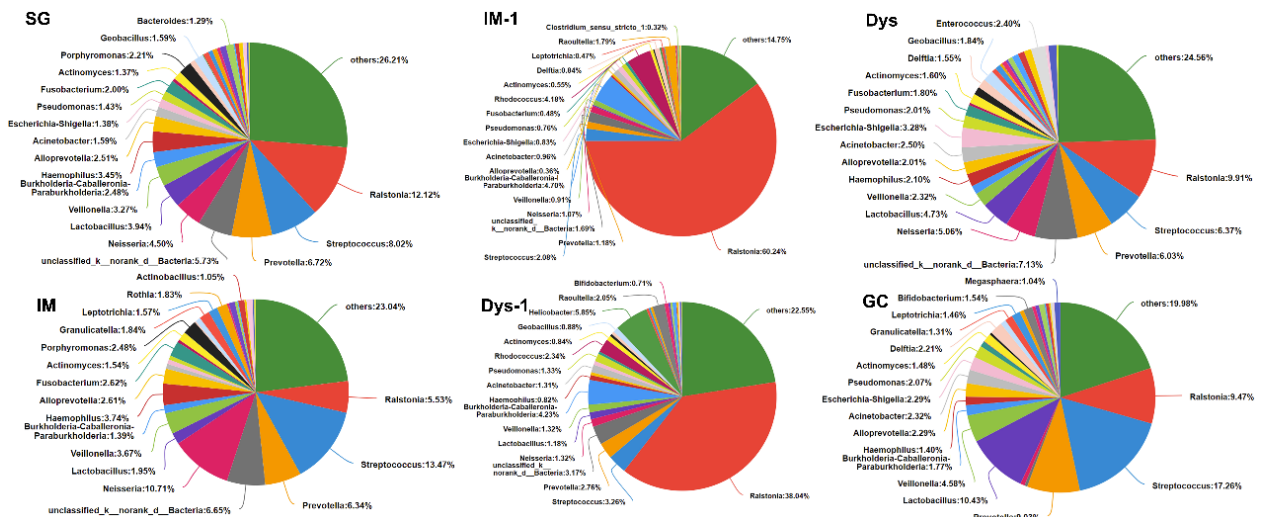


Supplementary Figure 1 Hierarchical clustering tree at genus level. A: IM and B: Dys groups.



**Supplementary Figure 2 Community analysis pieplot at genus level in different stages of diseases.** SG: Superficial gastritis; IM: Intestinal metaplasia; Dys: Dysplasia; GC: Gastric cancer; IM-1: Samples circled in Supplementary Figure 1A; Dys-1: samples circled in Supplementary Figure 1B.

(Decomposable Supplementary Figures were presented in "73407-Figures.pptx)

**Supplementary Table 1 Demographic characteristics of the enrolled subjects (mean  $\pm$  SD)**

	SG	AG	IM	Dys	GC
Number	56	9	27	29	13
Age	50.29 $\pm$ 14.31	60.67 $\pm$ 10.71	60.27 $\pm$ 14.89	62.71 $\pm$ 12.21	71.67 $\pm$ 9.87
Gender (M/F)	27/29	5/4	12/15	15/14	5/6
BMI (kg/m <sup>2</sup> )	23.82 $\pm$ 3.54	24.79 $\pm$ 3.69	23.21 $\pm$ 2.96	22.24 $\pm$ 2.12	22.28 $\pm$ 4.31
Smoke (Yes/No)	10/46	1/8	8/19	6/23	2/11
Drinking (Yes/No)	9/47	5/4	9/18	2/27	3/10

SG: Superficial gastritis; AG: Atrophic gastritis; IM: Intestinal metaplasia; Dys: Dysplasia; GC: Gastric cancer.

**Supplementary Table 2 Relative abundance of selected phyla in the five groups (mean±SD)**

	<b>SG (%)</b> <i>n</i> = 56	<b>AG (%)</b> <i>n</i> = 9	<b>IM (%)</b> <i>n</i> = 27	<b>Dys (%)</b> <i>n</i> = 29	<b>GC (%)</b> <i>n</i> = 13	<b>One-way ANOVA <i>P</i> value</b>
p__Proteobacteria	33.79 ± 22.63	21.37 ± 15.10	55.34 ± 25.81	54.89 ± 24.57	22.54 ± 19.33	< 0.001
p__Firmicutes	30.39 ± 18.32	33.53 ± 21.79	19.47 ± 15.60	19.98 ± 16.79	49.59 ± 24.61	0.022
p__Bacteroidota	13.77 ± 9.23	12.72 ± 7.23	8.33 ± 6.85	8.098 ± 7.504	14.98 ± 11.71	0.051
p__unclassified_k__norank_d__Bacteria	9.34 ± 15.9	21.41 ± 26.06	4.20 ± 8.24	4.73 ± 11.11	0.65 ± 0.74	0.002
p__Actinobacteriota	6.30 ± 5.15	6.05 ± 5.05	6.53 ± 2.06	6.98 ± 4.623	5.29 ± 4.00	0.919
p__Fusobacteriota	2.59 ± 3.44	2.10 ± 1.56	2.63 ± 4.30	1.46 ± 2.29	3.79 ± 3.40	0.336
p__Patescibacteria	0.94 ± 1.34	0.78 ± 0.85	1.06 ± 1.27	0.80 ± 1.36	1.28 ± 0.93	0.840

SG: Superficial gastritis; AG: Atrophic gastritis; IM: Intestinal metaplasia; Dys: Dysplasia; GC: Gastric cancer.

**Supplementary Table 3 Network single-valued property sheet**

	<b>Transitivity</b>	<b>Diameter</b>	<b>Average shortest path length</b>
SG	0.571428571	none	none
AG	0.428571429	none	none
IM	0.482758621	4	1.878788
Dys	0.657534247	3	1.527273
GC	0.3	none	none

SG: Superficial gastritis; AG: Atrophic gastritis; IM: Intestinal metaplasia; Dys: Dysplasia; GC: Gastric cancer; "none" indicates the network is disconnected.