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Enlighten – Research publications by members of the University of Glasgow <u>http://eprints.gla.ac.uk</u> 1 Comparison of the prognostic value of ECOG-PS, mGPS and BMI/WL: Implications

2 for a clinically important framework in the assessment and treatment of advanced

3 cancer

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- 21 Short Title: Prognostication of ECOG-PS/mGPS & BMI/WL in cancer
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- 23 composition, ECOG, physical function testing, computed tomography.
- 24 **Conflicts of Interest:** The authors declare no potential conflicts of interest
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27 Abstract:

Background and Aims: The systemic inflammatory response is associated with the loss of lean tissue, anorexia, weakness, fatigue and reduced survival in patients with advanced cancer and therefore is important in the definition of cancer cachexia. The aim of the present study was to carry out a direct comparison of the prognostic value of Eastern Cooperative Oncology Group Performance Status (ECOG-PS), modified Glasgow Prognostic Score (mGPS) and Body Mass Index/Weight Loss Grade (BMI/WL grade) in patients with advanced cancer.

35 Method: All data were collected prospectively across 18 sites in the UK and Ireland.
36 Patient's age, sex, ECOG-PS, mGPS and BMI/WL grade were recorded, as were details of
37 underlying disease including metastases. Survival data were analysed using univariate and
38 multivariate Cox regression.

Results: A total of 730 patients were assessed. The majority of patients were male (53%), over 65 years of age (56%), had an ECOG-PS>0/1 (56%), mGPS≥1 (56%), BMI≥25 (51%),
<2.5% weight loss (57%) and had metastatic disease (86%). On multivariate cox regression analysis ECOG-PS (HR 1.61 95%CI 1.42-1.83, p<0.001), mGPS (HR 1.53, 95%CI 1.39-1.69, p<0.001) and BMI/WL grade (HR 1.41, 95%CI 1.25-1.60, p<0.001) remained independently associated with overall survival. In patients with a BMI/WL grade 0/1 both ECOG and mGPS remained independently associated with overall survival.</p>

46 Conclusion: The ECOG/mGPS framework may form the basis of risk stratification of
47 survival in patients with advanced cancer.

48

50 Statement of Significance:

This study shows that the ECOG/mGPS framework had prognostic value where BMI/WL was normal. This would suggest that the ECOG/mGPS framework may form the basis of risk stratification of survival and provide diagnostic criteria for cachexia in patients with advanced cancer. Furthermore, it would redirect clinical efforts to treat cachexia.

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57 Introduction

58

The recognition of the poor prognosis associated with the syndrome of cachexia dates back to ancient Greece. These observations remain valid today as in patients with advanced cancer, progressive involuntary loss of body weight and lean tissue, anorexia, weakness and fatigue (cancer cachexia) are associated with poor survival[1]. Despite the clinical recognition of the syndrome of cancer cachexia, performance status remains the most routinely assessed clinical measure on which to base likely patient outcome to treatment and prognosis [2].

There is now consistent evidence that the presence of a systemic inflammatory response, as evidenced by the modified Glasgow Prognostic Score (mGPS) is associated with the loss of lean tissue, anorexia, weakness and fatigue and poor survival in patients with advanced cancer [3, 4]. Moreover, the mGPS, in combination with ECOG-PS, has been shown to effectively stratify the above measures of cachexia [2, 5].

As a direct extension of the consensus statement of Fearon and coworkers, Martin and colleagues (2015), in a large cohort study of more than 8,000 patients with advanced cancer proposed that cachexia should be graded according to the concurrent Body Mass Index (BMI) and the degree of weight loss (WL) [6]. They showed that the BMI/WL grade had independent prognostic value and effectively stratified survival. More recently, this grading system has been reported to be associated with quality of life [7].

Therefore, while ECOG-PS, mGPS and BMI/WL grade are all associated with symptom burden and have valid prognostic value, to date, there has been no direct comparison of their prognostic value in patients with advanced cancer. Such a comparison may inform clinical practice as to which factors are associated with reduced survival and in turn inform the assessment and treatment of cancer cachexia. Therefore, the aim of the present study was to

- 81 compare the prognostic value of ECOG-PS, mGPS and BMI/WL in a prospective cohort of
- 82 patients with advanced cancer.

Patients: 85

An international database of patients with advanced cancer was analysed. All data were 86 collected prospectively across 18 sites in the UK and Ireland (cancer centres, hospitals, and 87 specialist palliative care units) over a five-year period (2011-2016). Eligible patients met the 88 following criteria: >18 years of age; advanced cancer (defined as metastatic cancer 89 [histological, cytological or radiological evidence], locally advanced or receiving anti-cancer 90 91 therapy with palliative intent); able to complete study questionnaires; provide a venous blood 92 sample and with a recorded ECOG-PS. Patients were excluded if they had breast or prostate 93 carcinoma with only bone metastases as their survival times could be many years and 94 therefore an argument could be made that they did not in fact have advanced cancer. Patients 95 who were undergoing active anti-cancer therapy or not, on both an inpatient and outpatient basis were included. The study had ethics committee approval in both the UK and Ireland 96 (UK-12/SS/0181 and Ireland EMC 4(g) 2015) and was conducted in accordance with the 97 Declaration of Helsinki. All patients provided written informed consent. The study adhered to 98 99 the STROBE guidelines for cohort studies.

Individual centres were opened at staggered time points. Within each centre, patients 100 who fulfilled the eligibility criteria were invited to participate and consented on a sequential 101 basis therefore reducing selection bias (Table 1). All assessments, including blood sampling, 102 were performed on the day of consent." 103

Prognostic markers 104

Clinicopathological data including the patient's age, sex, ECOG-PS, mGPS, BMI/WL 105 grade, underlying primary disease, and the presence of metastasis were recorded [2, 7, 8]. 106

107 **Bio-markers:** C-reactive protein (CRP) and albumin combined in the mGPS. An 108 autoanalyzer was used to measure serum CRP (mg/L) and albumin (g/L) concentrations 109 (Architect; Abbot Diagnostics, Maidenhead, UK). The mGPS and BMI/WL grade was 110 derived as previously described.[7, 9]

111 Statistical analysis:

Categorical variables were analysed using χ^2 test for linear-by-linear association, or χ^2 112 test for 2 by 2 tables. Patients were followed prospectively until the date of censoring 113 114 (11/06/2018) or date of death from any cause (if present). Survival time was calculated from the date of recruitment to the date of death or censoring, whichever came first. Three month 115 survival rate was examined since patients who have less than 3 month survival are considered 116 117 to have refractory disease (cachexia) and allowed comparison with other studies [2, 5, 6]. Survival data were analysed using univariate and multivariate Cox regression. In addition to 118 significant variables of interest on univariate analysis the predefined variables age, sex and 119 cancer location were entered into a backward conditional multivariate model. Given the 120 central prognostic role of performance status in patients with advanced cancer and the 121 122 increased integration of oncology and palliative care ECOG-PS was taken as the primary stratification factor[10]. Cox Regression analysis was carried out for ECOG-PS, mGPS and 123 BMI/WL grade to establish proportional Hazard Ratios. 124

Two tailed p values <0.05 were considered statistically significant. Statistical
analysis was performed using SPSS software (Version 21.0. SPSS Inc., Chicago, IL, USA).

128 **Results**

A total of 730 patients (390 males, 340 females) met the eligibility criteria. The 129 clinicopathological characteristics of the study population is shown in Table 2. The majority 130 of patients were over 65 years of age (55.8%), had an ECOG-PS>0/1 (56.0%), mGPS>0 131 (55.5%), BMI/ weight loss grade 0/1 (55%) and had metastatic disease (85.8%). The majority 132 of tumours were gastrointestinal (42.9%) and lung (28.2%) cancers. In those patients with 133 tumours other than these the tumour types included Neurological 7 (1%), Urology 46 (6%), 134 135 Gynaecological 33 (5%), Melanoma 28 (4%), Haematological 26 (4%), Breast 47 (6%), Unknown Primary 10 (1%), Others 14 (2%). The median overall survival (OS) for the entire 136 cohort was 7.3 months (95% CI: 1.0-73.63 months). At the time of censoring, 182 patients 137 138 (39.5%) were still alive. Median follow up time for these patients was 6.6 months (95% CI: 5.8-7.1 months). 139

The relationship between ECOG-PS, mGPS and BMI/WL grade and overall survival
in patients with advanced cancer is shown in Table 3 and Figures 1-3. On multivariate cox
regression analysis ECOG-PS (HR 1.61 95%CI 1.42-1.83, p<0.001), mGPS (HR 1.53,
95%CI 1.39-1.69, p<0.001) and BMI/WL grade (HR 1.41, 95%CI 1.25-1.60, p<0.001)
remained independently associated with overall survival.

In patients with an ECOG-PS 0/1 the relationship between mGPS and BMI/WL grade and overall survival in patients with advanced cancer is shown in Table 3b. On multivariate cox regression analysis mGPS (HR 1.50, 95%CI 1.32-1.72, p<0.001) and BMI/WL Grade (HR 1.29, 95%CI 1.06-1.56, p=0.009) remained independently associated with overall survival. In patients with an ECOG-PS 2 the relationship between mGPS and BMI/WL grade and overall survival in patients with advanced cancer is shown in Table 3c. On multivariate cox regression analysis mGPS (HR 1.56, 95%CI 1.32-1.86, p<0.001) and BMI/WL Grade (HR 1.46, 95%CI 1.19-1.80, p<0.001) remained independently associated with overall survival.

In patients with an ECOG-PS 3/4 the relationship between mGPS and BMI/WL grade and overall survival in patients with advanced cancer is shown in Table 3d. On multivariate cox regression analysis mGPS (HR 1.55, 95%CI 1.12-2.15, p=0.009) and BMI/WL grade (HR 1.53, 95%CI 1.11-2.12, p=0.010) remained independently associated with overall survival.

The relationship between ECOG-PS, mGPS and 3-month survival is shown in Table 4. In patients with an ECOG-PS of 0/1 there was a significant association between mGPS and 3-months survival (p<0.001). In patients with an ECOG-PS of 2 there was a significant association between mGPS and 3-months survival (p<0.001). In patients with an ECOG-PS of 3/4 there was a non-significant association between mGPS and 3-months survival (p=0.102). In patients with an ECOG-PS of 0-4 there was a significant association between mGPS and 3-months survival (p<0.001).

In patients with an mGPS of 0 there was a significant association between ECOG-PS and 3-months survival (p<0.001). In patients with an mGPS of 1 there was a significant association between ECOG-PS and 3-months survival (p=0.021). In patients with an mGPS of 2 there was a significant association between ECOG-PS and 3-months survival (p<0.001). In patients with an mGPS of 0-2 there was a significant association between ECOG-PS and 3-months survival (p<0.001).

The relationship between ECOG-PS, mGPS and 3-month survival in patients with a BMI/WL grade 0/1 is shown in Table 5. In patients with an ECOG-PS of 0/1 there was a significant association between mGPS and 3-months survival (p=0.001). In patients with an ECOG-PS of 2 there was a trend to a significant association between mGPS and 3-months survival (p=0.085). In patients with an ECOG-PS of 3/4 there was a non-significant association between mGPS and 3-months survival (p=0.741). In patients with an ECOG-PS of 0-4 there was a significant association between mGPS and 3-months survival (p<0.001).

In patients with an mGPS of 0 there was a significant association between ECOG-PS and 3-months survival (p=0.001). In patients with an mGPS of 1 there was a non-significant association between ECOG-PS and 3-months survival (p=0.343). In patients with an mGPS of 2 there was a significant association between ECOG-PS and 3-months survival (p=0.003). In patients with an mGPS of 0-2 there was a significant association between ECOG-PS and 3-months survival (p<0.001).

187 Discussion

The results of the present study show that, in a prospective cohort of patients with 188 189 advanced cancer and a median survival of 7 months, the majority of patients had a good performance status, low BMI/WL grade (normal BMI, minimal weight loss) and had 190 191 evidence of a systemic inflammatory response. Although ECOG-PS, mGPS and BMI/WL 192 grade all effectively stratified overall survival when adjusted for age, sex and cancer location, both ECOG-PS and mGPS also stratified patient survival in those patients with a low 193 BMI/WL grade. Therefore, the combination of ECOG-PS/ mGPS/ BMI/WL grade 194 consistently stratifies survival in patients with advanced cancer [2, 5, 11]. 195

The results of the present study are consistent with the work of Martin and colleagues 196 197 who examined the relationship between weight loss grade, performance status and the GPS in more than 2,500 patients with advanced cancer and a median survival of 7.6 months [12]. 198 Unfortunately, to date this data has only been published in abstract form. Nevertheless, the 199 tabulated data presented in abstract are consistent with the present analysis and their 200 conclusions that "a combination of BMI/ WL grades, PS and GPS consistently stratifies 201 202 advanced cancer patients into very different survival groups, and could be considered as 203 diagnostic criteria for cachexia" have been confirmed and extended in the present study [12]. For example, in the present study, in Table 5, the numbers of patients with ECOG-PS 3-4 204 205 cohort (BMI/WL grade 0/1) were relatively small (n=33) and the mGPS did not significant stratify survival. However, in the study of Martin and colleagues [11] in a larger cohort 206 (n=2,656) the numbers of patients with ECOG-PS 3-4 was 96 and mGPS significantly 207 208 stratified survival. Therefore, the ECOG-PS 3-4 subsample in the present study was likely to 209 be underpowered. It remains to be whether BMI/WL grade as an indicator of nutritional risk is superior to routine clinical screening tools such as MUST [13]. Moreover, such work is the 210

basis of the rationalisation of the multiple tools developed to identify clinically importantcachexia, sarcopenia and malnutrition.

213 The results of the present study indicate the importance of the systemic inflammatory response not only as a prognostic factor but also to inform the nutritional and 214 215 functional decline associated with advanced cancer. Indeed, in those patients who had both a 216 good performance status and good BMI/WL grade (no obvious functional decline or weight loss), the mGPS effectively stratified median survival between 11.4 months and 7.5 months. 217 Furthermore, in those patients, 42% had an elevated mGPS. One interpretation of the 218 219 findings is that obvious weight loss in patients with advanced cancer is a later event than functional decline, and that functional decline is a later event than the development of a 220 systemic inflammatory response [14]. Therefore, it may be that the mGPS should form the 221 222 basis of stratification of likely survival in patients with advanced cancer. Indeed, the prognostic value of the mGPS has been extensively validated in early stage disease [15]. 223 224 Moreover, some workers have proposed that in "the more aggressive tumour types (e.g. 225 pancreas and lung), the future of patients with elevated mGPS scores is so grim that they should be given precachexia status and offered multimodal therapy which may delay the 226 227 onset of cachexia and/or death [16]. Also, Morley (2019) commented that although the cachexia score (CASCO) has been identified "as the best screening test available for 228 229 cachexia, a quicker screen that may be equally effective is the Glasgow Prognostic Score" [17]. Irrespective, greater prominence should be given to the assessment of the systemic 230 inflammatory response (as evidenced by the mGPS) in patients with advanced cancer [3]. 231 232 Moreover, the systemic inflammatory response may be considered a cardinal feature of the 233 syndrome of cancer cachexia [18, 19]. If this proves to be the case then the systemic 234 inflammatory response will become an important therapeutic target for cancer cachexia in the 235 coming years [20]. Indeed, targeting the inflammatory response to treat cancer cachexia has

been proposed as a therapy with clinical trials now underway [21, 22]. Trials have examined
this in the past but importantly patients were not entered into these trials on the basis of their
systemic inflammatory response.

The present study had a number of limitations. The majority of patients were 239 240 undergoing palliative care. As a result, it could be assumed that there had a high symptom 241 burden which has been shown to be associated with worse outcomes. Furthermore, despite recruitment occurring across 18 sites, the patient cohort may not be completely representative 242 of patients with advanced cancer. However, they were well defined in terms of the 243 244 components of know and validated prognostic scores which will allow for direct comparison with other populations in future studies. Finally, the method of patient recruitment/sampling 245 strategy was opportunistic. However, the heterogeneity of the primary cancer types suggests 246 that the recruitment process while being opportunistic was robust. 247

In summary, while ECOG-PS, mGPS and BMI/WL grade are all valid prognostic scores and may form the basis of future risk stratification of survival in patients with advanced cancer.

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• Ross D Dolan: Data interpretation and writing of the manuscript

- Louise Daly: Data interpretation and writing of the manuscript
- Wei MJ Sim: Assistant in writing of the manuscript
- Marie Fallon: Supervision and assistance with the manuscript
- Aoife Ryan: Supervision and assistance with the manuscript

259	•	Donald C McMillan: Senior author who assisted with the manuscript and data
260		interpretation
261	•	Barry J Laird: Senior author who assisted with the manuscript and data
262		interpretation

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Table 1. Summary table of recruitment centres including patient numbers

Centres	Overall numbers Recruited	Numbers Excluded	Numbers included in Final Analysis
Abersy	31 (3.0)	2 (0.7)	29 (4.0)
Beatson Glasgow	96 (9.3)	1 (0.3)	95 (13.0)
Coventry	29 (2.8)	3 (1.0)	26 (3.6)
CUH	166 (16.2)	155 (52.2)	11 (1.5)
Denbigh	54 (5.3)	13 (4.4)	41 (5.6)
Eastwood	26 (2.5)	3 (1.0)	23 (23.2)
Edinburgh	15 (1.5)	3 (1.0)	12 (1.6)
Gwyned	22 (2.1)	0 (0.0)	22 (3.0)
Hayward	34 (3.3)	2 (0.7)	32 (4.4)
MUH	383 (37.3)	59 (19.9)	324 (44.4)
Nighting	27 (2.6)	6 (2.0)	21 (2.9)
Port Talbert	2 (0.2)	1 (0.3)	1 (0.1)
РРШН	17 (1.7)	2 (0.7)	15 (2.1)
Scar	4 (0.4)	3 (1.0)	1 (0.1)
St. Andrews	9 (0.9)	1 (0.3)	8 (1.1)
St Gem	70 (6.8)	33 (11.1)	37 (5.1)
Strathclyde	5 (0.5)	1 (0.3)	4 (0.5)
Wrexham	37 (3.6)	9 (3.0)	28 (3.8)
Total	1027	297	730

Table 2	Cliniconathalagiaal	abore staristics of	notionto with	advanad as	$m_{22} = (m_{-}720)$
Table 2.	Chineopaniological	characteristics of	patients with	auvanceu ca	(n = 750)

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174 (23.4) 174 (23.4) 175 (21.4) 156 (21.4) 156 (21.4) 209 (28.6) % Weight Loss 22.5 315 (43.2) BMI/WL gradel 0/1 404 (55.3) 241 (33.0) 4 55 (11.6)		20-21.9 kg/m ²	92 (12.6)
156 (21.4) 25-27.9 kg/m² 156 (21.4) ≥28.0 kg/m² 209 (28.6) % Weight Loss <2.5		22-24.9 kg/m ²	174 (23.4)
≥28.0 kg/m² 209 (28.6) % Weight Loss <15 (56.8)		25-27.9 kg/m ²	156 (21.4)
% Weight Loss		≥28.0 kg/m ²	209 (28.6)
≥2.5 315 (43.2) BMI/WL gradel 0/1 404 (55.3) 2/3 2/3 241 (33.0) 4 85 (11.6) 85 (11.6)	% Weight Loss	<2.5	415 (56.8)
BMI/WL gradel 0/1 404 (55.3) 2/3 2/1 (33.0) 241 (33.0) 4 85 (11.6) 85 (11.6)		≥2.5	315 (43.2)
2/3 241 (33.0) 4 85 (11.6)	BMI/WL grade-	0/1	404 (55.3)
4 85 (11.6)		2/3	241 (33.0)
		4	85 (11.6)

1 ECOG-P: Eastern Cooperative Oncology Group Performance Status, 1 mGPS: modified Glasgow Prognostic Score, 1 BMI: 1Body Mass

Index, BMI/WL grade: Body Mass Index/Weight Loss Grade

Table 3. The relationship between ECOG, mGPS and BMI/WL grade and overall survival in patients with advanced cancer.

Characteristics	Univariate	p-value	Multivariate	p-value	Multivariate Adjusted for Age, Sex and Cancer Location	p-value
Table 3a ECOG-PS 0/1-4 (n=730)						
ECOG-PS1	1.85 (1.63-2.09)	< 0.001	1.61 (1.42-1.83)	< 0.001	1.64 (1.44-1.86)	< 0.001
mGPS1	1.63 (1.48-1.80)	<0.001	1.53 (1.39-1.69)	< 0.001	1.49 (1.35-1.64)	< 0.001
BMI/WL grade-	1.48 (1.30-1.67)	<0.001	1.41 (1.25-1.60)	< 0.001	1.39 (1.23-1.58)	< 0.001
Table 3b ECOG-PS 0/1 (n=409)						
mGPS1	1.51 (1.32-1.72)	< 0.001	1.50 (1.32-1.72)	< 0.001	1.44 (1.26-1.65)	< 0.001
BMI/WL grade-	1.29 (1.07-1.56)	0.007	1.29 (1.06-1.56)	0.009	1.25 (1.03-1.51)	0.024
Table 3b ECOG-PS 2 (n=240)						
mGPS1	1.59 (1.34-1.89)	< 0.001	1.56 (1.32-1.86)	< 0.001	1.53 (1.28-1.82)	< 0.001
BMI/WL grade-	1.50 (1.22-1.84)	< 0.001	1.46 (1.19-1.80)	< 0.001	1.43 (1.16-1.76)	0.001
Table 3c ECOG-PS 3-4 (n=81)						
mGPS1	1.42 (1.04-1.95)	0.029	1.55 (1.12-2.15)	0.009	1.54 (1.11-2.14)	0.009
BMI/WL grade-	1.37 (1.02-1.84)	0.039	1.53 (1.11-2.12)	0.010	1.58 (1.15-2.19)	0.005

1 ECOG-P: Eastern Cooperative Oncology Group Performance Status, 1 mGPS: modified Glasgow Prognostic Score, 1 BMI: 4Body Mass Index, BMI/WL grade: Body Mass Index/Weight Loss Grade. Statiscial analysis was with univariate and multivariate Cox regression analysis.

ECOG-PS1		mGPS1=0	mGPS1=1	mGPS1=2	mGPS10-2	
		n (%)	n (%)	n (%)	n (%)	P-value
0.1		22(= (, 0)	107	400	
0-1	n	220	50	12/	409	
	Survival Rate at 3 months	218 (96.5%)	46 (82.1%)	105 (82.7%)	369 (90.26%)	< 0.001
	Median Survival	10.9	7.0	7.0	9.1	
	95% CI	9.2-12.3	5.3-10.2	5.7-8.9	8.0-10.0	
2	n	87	42	111	240	
	Survival Rate at 3 months	76 (87.4%)	28 (66.7%)	62 (55.9%)	166 (69.2%)	< 0.001
	Median Survival	7.3	5.0	3.5	5.2	
	95% CI	6.1-9.8	3.1-6.6	2.6-4.8	4.6-5.7	
3-4	n	12	13	56	81	
	Survival Rate at 3 months	8 (66.7%)	6 (46.2%)	19 (33.9%)	33 (40.7%)	0.102
	Median Survival	5.9	2.6	1.9	2.5	
	95% CI	2.5-14.2	0.6-4.5	1.2-2.7	1.5-3.1	
ECOG-PS1 0/1-4	n	325	111	294	730	
	Survival Rate at 3 months	302 (92.9%)	80 (72.1%)	186 (63.3%)	568 (77.8%)	< 0.001
	Median Survival	9.6	5.3	4.2	6.6	
	95% CI	8.4-10.8	4.2-6.6	3.6-5.1	5.8-7.1	
P-value		< 0.001	0.021	< 0.001	< 0.001	

Table 4. The relationship between the ECOG-PS, mGPS and 3 month survival rate in patients with advanced cancer (n=730)

l ECOG-P: Eastern Cooperative Oncology Group Performance Status, 1 mGPS: modified Glasgow Prognostic Score. Statiscial analysis was with χ^2 test for linear-by-linear association, or χ^2 test for 2 by 2 tables.

Table 5. The relationship between the ECOG-PS, mGPS and 3 month survival rate in patients with a BMI/WL

ECOG-PS]		mGPS1=0	mGPS1=1	mGPS1=2	mGPS10-2	
		n (%)	n (%)	n (%)	n (%)	P-value
0-1	n	148	32	73	253	
	Survival Rate at 3 months	144 (97.3%)	26 (81.3%)	62 (84.9%)	232 (91.7%)	0.001
	Median Survival	11.4	9.4	7.5	9.9	
	95% CI	9.2-14.4	4.0-17.8	6.1-9.9	8.7-11.4	
2	n	49	24	45	118	
	Survival Rate at 3 months	44 (89.8%)	21 (87.5%)	33 (73.3%)	98 (83.1%)	0.085
	Median Survival	7.9	6.6	4.9	6.7	
	95% CI	6.8-10.7	5.0-8.9	3.7-6.6	5.2-7.6	
3-4	n	6	5	22	33	
	Survival Rate at 3 months	4 (66.7%)	3 (60%)	11 (50.0%)	18 (54.5%)	0.741
	Median Survival	7.2	3.4	2.9	3.2	
	95% CI	1.0-73.2	0.6-8.4	1.2-5.0	1.8-5.0	
ECOG-PS] 0/1-4	n	203	61	140	404	
	Survival Rate at 3 months	192 (94.6%)	50 (82.0%)	106 (75.7%)	348 (86.1%)	< 0.001
	Median Survival	10.0	7.5	5.7	7.9	
	95% CI	8.9-11.7	5.8-8.9	4.8-7.1	7.3-8.9	
P-value		0.001	0.343	0.003	< 0.001	

grade 0/1 and advanced cancer (n=404)

1 ECOG-P: Eastern Cooperative Oncology Group Performance Status, 1 mGPS: modified Glasgow Prognostic Score. Statiscial analysis was

with χ^2 test for linear-by-linear association, or χ^2 test for 2 by 2 tables.



Survival in Months

	0 months	6 months	12 months	18 months	24 months	30 months	36 months	42 months
ECOG 0/1	409	317	236	194	176	166	159	154
ECOG 2	240	127	95	83	79	74	72	72
ECOG 3/4	81	22	16	13	12	12	12	12

Figure 1.0: The relationship between the ECOG-PS and OS in patients with advanced cancer (n=730, Log rank test: ECOG-PS 0/1-2: p<0.001, ECOG-PS 2-3/4:p<0.001, ECOG-PS 0/1-3/4: p<0.001)



	0 months	6 months	12 months	18 months	24 months	30 months	36 months	42 months
mGPS 0	325	270	207	180	166	158	152	150
mGPS 1	111	66	50	42	41	39	37	35
mGPS 2	294	130	90	68	61	55	64	53

Figure 2.0: The relationship between the mGPS and OS in patients with advanced cancer (n=730, Log rank test: mGPS 0-1: p<0.001, mGPS1-2: 0.006, mGPS 0-2: p<0.001)



	0 months	6 months	12 months	18 months	24 months	30 months	36 months	42 months
BMIWLGrade 0/1	404	300	224	187	171	160	152	148
BMIWLGrade 2/3	241	131	99	82	77	73	72	71
BMIWLGrade 4	85	35	24	21	20	19	19	19

Figure 3.0: The relationship between the BMIWL grade and OS in patients with advanced cancer (n=730, Log rank test: BMIWL grade 0/1-2/3: p<0.001, BMIWL grade 2/3-4: p<0.001, ECOG-PS 0/1-4: p=0.010)