

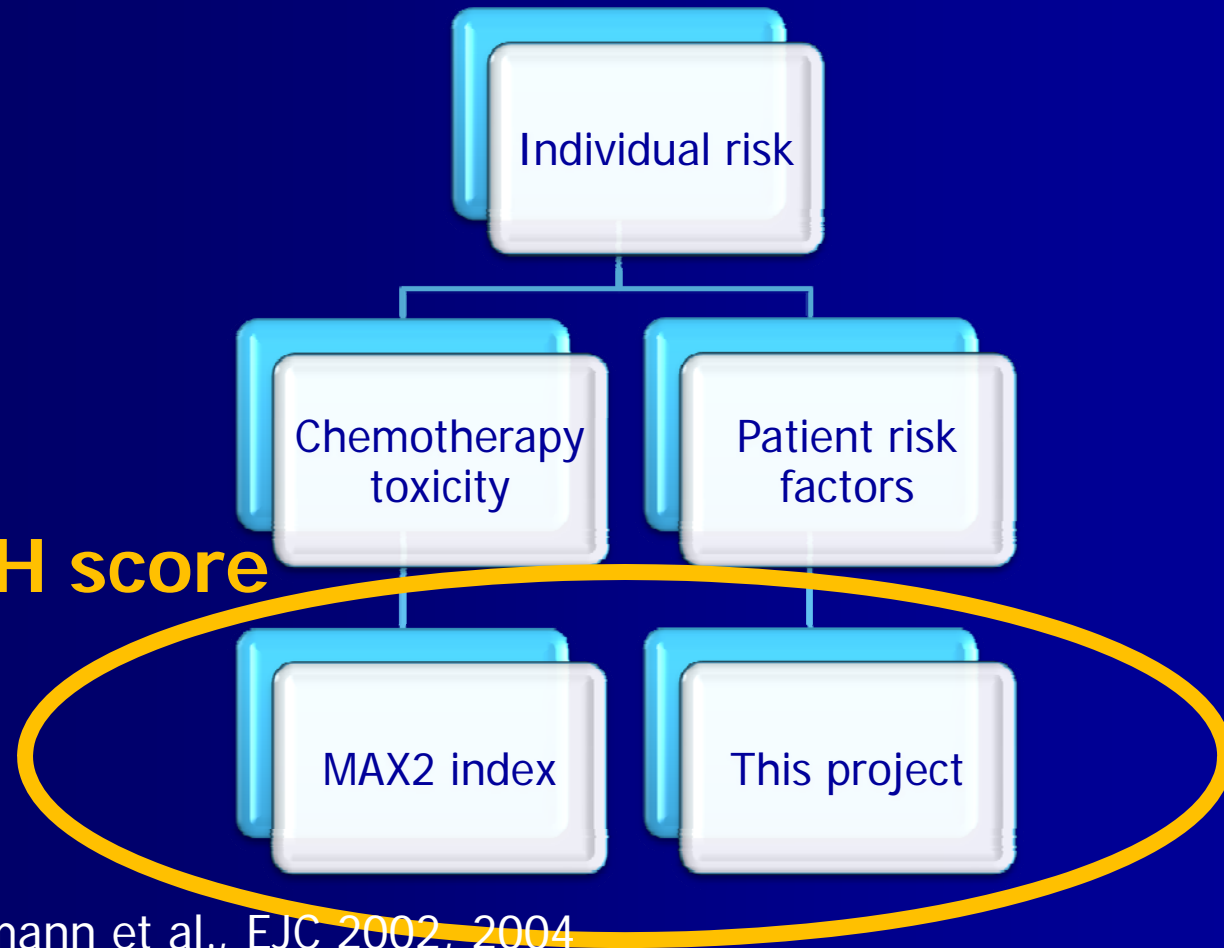
The CRASH score (Chemotherapy Risk Assessment Scale for High- Age Patients): Design and Validation

Martine Extermann, Ivette Boler, Richard Reich, Gary Lyman, Richard Brown, Joseph DeFelice, Richard Levine, Eric Lubiner, Pablo Reyes, Frederic Schreiber.
Moffitt Cancer Center, Tampa, FL, Duke University, Durham, NC, Moffitt Research Network, FL.

This study was supported by Grant ACS-RSG-03-151-01-CCE



Project framework



Extermann et al., EJC 2002, 2004

The MAX2 index

Most frequent G4 hem. tox + most frequent G3+4 non-hem. tox
2

Example

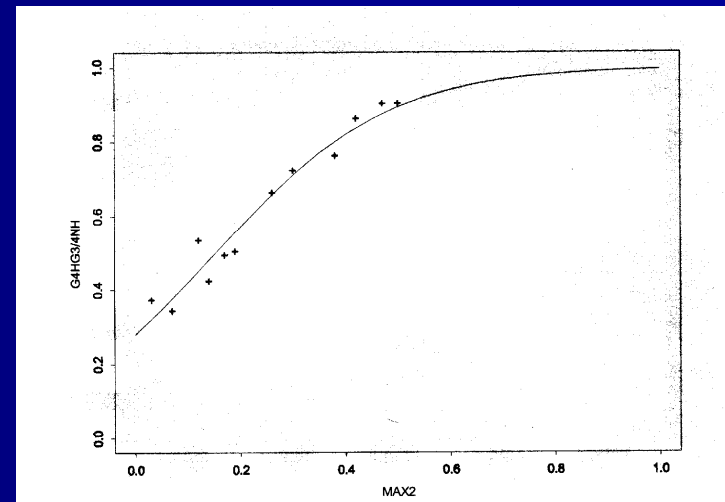
25% grade 4 neutropenia
13% grade 3+4 diarrhea



$$\text{MAX2} = \frac{0.25 + 0.13}{2} = 0.19$$

Validation

4 ECOG trials
12 treatment arms
2526 patients



Extermann et al., EJC 2002, 2004

Methods

- Prospective multicentric study
- Prospective evaluation of toxicity
- Weekly CBC
- Regimen free, but published
- Management free
- 24 potential predictors
- G4H or G3-4 NH toxicity (CTCAE 3.0)

Results: Profile

- 585 eligible, 518 evaluable patients
- 337 Moffitt, 181 affiliates. Very similar baseline characteristics.
- Median age 76 (70-92)
- 23 tumor types
- 121 chemotherapy regimens (!)

End-points

- G4H 32%
- G3-4NH 56%
- Combined 64%
- Median time to 1st toxicity: 22 days
- Interquartile: 9-51 days

Global chemotoxicity prediction

- Hemoglobin and CrCl associated
- All models had poor fit (Nagelke $R^2 < 0.05$)
- From parallel work, increasing impression that G4H & G3-4NH have different predictors.
- We assessed a two subscores approach

Univariate predictors*

- **Heme**
- Diastolic blood pressure
- LDH
- IADL
- AST
- Lymphocytes
- **Non-heme**
- ECOG PS
- Hemoglobin
- Creatinine Clearance
- Albumin
- MMS
- Self-rated health
- MNA

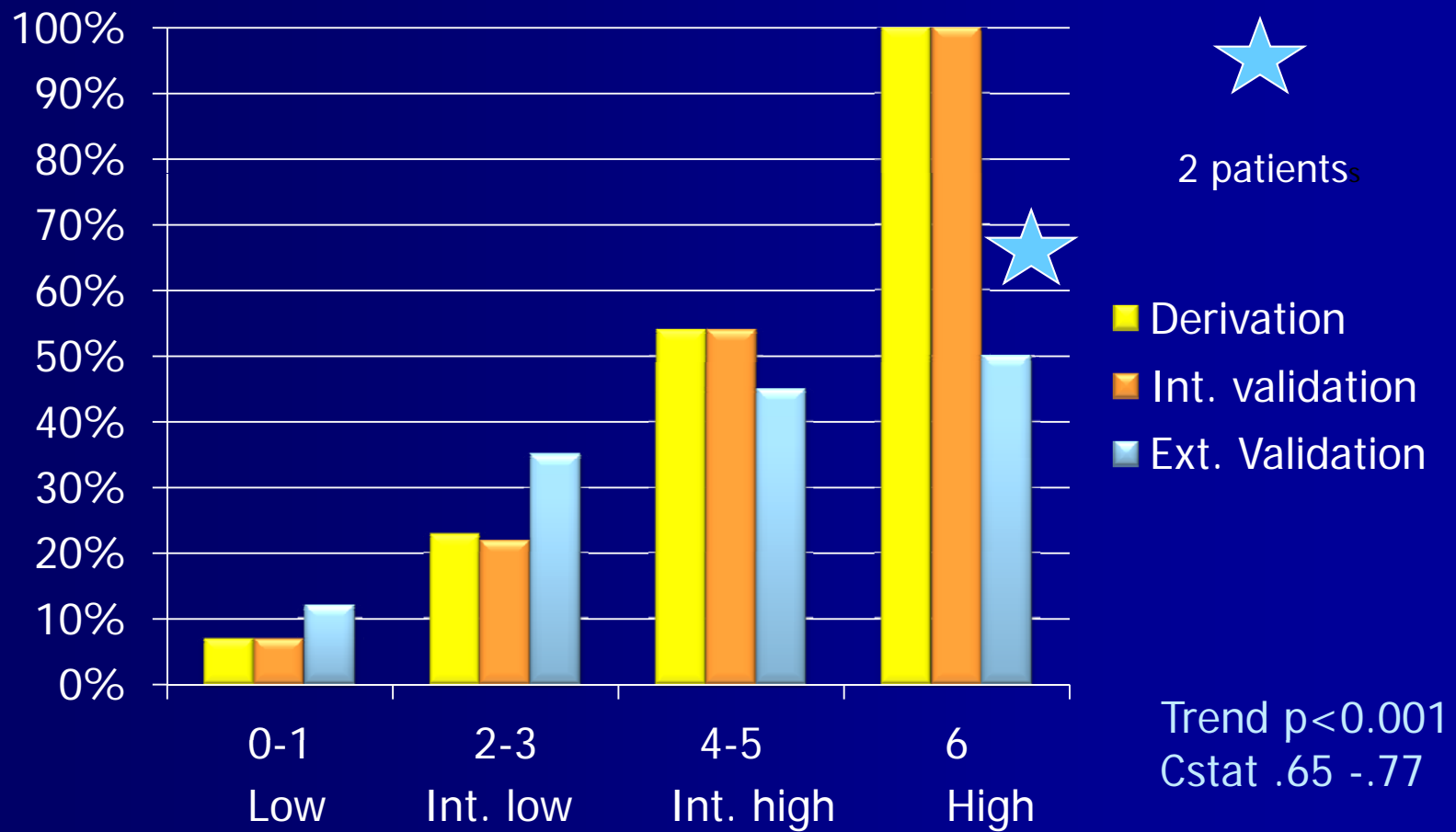
*adjusted for chemotox

Heme model

Item	0	1	2 points
DBP	≤ 72	> 72	
IADL	26-29	10-25	
LDH*	0-459		> 459
Chemotox	0-0.44	0.45-0.57	> 0.57

*ULN = 618

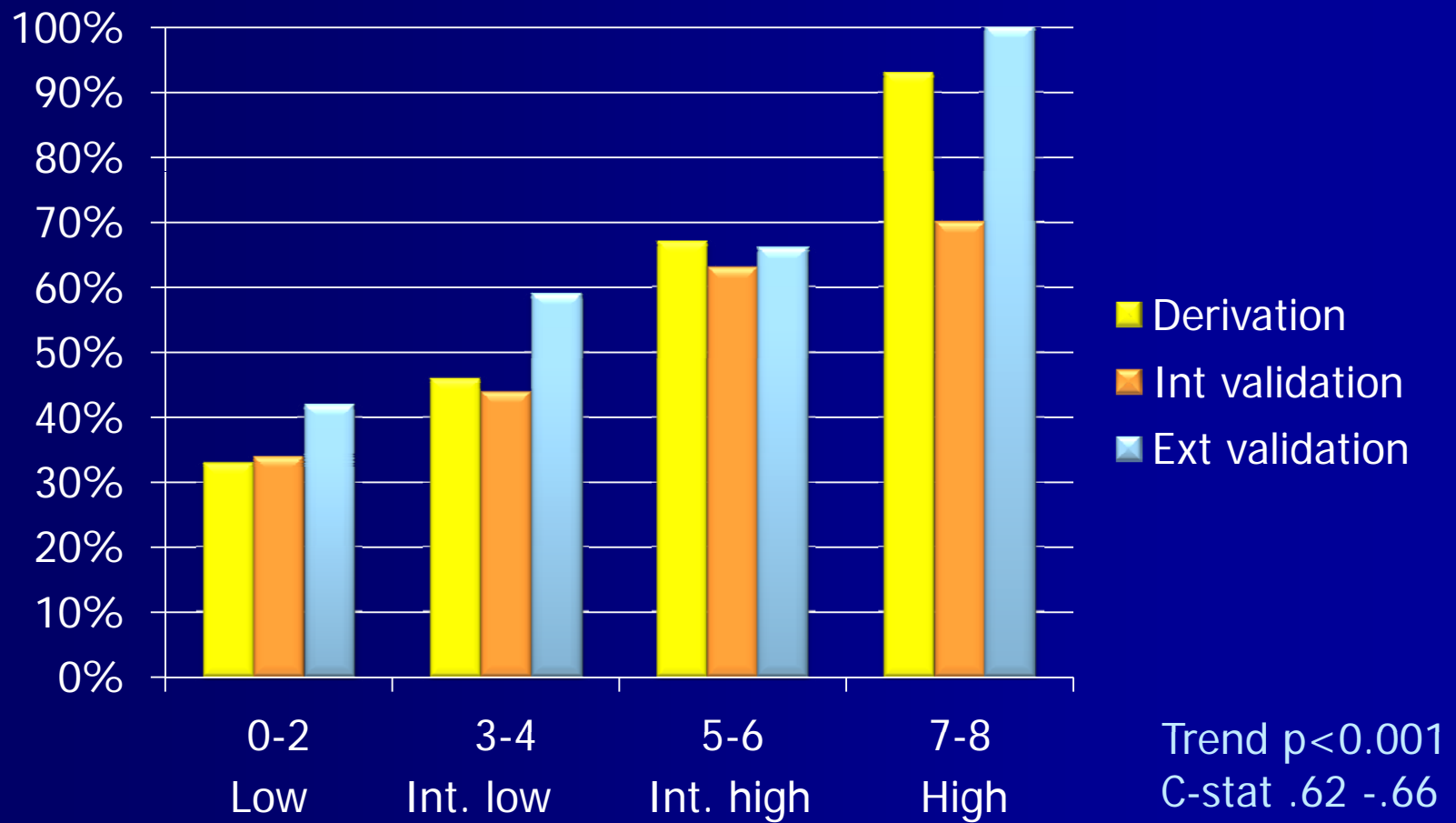
Heme model



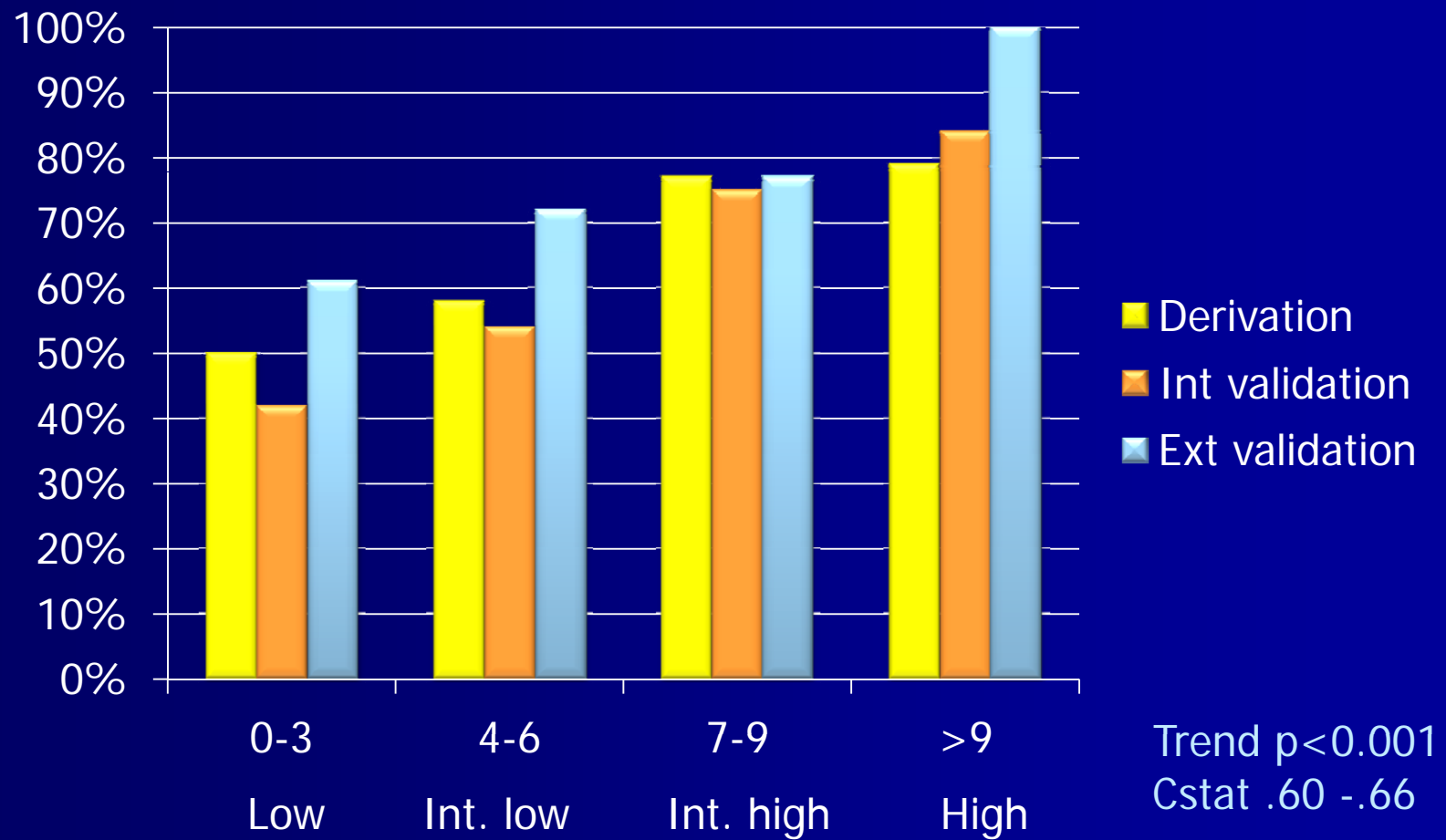
Non-heme model

Item	0	1	2 points
ECOG PS	0	1-2	3-4
MMS	30		<30
MNA	28-30		<28
Chemotox	0-0.44	0.45-0.57	>0.57

Non-heme model



Combined model



Conclusions I

- Validated model
- The split model is better than the unified model
- Geriatric instruments are helpful in oncology
- Splits are high on the geriatric instruments, so key impairments might be captured by shorter screens

Conclusions II

- Formal validation should be done for patients under 70.
- A global approach is sound given the striking number of chemo regimens we give to older cancer patients.
- **Rating package available:**
- www.moffitt.org/saoptools
- **In press: Cancer 2011**