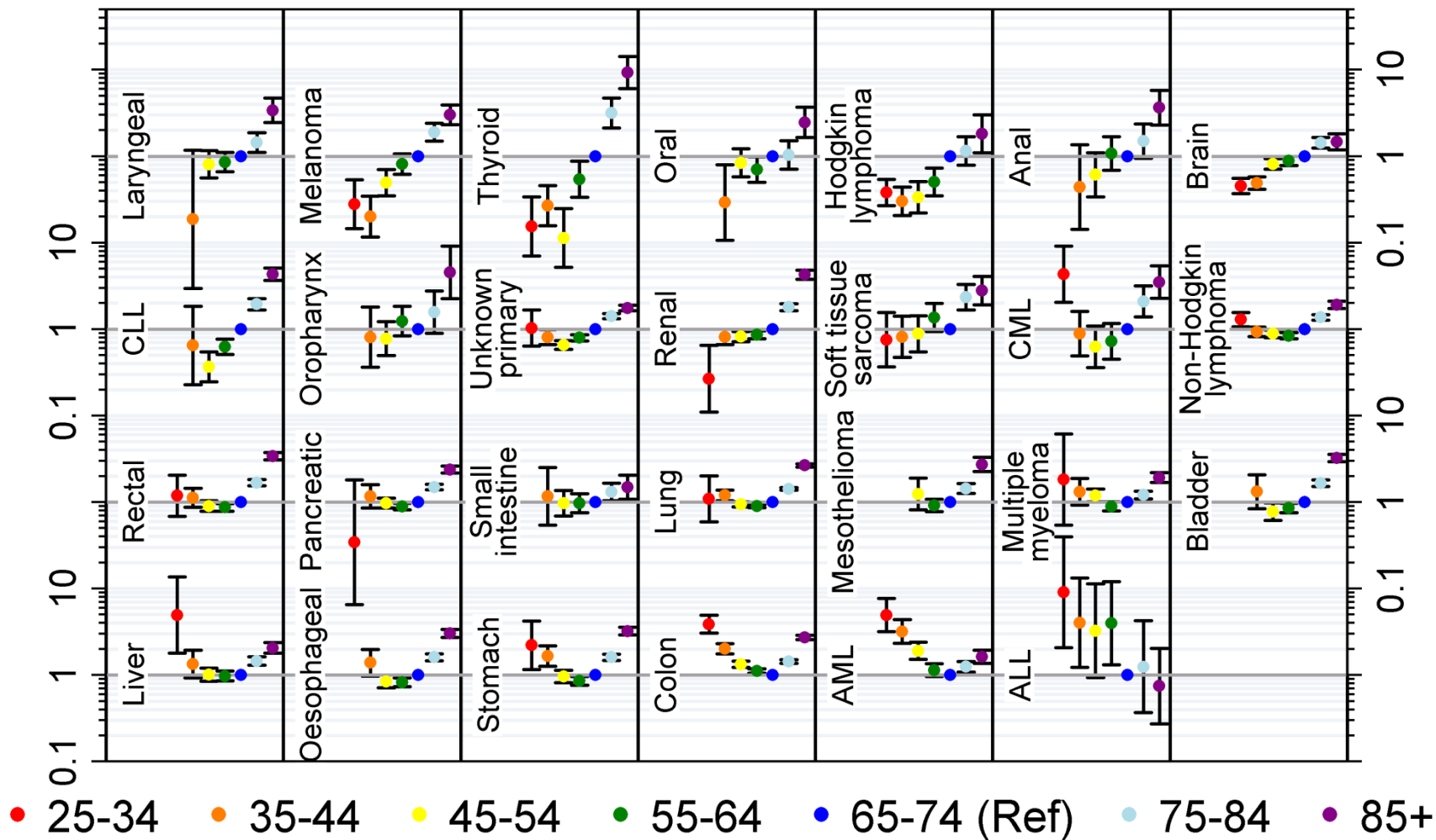
Variation in emergency presentation by **age**



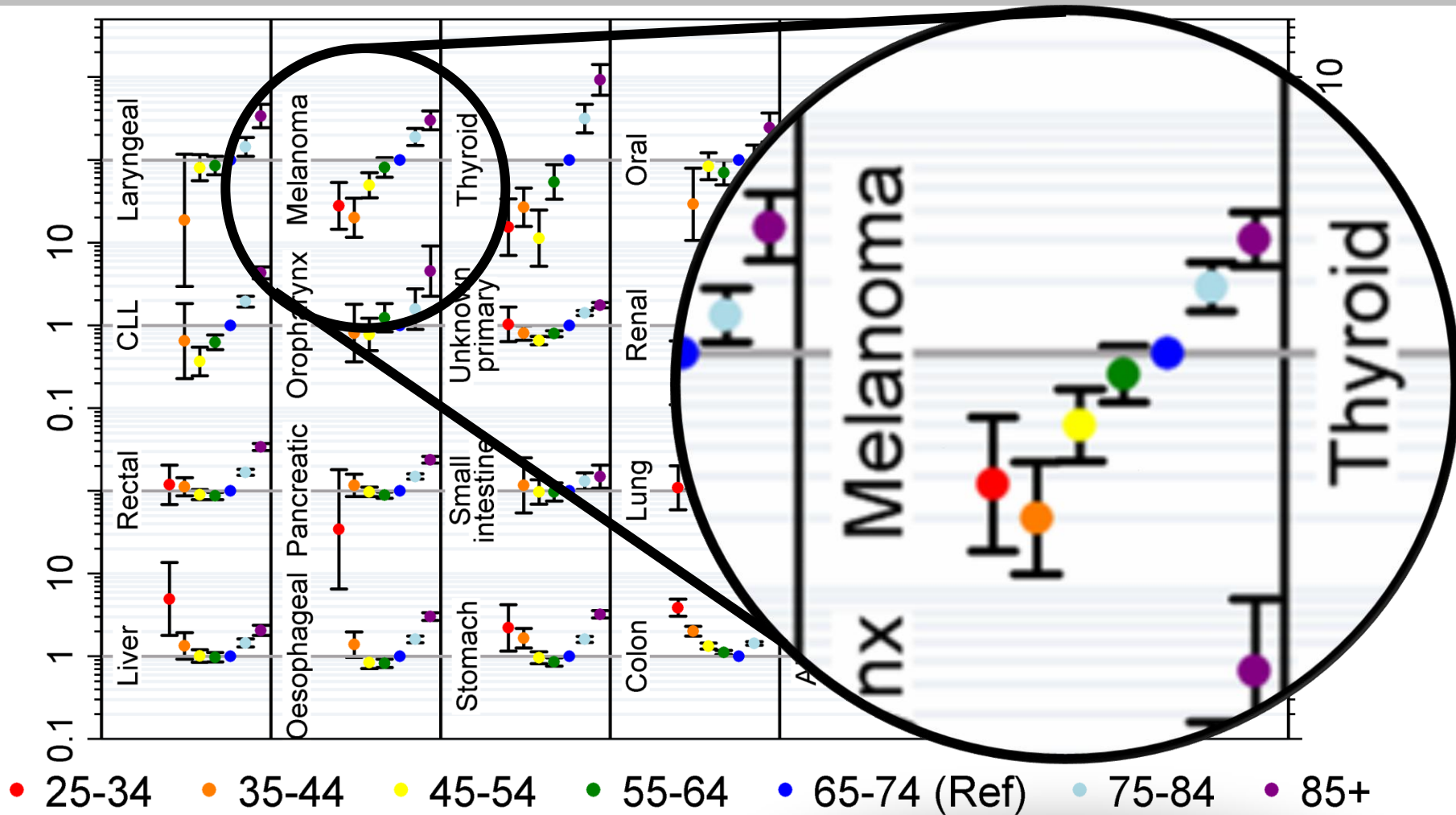
Variation in emergency presentation by **age**



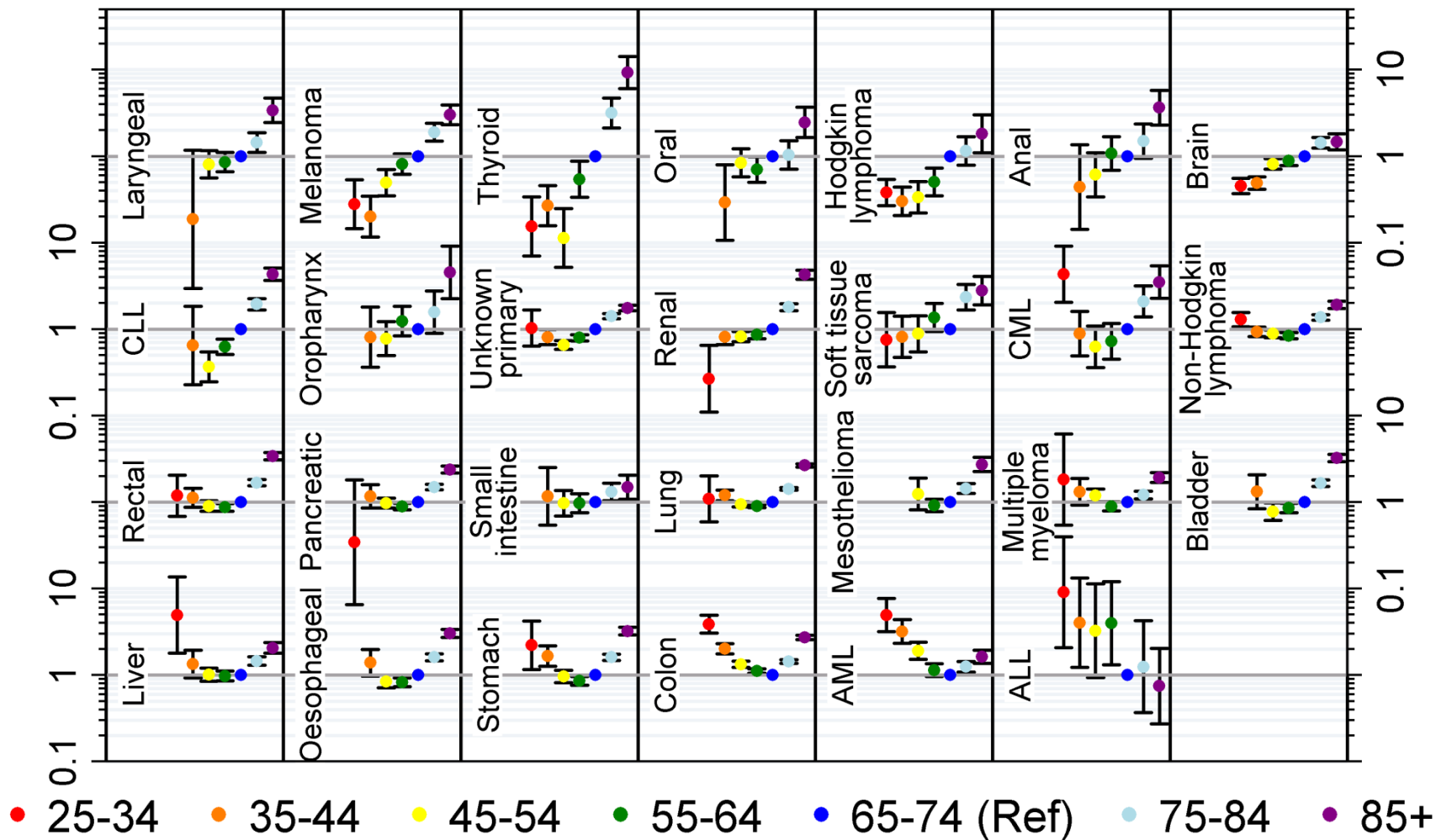
Variation in emergency presentation by **age**



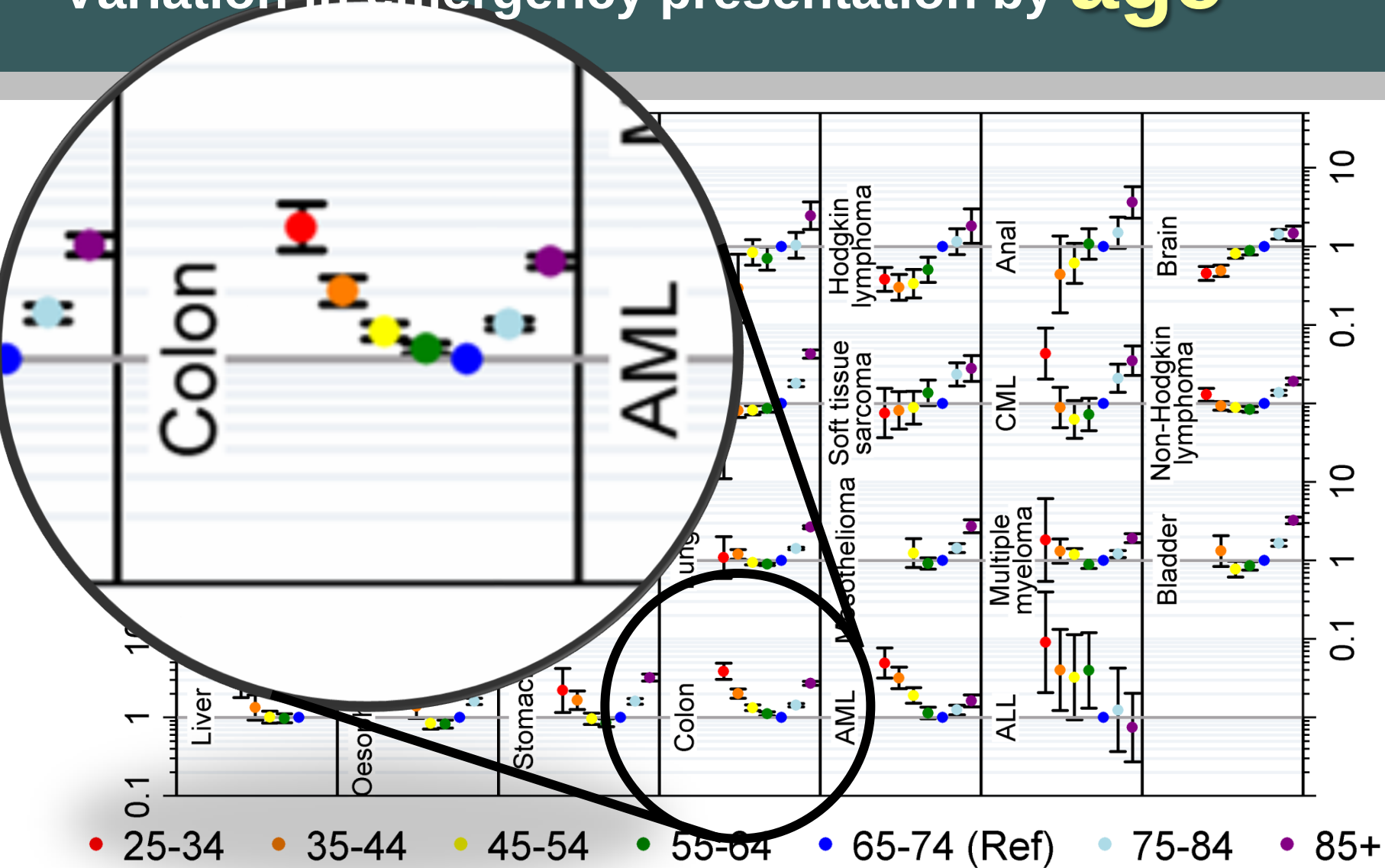
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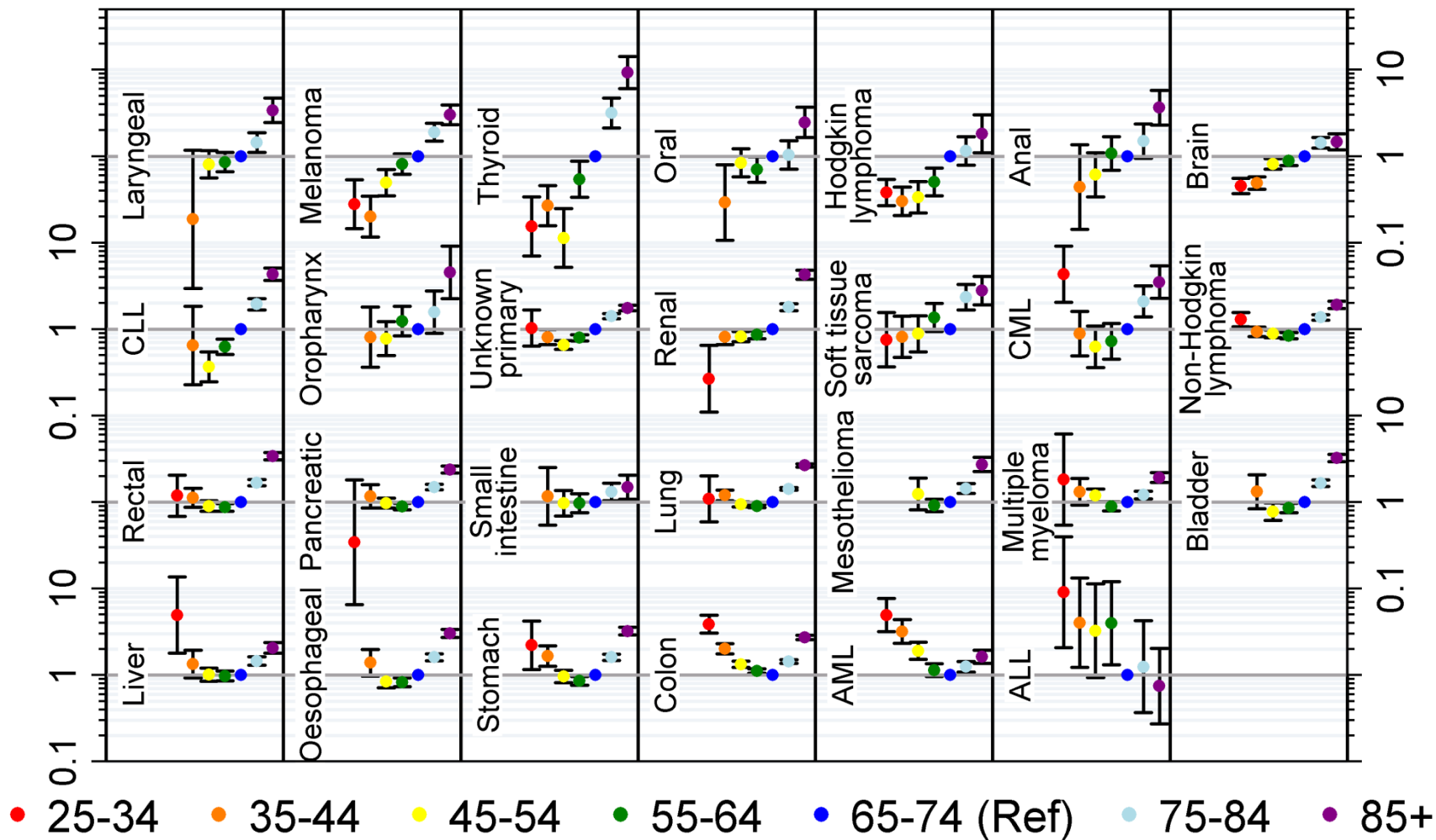
Variation in emergency presentation by **age**



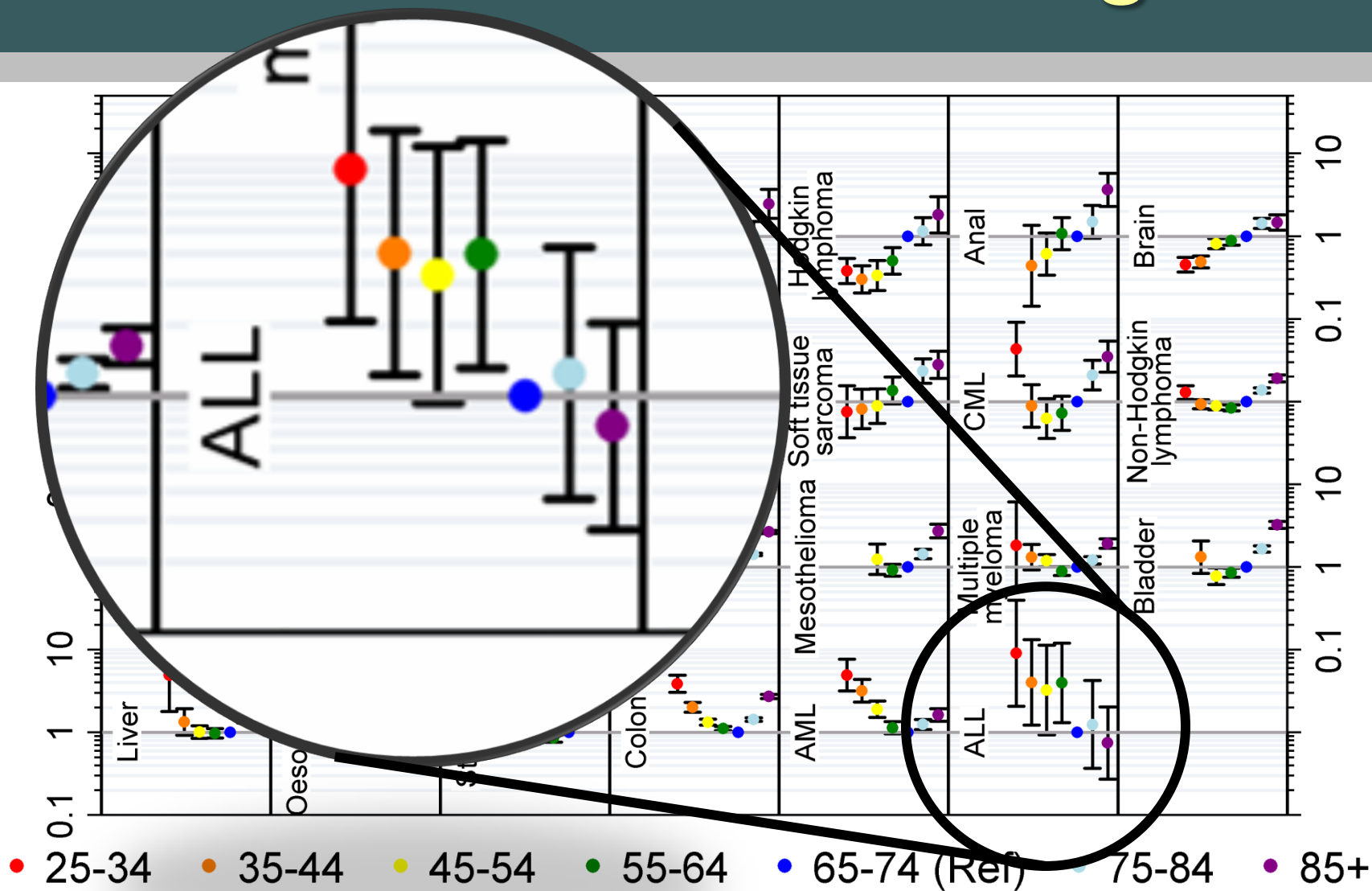
Variation in emergency presentation by **age**



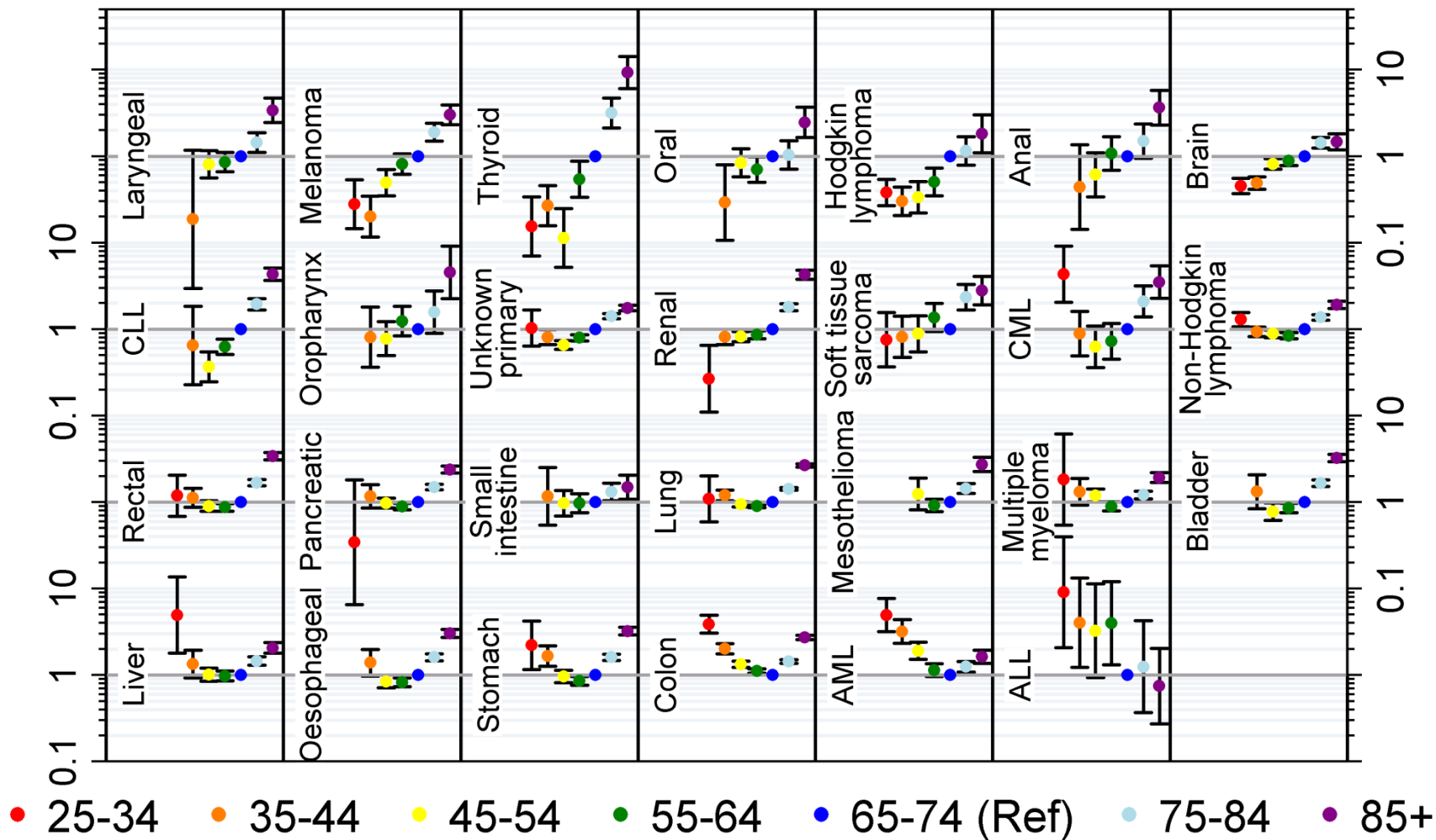
Variation in emergency presentation by **age**



Variation in emergency presentation by **age**



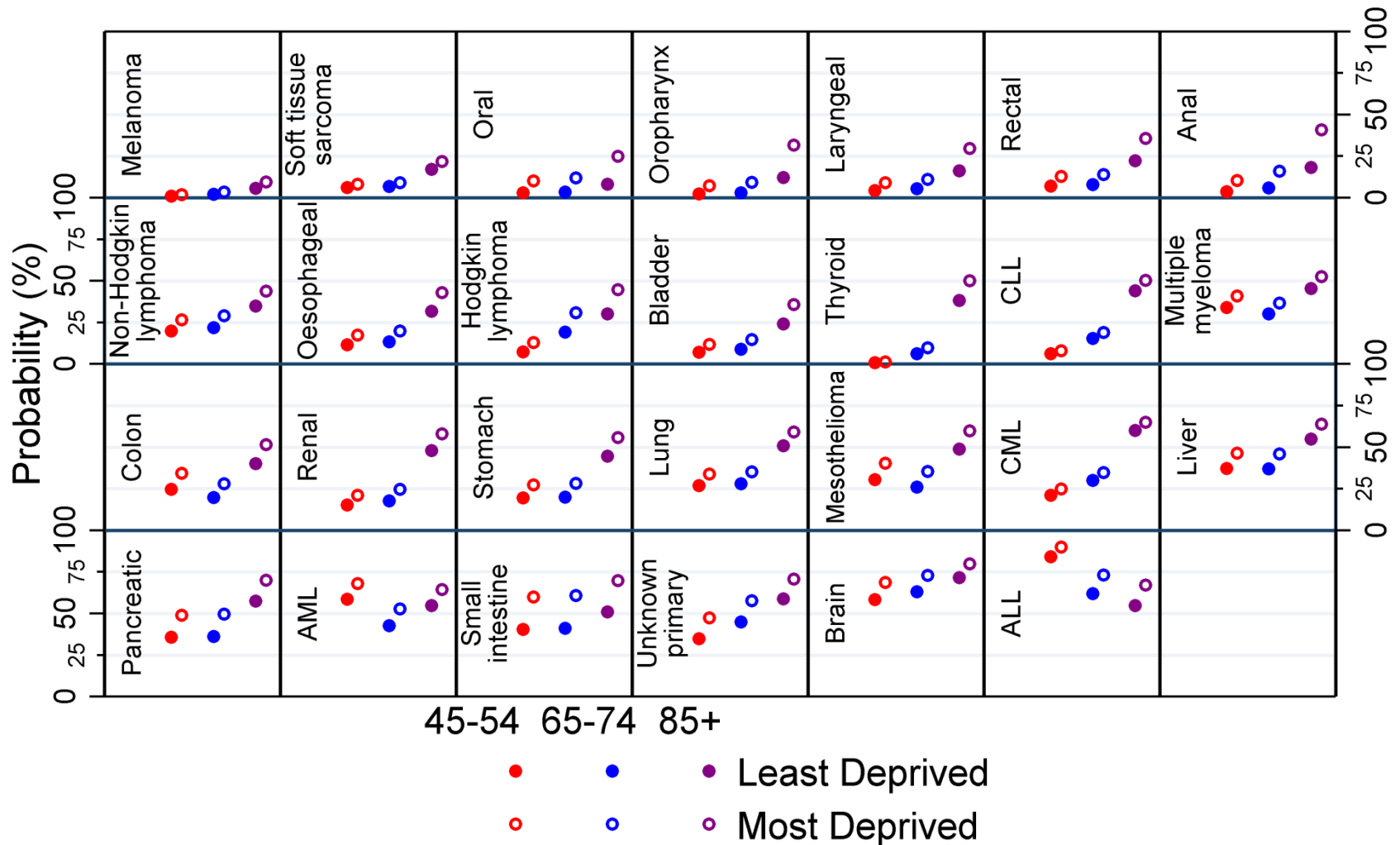
Variation in emergency presentation by **age**



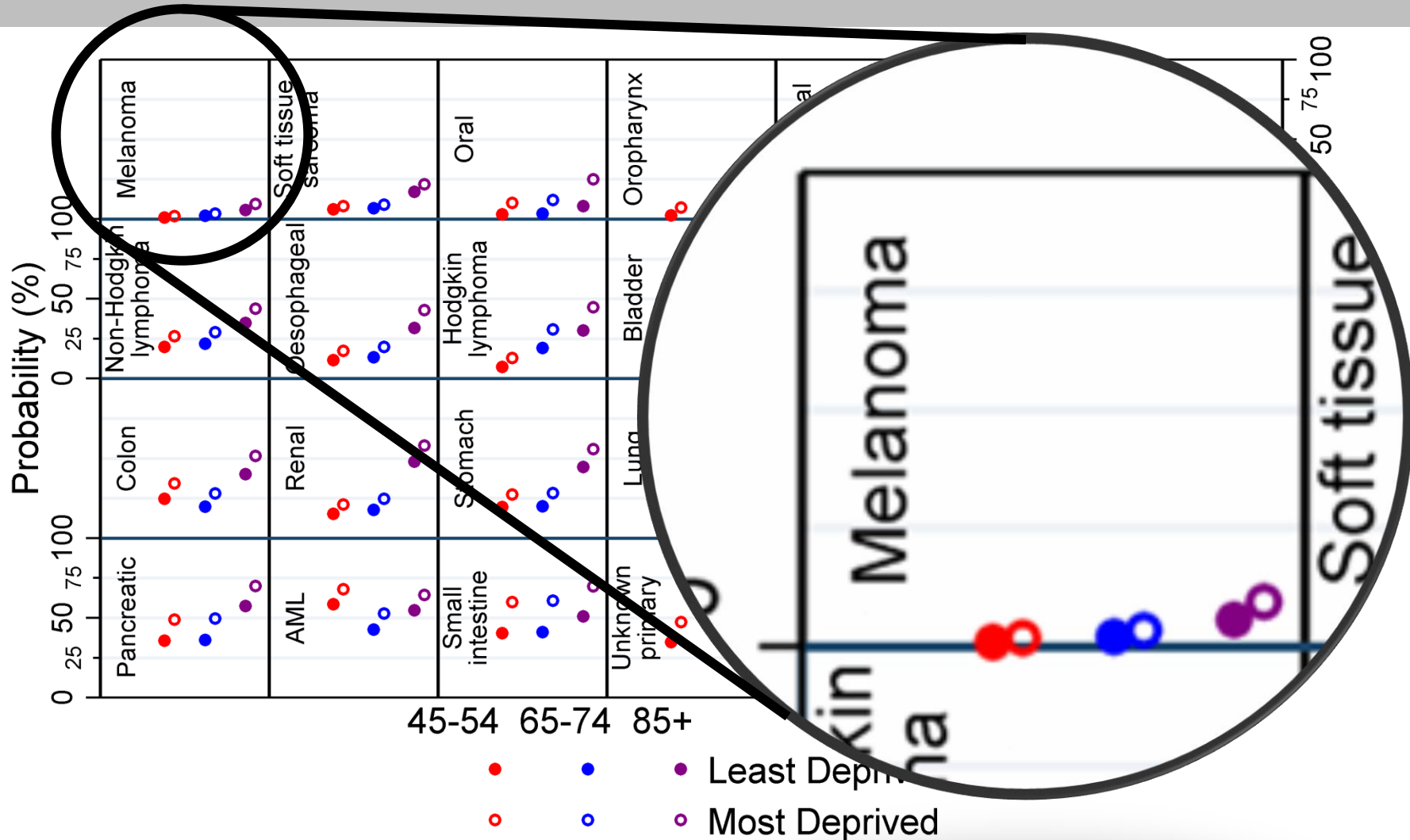
How important is socio-demographic variation?

- On average variation by cancer site is far bigger than variation by socio-demographics
 - Is the variation we have considered important?
 - Or is it just minor adjustments?
- We must remember that average variation hides big differences between cancer sites
- Answer this by considering predicted probabilities of emergency presentation for men in
 - 3 age groups
 - 2 deprivation groups

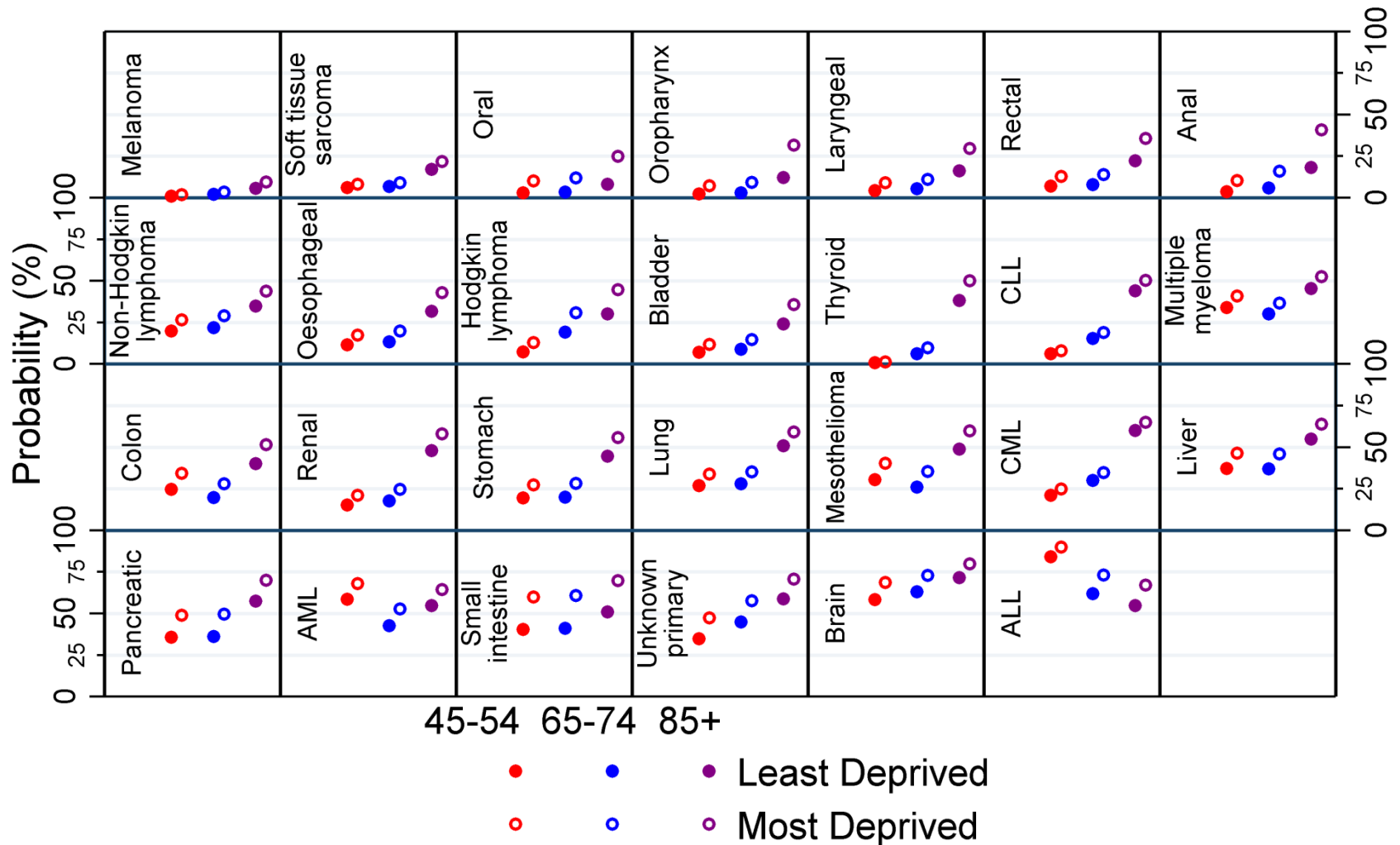
Probability of emergency presentation

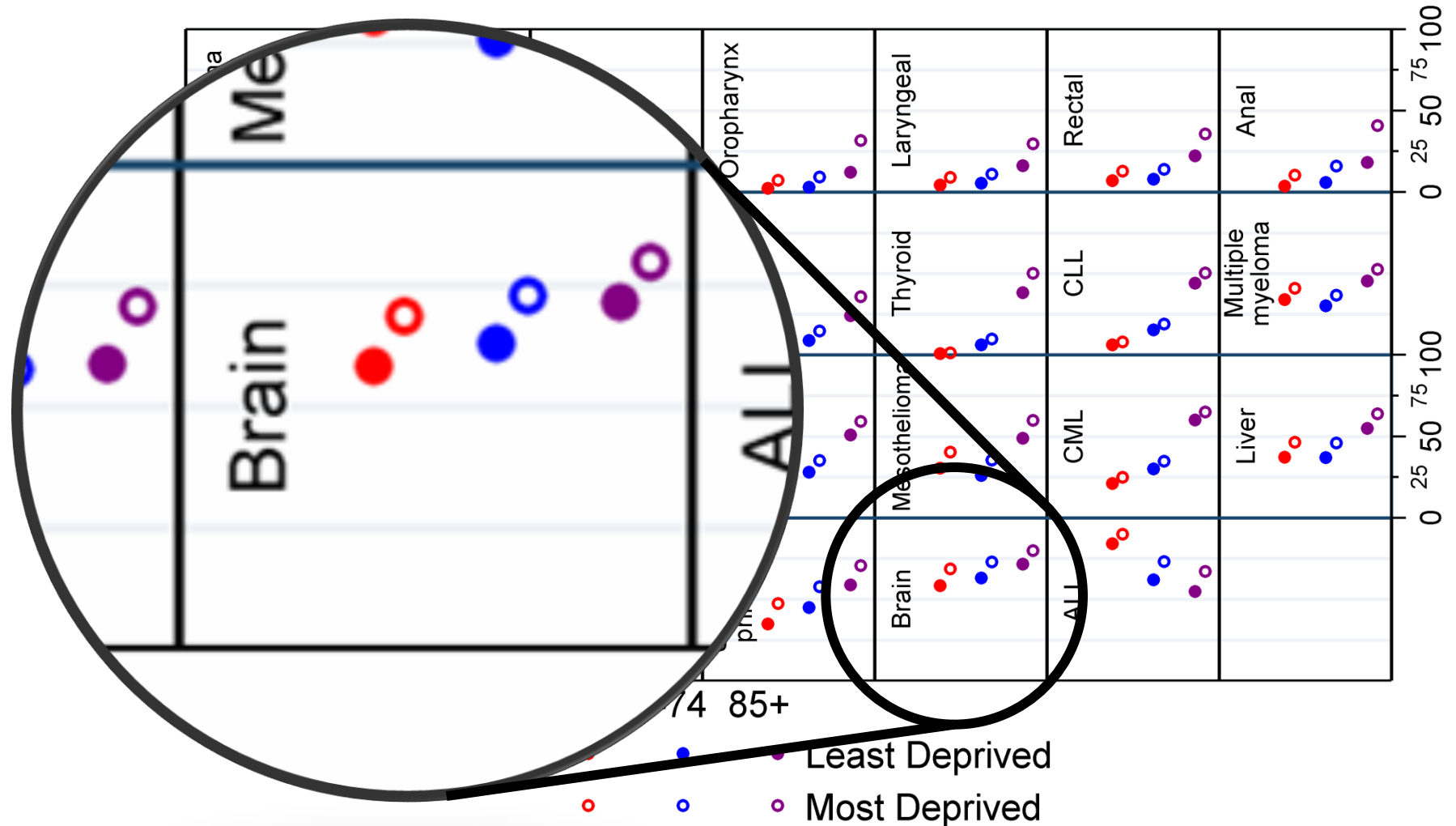


Probability of emergency presentation

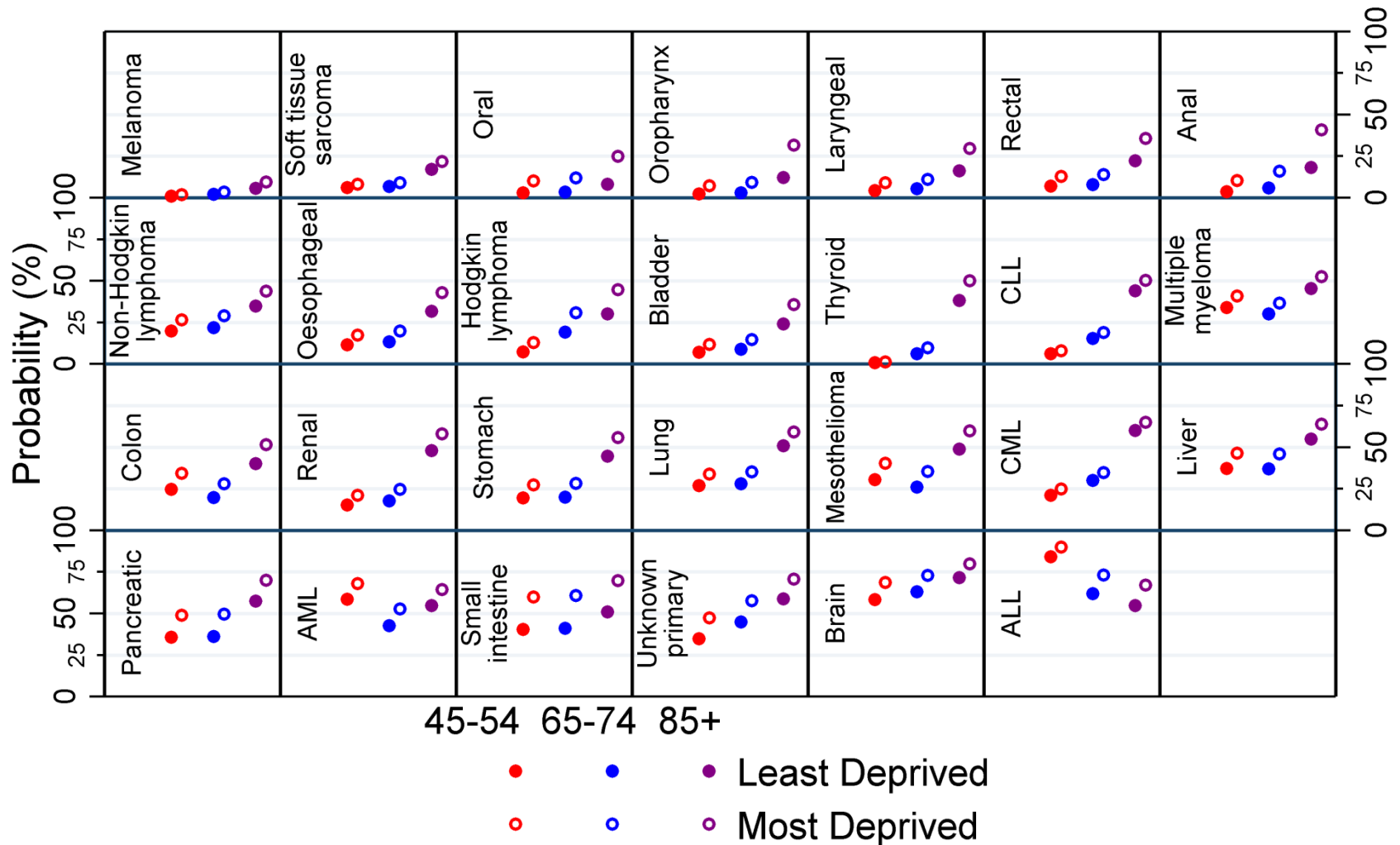


Probability of emergency presentation

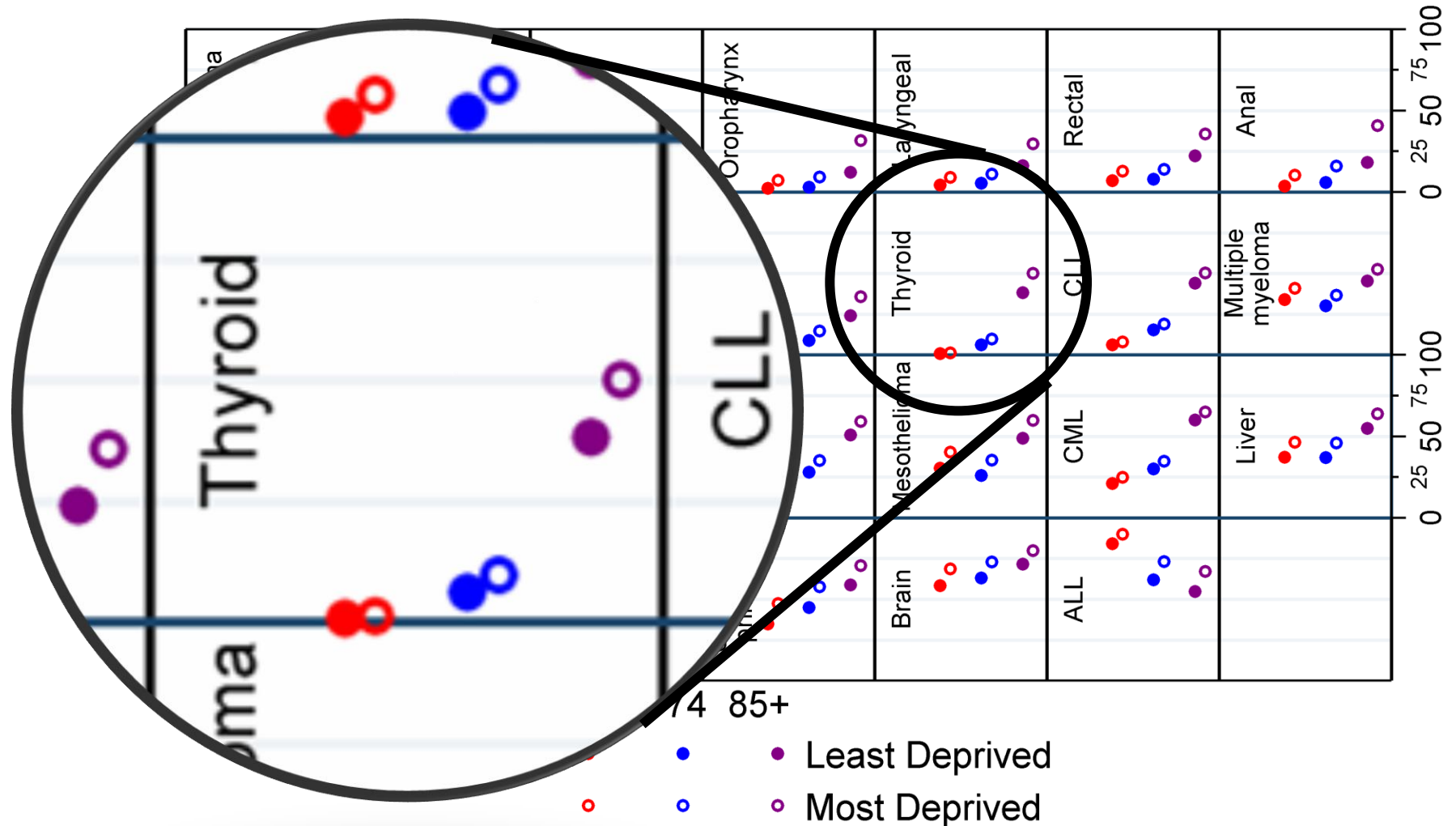




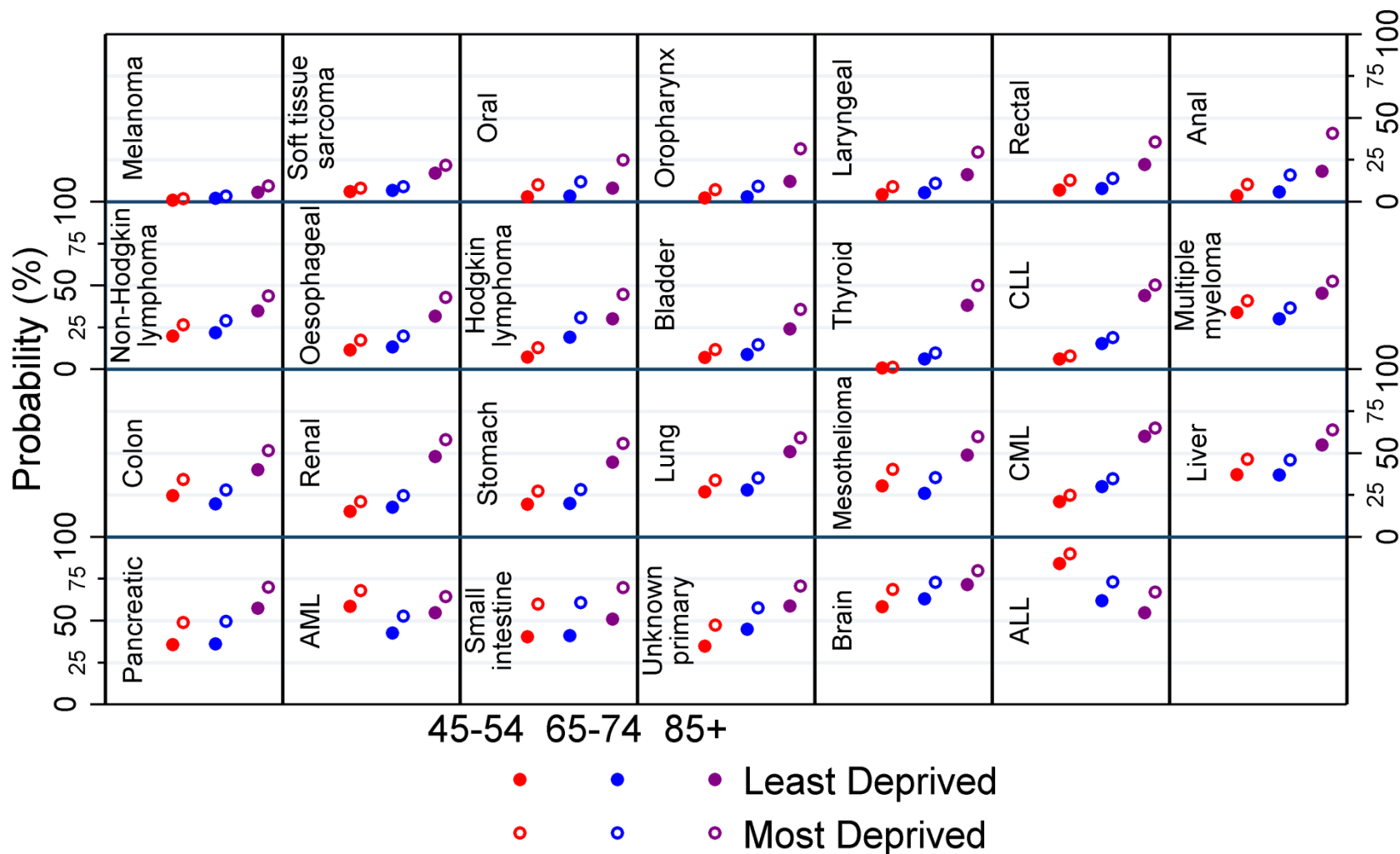
Probability of emergency presentation



Probability of emergency presentation



Probability of emergency presentation



What do all these patterns mean?

Did the patient seek medical help promptly? [†]	Was the patient a 'first presenter'? [‡]	
	Yes	No
	Yes Biological factors (leading to a dramatic clinical presentation with minimal or no prior symptoms) Emergency presentation unavoidable	Atypical symptoms (making suspecting of diagnosis of cancer challenging) Deficient investigation strategy (e.g., wrong or untimely testing, false-negative findings or true-positive findings overlooked) Medical error Emergency presentation potentially avoidable[§]
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A proposed taxonomy to motivate study design and support service improvement

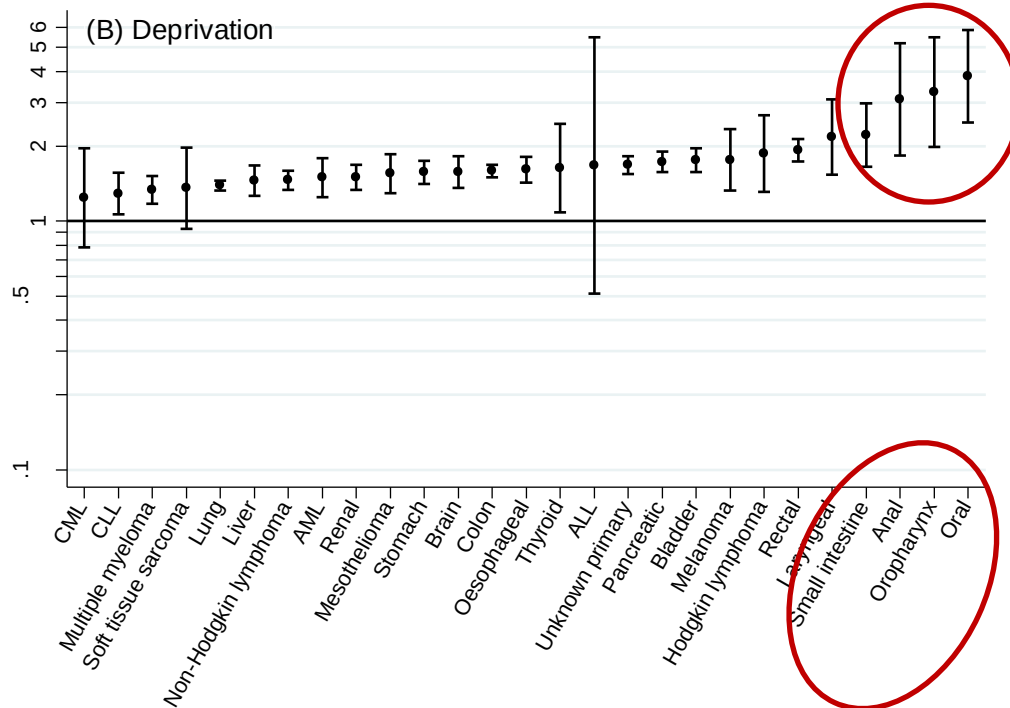
(Lyratzopoulos, Saunders, Abel, *Future Oncology* 2014)

Consider again:

- Biological / tumour factors
- Patient behaviour
- Healthcare factors

Is it really possible that all the cancer-specific variation reflects tumour biology?

Variation in emergency presentation by deprivation



No evidence for substantive SES differences in symptoms

Higher risk of emergency presentation for deprived patients with oral and anal/small intestine cancer betrays psychosocial factors

Socio-economically patterned

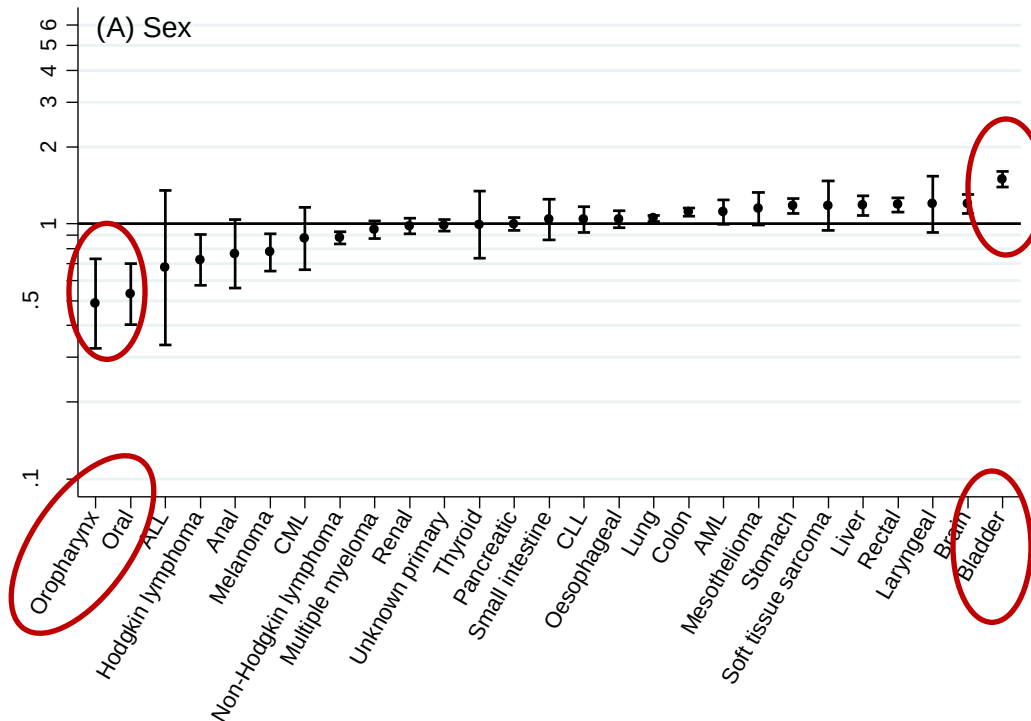
- awareness
- 'normalisation' process *specifically* for those cancers

Variation in emergency presentation by **sex**

No evidence for substantive sex differences in symptoms (80% haematuria either sex)

Higher risk of emergency presentation for women with bladder cancer may betray 'diagnostic difficulty' in the presence of lower PPV of haematuria in women

Well described higher risk of prolonged intervals to Dx for women with bladder cancer



- Lyratzopoulos, Abel, McPhail, Neal, Rubin, BMJ Open 2013
- Global literature X many papers – not a 'UK / GP' problem

Nonetheless

- Highly complex picture requiring input from
 - Behavioural scientists
 - Clinicians (primary care & oncology)

Conclusion

- Routes to Diagnosis project provides a wealth of evidence regarding the stratified risk of emergency presentation
- Substantial variation in the age, sex and deprivation differences between cancers – unlikely to fully reflect tumour factors, particularly for deprivation
- Understanding stratified risk of emergency presentation may help to identify underlying mechanisms and target further research
- May be useful for targeting and developing interventions to reduce emergency presentations
- [Bearing in mind the good news that emergency presentations may be going down overall – beyond 2010]



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