Table 1. Multiple linear regression model of disease damage in the patients with Sjögren's syndrome*

Independent variable	β	t	P
Lymphoproliferative disease	0.425	9.395	0.000
Pleuropulmonary damage	0.339	7.133	0.000
Tear flow impairment	0.257	5.602	0.000
CNS involvement (long-lasting)	0.158	3.428	0.001
Salivary flow impairment	0.146	3.169	0.002
Structural ocular damage	0.146	3.021	0.003
Irreversible renal impairment	0.142	3.056	0.003
Loss of teeth	0.125	2.630	0.009
Peripheral neuropathy	0.115	2.451	0.015

* The dependent variable in this model was the numerical score for disease damage (0–10) assigned by the investigator. This 9-item model was a significant predictor of disease damage ($R = 0.778$, $P < 0.0001$). CNS = central nervous system.

SSDDI construction and validation. A multivariate model with 9 variables was the best predictor of the level of accumulated disease damage in the study population. The variables included in this model, their β values, and their P values are shown in Table 1. Table 2 shows the variables included in the SSDDI and the relative score assigned to each. For each item the definition that was used in the study glossary is also shown.

The scores obtained using the SSDDI in all of the patients were closely correlated with the scores given by the investigators ($R = 0.760$, $P < 0.0001$) (Figure 1). The differences between the 2 scores were normally distributed ($W = 0.94$, $P < 0.0001$). The mean difference was close to 0 (mean ± SD 0.267 ± 1.31), and the differences were ±3, and therefore outside the limit for 95% agreement (see Patients and Methods), in only 6.3% of the patients.

Construct validity of the SSDDI was also proven by assessment of its convergent validity and divergent validity. All of the variables included in the SSDDI were closely correlated with the corresponding gold standard, i.e., the investigator scores of damage ($P = 0.002$ for 1 variable and $P < 0.0001$ for the remaining variables). The SSDDI variables either were not correlated with or were weakly correlated with the gold standard for activity, i.e., the investigator scores of activity.

Table 2. Sjögren's Syndrome Disease Damage Index*

Item	Definition	Score
Oral/salivary damage		
Salivary flow impairment	Unstimulated whole saliva collection <1.5 ml/15 minutes, by standard method†	1
Loss of teeth	Complete or almost complete	1
Ocular damage		
Tear flow impairment	Schirmer I test <5 mm in 5 minutes, by standard method†	1
Structural abnormalities	Corneal ulcers, cataracts, chronic blepharitis	1
Neurologic damage		
CNS involvement	Long-lasting stable CNS involvement	2
Peripheral neuropathy	Long-lasting stable peripheral or autonomic system impairment	1
Pleuropulmonary damage (any of the following)		2
Pleural fibrosis	Confirmed by imaging	
Interstitial fibrosis	Confirmed by imaging	
Significant irreversible functional damage	Confirmed by spirometry	
Renal impairment (any of the following)		2
Increased serum creatinine level or reduced GFR	Long-lasting stable abnormalities	
Tubular acidosis	Urinary pH >6 and serum bicarbonate <15 mmoles/liter in 2 consecutive tests	
Nephrocalcinosis	Confirmed by imaging	
Lymphoproliferative disease (any of the following)		5
B cell lymphoma	Clinically and histologically confirmed	
Multiple myeloma	Clinically and histologically confirmed	
Waldenström's macroglobulinemia	Clinically and histologically confirmed	

* The index was constructed using variables selected by means of a multivariate linear regression model. The score value assigned to each item was derived from the weight that the corresponding variable had in the model (β coefficient shown in Table 1). The definitions shown were provided in the glossary included with the clinical chart in which patient data were recorded. CNS = central nervous system; GFR = glomerular filtration rate.
† Refs. 24 and 25.