Are tumor budding and tumor grade the same (equivalent) in colorectal cancer?

Prof. Inti Zlobec
Translational Research Unit
Institute of Pathology
University of Bern

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Definition of tumor grade?

> 1920s: Broders «undifferentiated cancer cells at the invasive areas of the lip»

> 1932: Dukes «ignore these cells» in rectal cancer

> 1939: Grinnel infiltrating margins have lots of these undifferentiated cells

...  

> 1987/1988:  
  — Jass – tumor margin is prognostic and grade should be based on the WORST pattern  
  — Halvorsen and Seim – suggested well, moderate, poor, grade should be based on PREDOMINANT pattern

Tumor grade (WHO 2010)

G1 (>95% glandular formation)  G2 (50-95% glandular formation)  G3 (<50% glandular formation)
Tumor budding (ITBCC)

BD1 (0-4 buds/0.785 mm²)  BD2 (5-9 buds/0.785 mm²)  BD3 (10 pr more buds/0.785 mm²)

Lugli et al, Mod Pathol 2017- ITBCC recommendation
Aim

To determine the correlation of tumor grade and tumor budding in colorectal cancer and their impact on outcome
Materials and Methods

1090 patients diagnosed at UniBern

- Neoadjuvantly treated

Missing information G and BD

771 patients

Analysis of tumor grade & tumor budding with clinicopathological features

Missing information on OS and DFS

443 patients

Analysis of OS and DFS
Tumor grade and tumor budding are correlated but…

- 771 patients
- 72.6% are G2
- Highly correlated \((p<0.0001)\)
- Percent-concordance: 33.8%
## Association with clinicopathological features

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<th>Tumor Grade, G</th>
<th>Tumor Budding, BD</th>
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Association of tumor grade with OS and DFS

- **OS**
  - G1
  - G2
  - G3
  - $p=0.3151$

- **DFS**
  - G1
  - G2
  - G3
  - $p=0.2542$
Association of tumor budding with OS and DFS

$$p = 0.0286$$

$$p = 0.001$$
Discussion

- Both features reflect more aggressive cancers
- They contribute different information
- Reflect different processes (de-differentiation vs EMT)
  — Shown in DFS differences and certain associations
- More (tumor grade) or (less) subjective parameters
  — Actual No. tumor buds vs estimated % glandular formation
  — Interobserver variability is better (tumor budding) or worse (tumor grade)
- Both should still be reported

Meyer et al, Hum Pathol 2019
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