

Supplementary Table S1. The association of the erosive subtype with the Kallman scale.

A: The association of erosive hand osteoarthritis (HOA) with the Kallman score at all time points over five years. The association was computed using the generalised additive model (GAM) adjusted for sex and age. The identification number of the patients was treated as a random intercept.

The table contains effective degrees of freedom (EDF), *p*-value, adjusted coefficient of determination (R^2), and the percentage of deviance explained by the model.

B: The association between erosive HOA and the Kallman score at each time point was computed using generalised linear modelling with negative binomial assumption, adjusted for sex and age.

The table contains the estimated slope of each predictor, 95% confidence interval (CI), *p*-value, and adjusted coefficient of determination (R^2) at each time point. *p*-values <0.05 are highlighted in bold.

A

The Kallman score			
Predictors	Estimates	CI	p
(Intercept)	42.4	36.84 – 47.97	<0.001
Gender [male]	-4.98	-19.23 – 9.27	0.492
HOA subtype [erosive]	6.77	2.58 – 10.95	0.002
Smooth term (age)			<0.001
Smooth term (ID patient)			0.944
Smooth term (ID patient, age)			<0.001
Observations			393
R ²			0.989
Deviance explained = 99.3%			

B

Predictors	The Kallman score at baseline			The Kallman score after 2 years			The Kallman score after 5 years		
	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)	-73.38	-103.39 – -43.37	<0.001	-62.78	-95.69 – -29.88	<0.001	-63.15	-97.82 – -28.48	<0.001
Age	1.51	1.04 – 1.98	<0.001	1.31	0.81 – 1.81	<0.001	1.27	0.77 – 1.78	<0.001
Sex [male]	-9.03	-20.89 – 2.83	0.134	-8.96	-21.53 – 3.60	0.16	-10	-22.64 – 2.65	0.12
HOA subtype [erosive]	37.42	29.97 – 44.87	<0.001	39.52	31.49 – 47.55	<0.001	41.75	33.68 – 49.83	<0.001
Observations			131			131			131
R ² / R ² adjusted	0.566 / 0.556			0.546 / 0.536			0.560 / 0.550		

Supplementary Table S2. Correlation analyses between the Kallman scale and serum biomarkers (A) and clinical assessment parameters of hand osteoarthritis (HOA) (B). Both tables contain correlation coefficients tau (τ_b) and *p*-values at each time point. The correlation analyses were performed on all HOA, erosive subtype, and non-erosive subtype. The absolute value of correlation coefficients over 0.21 and 0.35 indicate a medium and strong association, respectively. *p*-values <0.05 are highlighted in bold.

A		Baseline		2 years		5 years	
	Patient group	τ_b	<i>p</i> -value	τ_b	<i>p</i> -value	τ_b	<i>p</i> -value
Alkaline phosphatase [μ kat/L]	all HOA patients	-0.10	0.248			-0.04	0.647
	erosive patients	-0.08	0.496			-0.03	0.771
	non-erosive patients	-0.14	0.304			-0.06	0.671
Atherogenic index	all HOA patients	-0.06	0.476	-0.05	0.576	-0.02	0.854
	erosive patients	-0.10	0.418	0.01	0.919	0.04	0.762
	non-erosive patients	-0.12	0.402	-0.18	0.185	-0.15	0.275
CRP [mg/L]	all HOA patients	0.02	0.816	0.02	0.787	-0.02	0.852
	erosive patients	-0.07	0.564	-0.07	0.574	-0.14	0.215
	non-erosive patients	0.11	0.410	0.10	0.475	0.09	0.515
ESR [mm/hour]	all HOA patients	0.01	0.945	0.08	0.346	0.12	0.165
	erosive patients	0.01	0.963	0.06	0.600	0.07	0.547
	non-erosive patients	-0.02	0.886	0.06	0.678	0.12	0.378
HDL [mmol/L]	all HOA patients	0.02	0.792	0.04	0.664	0.04	0.627
	erosive patients	0.01	0.919	0.01	0.963	0.06	0.613
	non-erosive patients	0.09	0.499	0.08	0.560	0.07	0.624
LDL [mmol/L]	all HOA patients	-0.09	0.335	-0.04	0.667	-0.01	0.898
	erosive patients	-0.16	0.178	0.00	0.975	0.06	0.581
	non-erosive patients	-0.12	0.372	-0.20	0.156	-0.21	0.136
Osteocalcin [μ g/L]	all HOA patients	-0.06	0.552	-0.02	0.818	0.02	0.828
	erosive patients	-0.11	0.409	-0.15	0.188	-0.06	0.608
	non-erosive patients	0.08	0.596	0.13	0.347	0.08	0.561
P1NP [μ g/L]	all HOA patients	-0.04	0.658	-0.03	0.772	-0.01	0.946
	erosive patients	-0.07	0.538	-0.11	0.343	-0.05	0.671
	non-erosive patients	-0.11	0.430	0.07	0.627	0.05	0.709
Ratio of total to HDL cholesterol	all HOA patients	-0.08	0.348	-0.05	0.576	-0.02	0.854
	erosive patients	-0.08	0.479	0.01	0.919	0.04	0.762
	non-erosive patients	-0.12	0.364	-0.18	0.185	-0.15	0.275
Total cholesterol [mmol/L]	all HOA patients	-0.04	0.642	-0.01	0.919	-0.01	0.903
	erosive patients	-0.11	0.346	0.05	0.686	0.10	0.390
	non-erosive patients	-0.10	0.469	-0.18	0.194	-0.24	0.077
Triglycerides [mmol/L]	all HOA patients	-0.01	0.937	0.05	0.562	-0.05	0.545
	erosive patients	0.09	0.455	0.09	0.446	0.04	0.723
	non-erosive patients	-0.15	0.262	-0.09	0.539	-0.21	0.127
Vitamin D [nmol/L]	all HOA patients	-0.07	0.429	-0.01	0.940	0.00	0.963
	erosive patients	-0.02	0.896	0.02	0.851	-0.04	0.746
	non-erosive patients	-0.18	0.170	-0.12	0.406	-0.04	0.786
β -CTX [μ g/L]	all HOA patients	0.01	0.941	-0.07	0.446	0.06	0.494
	erosive patients	-0.04	0.749	-0.16	0.158	0.00	0.985
	non-erosive patients	-0.04	0.744	0.10	0.459	0.05	0.702

B

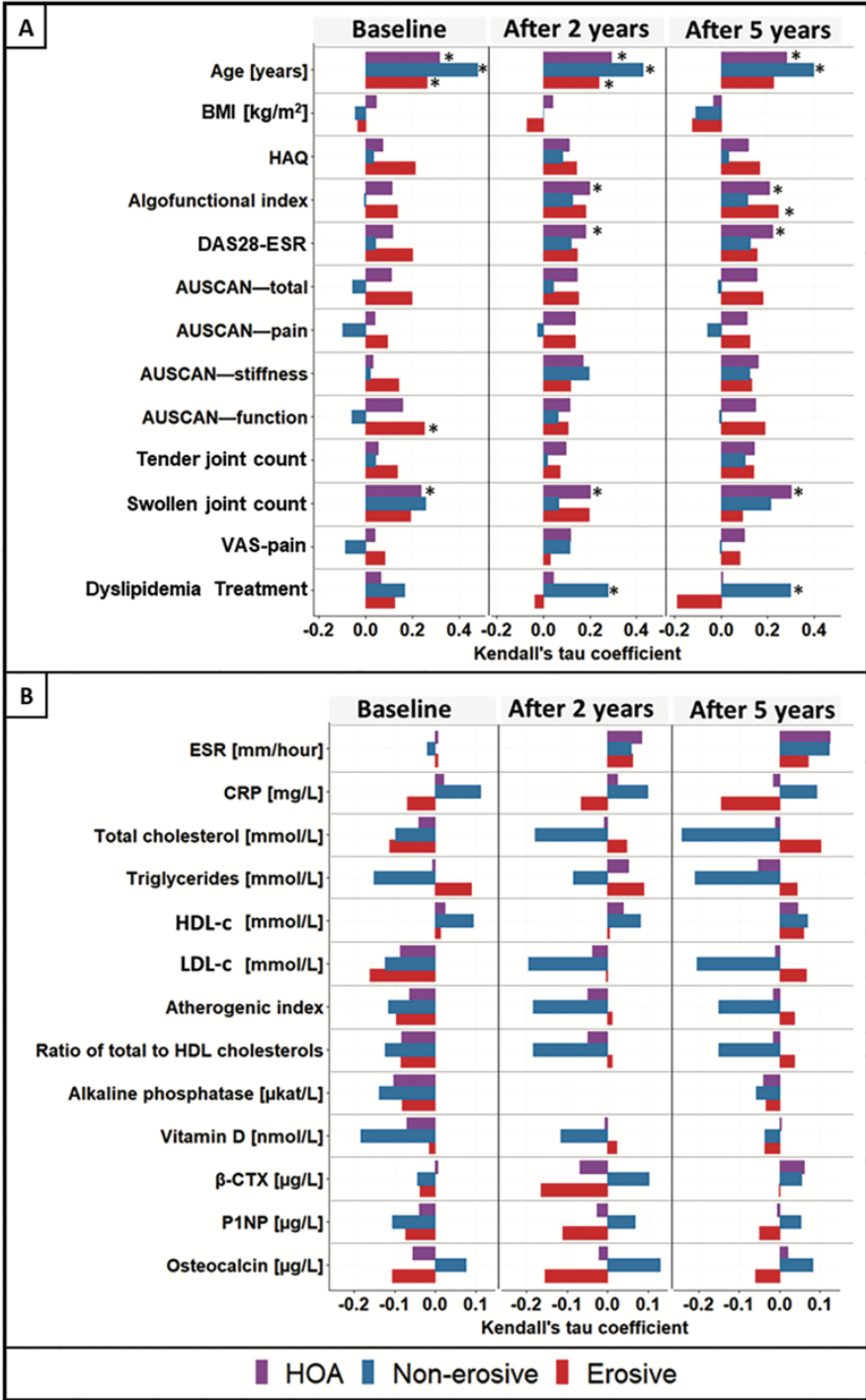
	Patient group	Baseline		2 years		5 years	
		τ_b	<i>p</i> -value	τ_b	<i>p</i> -value	τ_b	<i>p</i> -value
Age [years]	all HOA patients	0.32	0.000	0.29	0.001	0.28	0.001
	erosive patients	0.26	0.024	0.24	0.038	0.22	0.051
	non-erosive patients	0.48	0.000	0.43	0.001	0.40	0.003
Algofunctional index	all HOA patients	0.11	0.206	0.20	0.025	0.21	0.019
	erosive patients	0.14	0.253	0.18	0.118	0.24	0.035
	non-erosive patients	-0.01	0.962	0.12	0.369	0.11	0.411
AUSCAN – function	all HOA patients	0.16	0.074	0.11	0.206	0.15	0.095
	erosive patients	0.25	0.034	0.10	0.370	0.19	0.109
	non-erosive patients	-0.06	0.657	0.06	0.652	-0.01	0.951
AUSCAN – pain	all HOA patients	0.04	0.669	0.14	0.126	0.11	0.213
	erosive patients	0.09	0.441	0.13	0.250	0.12	0.298
	non-erosive patients	-0.10	0.458	-0.02	0.858	-0.06	0.669
AUSCAN – stiffness	all HOA patients	0.03	0.735	0.17	0.054	0.16	0.074
	erosive patients	0.14	0.237	0.12	0.322	0.13	0.261
	non-erosive patients	0.02	0.881	0.20	0.158	0.12	0.383
AUSCAN – total	all HOA patients	0.11	0.216	0.14	0.103	0.15	0.084
	erosive patients	0.20	0.098	0.15	0.202	0.18	0.123
	non-erosive patients	-0.06	0.671	0.04	0.766	-0.01	0.919
BMI [kg/m ²]	all HOA patients	0.04	0.618	0.04	0.660	-0.03	0.709
	erosive patients	-0.03	0.776	-0.07	0.549	-0.12	0.289
	non-erosive patients	-0.04	0.741	0.00	0.996	-0.11	0.425
Dyslipidaemia treatment	all HOA patients	0.06	0.467	0.04	0.624	0.00	0.958
	erosive patients	0.13	0.294	-0.04	0.761	-0.19	0.128
	non-erosive patients	0.17	0.216	0.28	0.042	0.30	0.043
Swollen joint count	all HOA patients	0.24	0.007	0.20	0.022	0.30	0.001
	erosive patients	0.19	0.106	0.20	0.093	0.09	0.438
	non-erosive patients	0.26	0.053	0.07	0.634	0.21	0.122
Tender joint count	all HOA patients	0.05	0.551	0.09	0.285	0.14	0.107
	erosive patients	0.14	0.252	0.07	0.545	0.14	0.230
	non-erosive patients	0.04	0.761	0.02	0.905	0.10	0.455
DAS28-ESR	all HOA patients	0.12	0.193	0.18	0.039	0.22	0.012
	erosive patients	0.20	0.091	0.14	0.220	0.15	0.191
	non-erosive patients	0.04	0.755	0.12	0.394	0.13	0.363
HAQ	all HOA patients	0.07	0.409	0.11	0.210	0.12	0.193
	erosive patients	0.21	0.073	0.14	0.222	0.16	0.161
	non-erosive patients	0.03	0.812	0.08	0.555	0.03	0.827
VAS-pain [mm]	all HOA patients	0.04	0.649	0.11	0.196	0.10	0.262
	erosive patients	0.08	0.489	0.03	0.801	0.08	0.492
	non-erosive patients	-0.09	0.517	0.11	0.421	0.00	0.976

Supplementary Table S3. The result of the adjusted generalised additive model (GAM) on the assessment of serum biomarkers (A) and clinical assessment parameters (B) in relation to the Kallman scale in all hand osteoarthritis (HOA) patients, erosive, and non-erosive subtypes. The table contains effective degrees of freedom (EDF), *p*-value, adjusted coefficient of determination (R^2), and the percentage of deviance explained by the model.

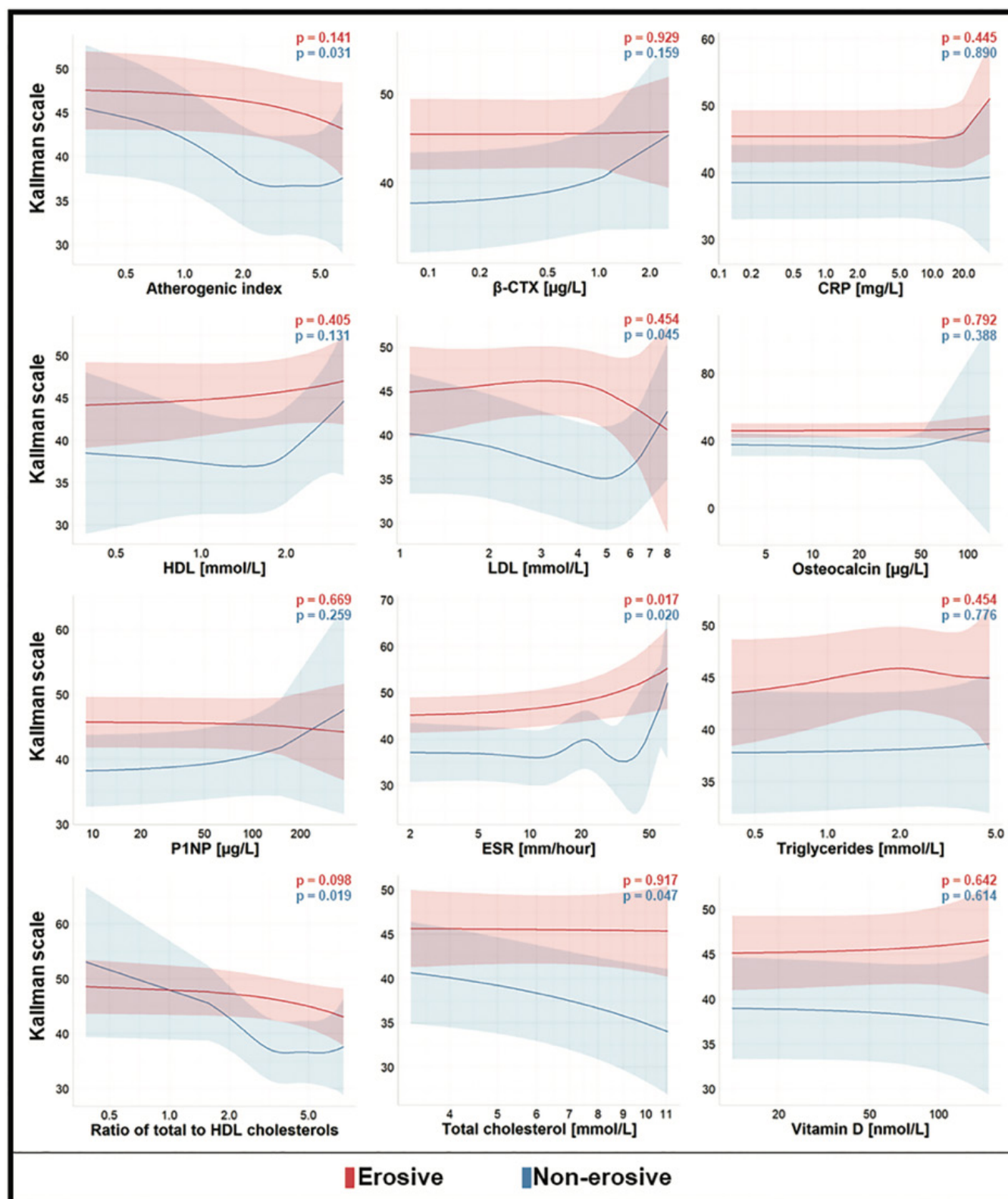
A					
	Patient group	EDF	<i>p</i> -value	adjusted R^2	Deviance explained (%)
Atherogenic index	all HOA patients	1	0.028	0.99	99.28
	erosive patients	1	0.141	0.99	99.30
	non-erosive patients	3.1	0.031	0.99	99.30
β -CTX [μ g/L]	all HOA patients	1	0.444	0.99	99.27
	erosive patients	1	0.929	0.99	99.27
	non-erosive patients	1	0.159	0.99	99.27
CRP [mg/L]	all HOA patients	2	0.458	0.99	99.28
	erosive patients	1.9	0.445	0.99	99.28
	non-erosive patients	1	0.890	0.99	99.28
HDL [mmol/L]	all HOA patients	1	0.130	0.99	99.27
	erosive patients	1	0.405	0.99	99.28
	non-erosive patients	2.4	0.131	0.99	99.28
LDL [mmol/L]	all HOA patients	2.6	0.300	0.99	99.28
	erosive patients	1.9	0.454	0.99	99.29
	non-erosive patients	2.9	0.045	0.99	99.29
Osteocalcin [μ g/L]	all HOA patients	1	0.932	0.99	99.29
	erosive patients	1	0.792	0.99	99.30
	non-erosive patients	1.9	0.388	0.99	99.30
P1NP [μ g/L]	all HOA patients	1	0.993	0.99	99.27
	erosive patients	1	0.669	0.99	99.28
	non-erosive patients	1	0.259	0.99	99.28
ESR [mm/hour]	all HOA patients	1.9	0.014	0.99	99.27
	erosive patients	1	0.017	0.99	99.30
	non-erosive patients	4.3	0.020	0.99	99.30
Triglycerides [mmol/L]	all HOA patients	1	0.644	0.99	99.27
	erosive patients	2.1	0.454	0.99	99.27
	non-erosive patients	1	0.776	0.99	99.27
Ratio of total to HDL cholesterol	all HOA patients	1	0.024	0.99	99.28
	erosive patients	1	0.098	0.99	99.30
	non-erosive patients	3.4	0.019	0.99	99.30
Total cholesterol [mmol/L]	all HOA patients	1	0.193	0.99	99.27
	erosive patients	1	0.917	0.99	99.27
	non-erosive patients	1	0.047	0.99	99.27
Vitamin D [nmol/L]	all HOA patients	1	0.973	0.99	99.27
	erosive patients	1	0.642	0.99	99.26
	non-erosive patients	1	0.614	0.99	99.26

B

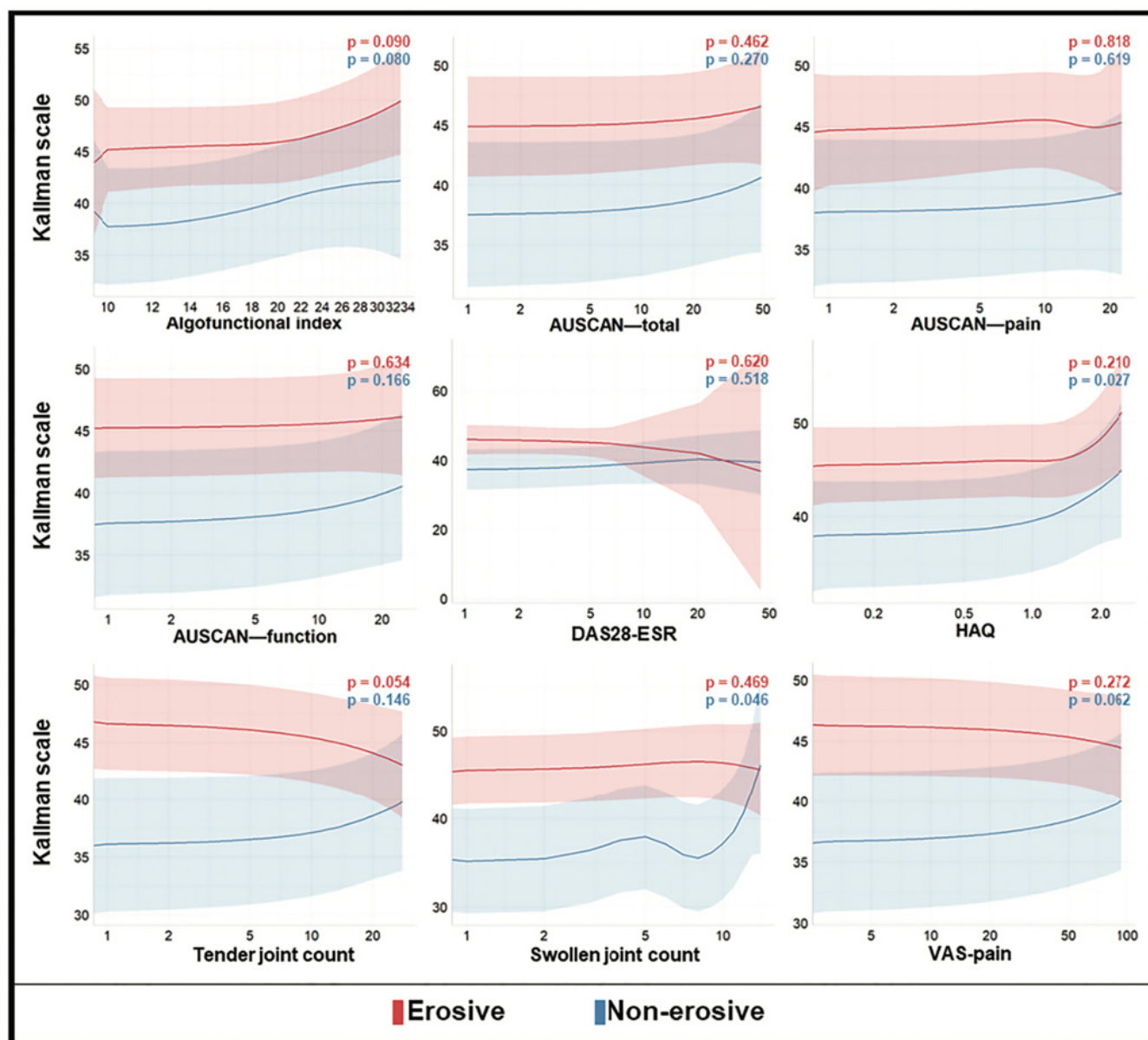
	Patient group	EDF	<i>p</i> -value	adjusted R ²	Deviance explained (%)
Algofunctional index	all HOA patients	2	0.020	0.99	99.29
	erosive patients	2	0.090	0.99	99.31
	non-erosive patients	3	0.080	0.99	99.31
AUSCAN – total	all HOA patients	1	0.211	0.99	99.27
	erosive patients	1	0.462	0.99	99.27
	non-erosive patients	1	0.270	0.99	99.27
AUSCAN – pain	all HOA patients	1	0.760	0.99	99.27
	erosive patients	2	0.818	0.99	99.27
	non-erosive patients	1	0.619	0.99	99.27
AUSCAN – function	all HOA patients	1	0.214	0.99	99.27
	erosive patients	1	0.634	0.99	99.27
	non-erosive patients	1	0.166	0.99	99.27
DAS28-ESR	all HOA patients	1	0.566	0.99	99.27
	erosive patients	1	0.620	0.99	99.27
	non-erosive patients	2	0.518	0.99	99.27
HAQ	all HOA patients	3	0.016	0.99	99.31
	erosive patients	3	0.210	0.99	99.31
	non-erosive patients	2	0.027	0.99	99.31
Tender joint counts	all HOA patients	1	0.772	0.99	99.27
	erosive patients	1	0.054	0.99	99.27
	non-erosive patients	1	0.146	0.99	99.27
Swollen joint counts	all HOA patients	1	0.041	0.99	99.26
	erosive patients	2	0.469	0.99	99.29
	non-erosive patients	4	0.046	0.99	99.29
VAS-pain [mm]	all HOA patients	1	0.628	0.99	99.27
	erosive patients	1	0.272	0.99	99.28
	non-erosive patients	1	0.062	0.99	99.28



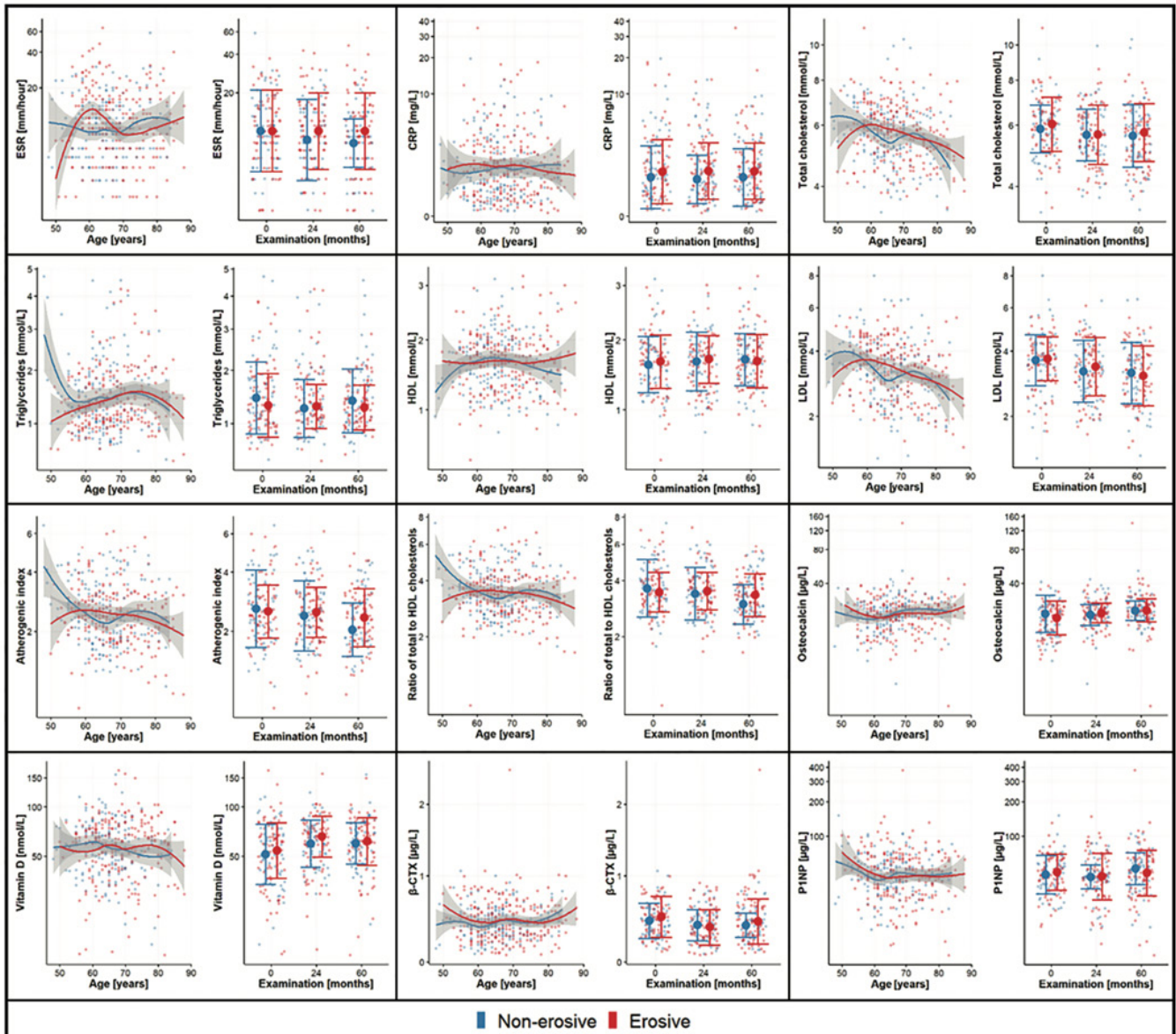
Supplementary Fig. S1. The correlation analyses between Kallman scale and clinical assessment parameters (A) or serum biomarkers (B) in all hand osteoarthritis (HOA) patients (violet), erosive (red) and non-erosive (blue) subtypes at each time point. The correlation was computed using Kendall's tau correlation. * $p<0.05$.



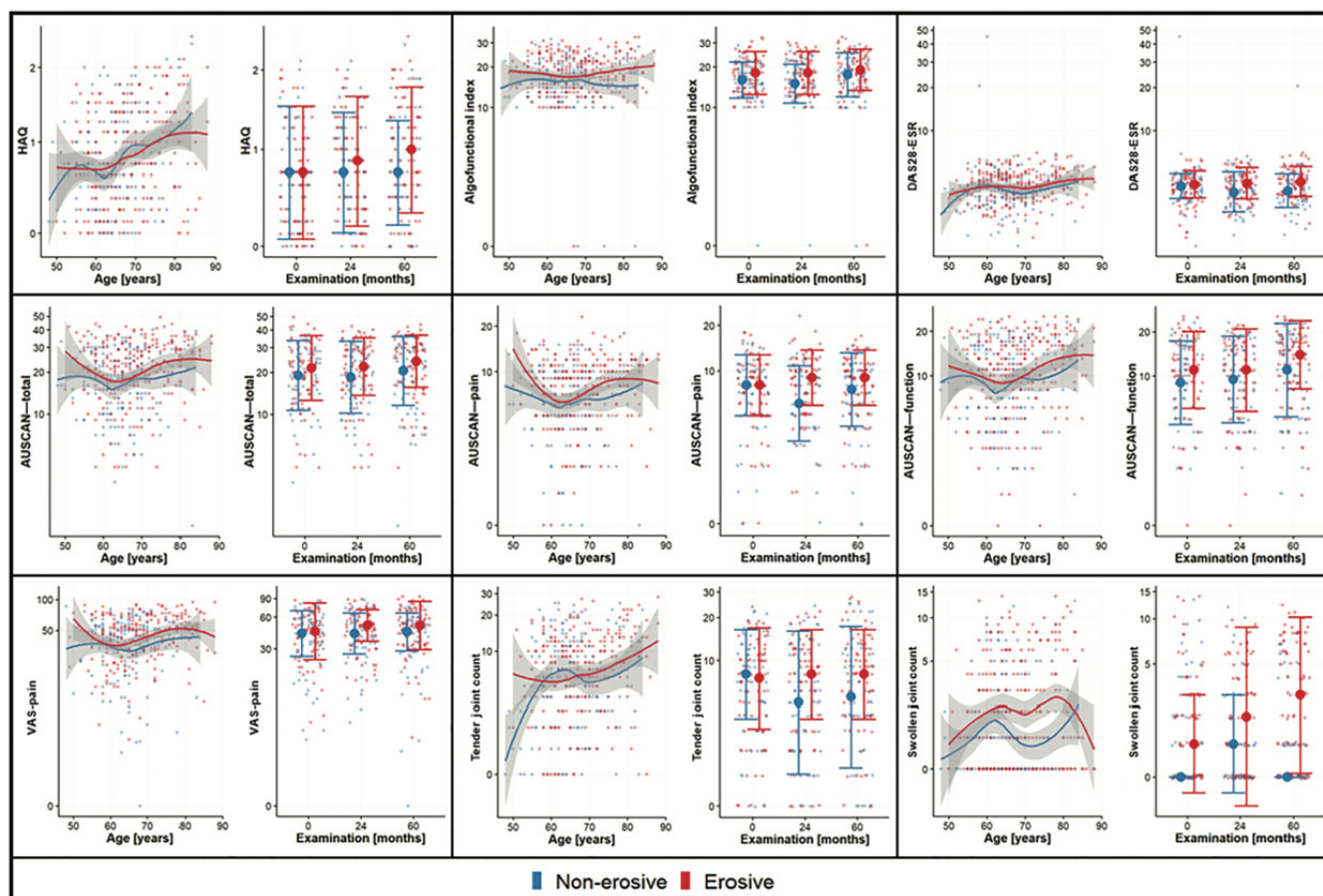
Supplementary Fig. S2. The shape of associations estimated by the adjusted generalized additive model (GAM) between serum biomarkers and the Kallman score in patients with erosive (red) and non-erosive (blue) subtypes. Each shape is defined by 95% confidence interval (CI). The horizontal trend line suggests no discernible association between the Kallman score and serum biomarkers within the subtype; in contrast, an increasingly positive or negative slope implies a growing association. The overlapping blue and red ribbons signify no difference between erosive and non-erosive subtypes. p -values for both subsets of erosive and non-erosive patients are shown in upper right corners. Data is detailed in Supplementary Table S3A.



Supplementary Fig. S3. The shape of associations estimated by the adjusted generalized additive model (GAM) between clinical assessment features and the Kallman score in patients with erosive (red) and non-erosive (blue) subtypes. Each shape is defined by 95% confidence interval (CI). The horizontal trend line suggests no discernible association between the Kallman scale and clinical assessment features within the subtype; in contrast, an increasingly positive or negative slope implies a growing association. The overlapping blue and red ribbons signify no difference between erosive and non-erosive subtypes. *p*-values for both subsets of erosive and non-erosive patients are shown in upper right corners. Data is detailed in Supplementary Table S3B.



Supplementary Fig. S4. The multiplot below shows grouped figures of the correlation between serum biomarkers and the age and median of the biomarkers at each time point. In both figures, each dot represents a patient with erosive (red) or non-erosive (blue) hand osteoarthritis (HOA). The correlation figures include trendlines for both HOA subtypes computed using local polynomial regression (LOESS). The figures on the right side of each box include medians for both subtypes at each time point and error bars represent the median absolute deviations.



Supplementary Fig. S5. The multiplot below shows grouped figures of the correlation between clinical assessment parameters and the age and median of the parameters at each time point. In both figures, each dot represents a patient with erosive (red) or non-erosive (blue) hand osteoarthritis (HOA). The correlation figures include trendlines for both HOA subtypes computed using local polynomial regression (LOESS). The figures on the right side of each box include medians for both subtypes at each time point and error bars represent the median absolute deviations.