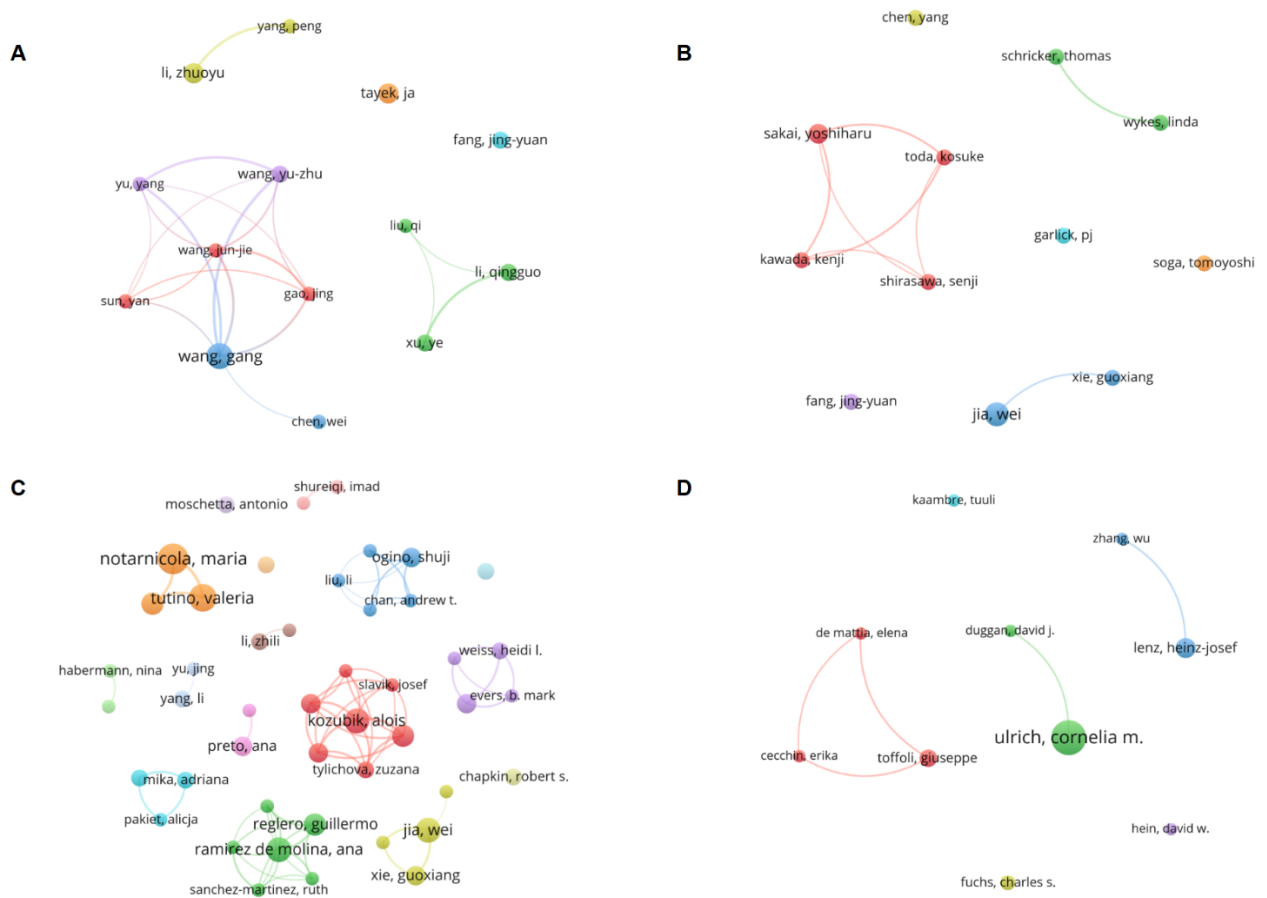


Supplementary Figure 1 Distribution of publications from different countries in the coauthorship analysis. A: The cooperation relationship between countries contributing to GM in CRC; B: The cooperation relationship between countries contributing to AM in CRC; C: The cooperation relationship between countries contributing to LM in CRC; D: The cooperation relationship between countries contributing to NM in CRC. The size of the circle represents the number of publications within different countries, the different colors represent different clusters within the field, and the connecting lines represent the cooperation between different countries.



Supplementary Figure 2 Visualization map of coauthorship authors. A: The cooperation relationship between authors contributing to GM in CRC; B: The cooperation relationship between authors contributing to AM in CRC; C: The cooperation relationship between authors contributing to LM in CRC; D: B: The cooperation relationship between authors contributing to NM in CRC. The size of the circle represents publication numbers of authors, the different colors represent different clusters within the field, and the connecting lines represent the cooperation between authors.

Supplementary Table 1 1991-2022 publication numbers related to metabolism in CRC, GM in CRC, AM in CRC, LM in CRC, and NM in CRC

Year	Publication numbers				
	Theme				
	Metabolism in CRC	GM in CRC	AM in CRC	LM in CRC	NM in CRC
1991	33	2	3	2	3
1992	33	5	2	4	1
1993	29	2	3	1	1
1994	45	3	2	3	5
1995	41	4	1	6	3
1996	51	2	3	6	3
1997	62	8	4	12	4
1998	68	6	4	10	4
1999	66	4	2	8	5
2000	83	7	3	7	7
2001	88	11	4	12	2
2002	102	6	1	12	9
2003	92	6	4	15	6
2004	143	9	5	19	17
2005	140	6	1	14	20
2006	155	14	5	17	17
2007	173	13	5	22	31
2008	189	15	5	21	23
2009	180	14	5	26	26
2010	199	18	6	33	24
2011	237	22	8	33	21
2012	241	28	8	37	23
2013	272	34	16	50	19
2014	298	40	17	47	30
2015	331	53	13	65	29

2016	365	49	19	69	25
2017	473	70	28	93	21
2018	453	66	28	104	24
2019	522	71	21	126	40
2020	604	93	36	127	24
2021	727	113	61	183	27
2022	822	106	68	207	3

Supplementary Table 2 Top 10 cited and cocited journals publishing papers related to cellular metabolism in colorectal cancer

Theme	Rank	Journal	Publications /citations	IF (2023)	JCR	Rank	Cocited journal	Citations	IF (2023)	JCR
Glucose metabolism	1	Oncotarget	29/1238	NA	NA	1	Cancer Res	1718	11.2	Q1
	2	Plos One	19/514	3.7	Q2	2	J Biol Chem	1218	4.8	Q2
	3	Front Oncol	13/215	4.7	Q2	3	Nature	1093	64.8	Q1
	4	Int J Oncol	13/339	5.2	Q2	4	Science	986	56.9	Q1
	5	J Nucl Med	13/1451	9.3	Q1	5	P Natl Acad Sci Usa	978	11.1	Q1
	6	Cancers	12/111	5.2	Q1	6	Cell	974	64.5	Q1
	7	Int J Mol Sci	11/263	5.6	Q1	7	Plos One	837	3.7	Q2
	8	Cancer Lett	11/643	9.7	Q1	8	J Nucl Med	727	9.3	Q1
	9	Cell Death Dis	11/518	9.0	Q1	9	Oncotarget	724	NA	NA
	10	Sci Rep	10/249	4.6	Q2	10	Oncogene	722	8.0	Q1
Amino acid metabolism	1	Cancers	11/99	5.2	Q1	1	Cancer Res	815	11.2	Q1
	2	Sci Rep	10/319	4.6	Q2	2	Nature	640	64.8	Q1
	3	Cancer Res	9/1206	11.2	Q1	3	J Biol Chem	562	4.8	Q2
	4	Carcinogenesis	8/448	4.7	Q2	4	P Natl Acad Sci	482	11.1	Q1

Usa										
	5	Metabolomics	8/55	3.6	Q2	5	Plos One	454	3.7	Q2
	6	Plos One	7/466	3.7	Q2	6	Science	449	56.9	Q1
	7	Oncotarget	7/322	NA	NA	7	Cell	421	64.5	Q1
	8	Front Pharmacol	7/44	5.6	Q1	8	Oncotarget	302	NA	NA
	9	Front Oncol	6/106	4.7	Q2	9	Cell Metab	293	29.0	Q1
	10	Cells	6/210	6.0	Q2	10	Int J Cancer	293	6.4	Q1
	1	Cancers	31/99	5.2	Q1	1	Cancer Res	3110	11.2	Q1
	2	Front Oncol	30/319	4.7	Q2	2	J Biol Chem	2340	4.8	Q2
	3	Sci Rep	23/1206	4.6	Q2	3	Nature	2153	64.8	Q1
	4	Int J Mol Sci	21/448	5.6	Q1	4	P Natl Acad Sci	2065	11.1	Q1
							Usa			
Lipid	5	Plos One	19/55	3.7	Q2	5	Plos One	1872	3.7	Q2
metabolism	6	Clin Nutr	19/466	6.3	Q1	6	Cell	1791	64.5	Q1
	7	Cancer Res	18/322	11.2	Q1	7	Science	1519	56.9	Q1
	8	Oncotarget	17/44	NA	NA	8	Gastroenterology	1423	29.4	Q1
	9	Front Pharmacol	17/106	5.6	Q1	9	Gut	1194	24.5	Q1
	10	Int J Cancer	15/210	6.4	Q1	10	Int J Cancer	1175	6.4	Q1

Nucleotide metabolism	1	Cancer Epidem Biomar	21/1049	3.8	Q2	1	Cancer Res	1463	11.2	Q1
	2	Int J Cancer	14/636	6.4	Q1	2	J Clin Oncol	902	45.3	Q1
	3	Pharmacogenomi cs	13/339	2.1	Q3	3	Clin Cancer Res	868	11.5	Q1
	4	Plos One	11/167	3.7	Q2	4	Cancer Epidem Biomar	862	3.8	Q2
	5	Cancer Res	8/1135	11.2	Q1	5	J Biol Chem	614	4.8	Q2
	6	Clin Cancer Res	8/633	11.5	Q1	6	Int J Cancer	590	6.4	Q1
	7	Cancer Chemoth Pharm	8/160	3.0	Q3	7	P Natl Acad Sci Usa	584	11.1	Q1
	8	Carcinogenesis	7/274	4.7	Q2	8	Carcinogenesis	554	4.7	Q2
	9	Brit J Cancer	7/324	8.8	Q1	9	Nature	489	64.8	Q1
	10	Am J Clin Nutr	6/498	5.13	Q1	10	Brit J Cancer	482	8.8	Q1

Supplementary Table 3 Top 10 references related to cellular metabolism in colorectal cancer

Theme	Rank	Reference	Journal	Citations
Glucose metabolism	1	Targeting lactate-fueled respiration selectively kills hypoxic tumor cells in mice- Sonveaux (2008)	J Clin Invest	1214
	2	Serine, glycine and one-carbon units: cancer metabolism in full circle- Locasle (2013)	Nat Rev Cancer	983
	3	Positron emission tomography provides molecular imaging of biological processes- Phelps (2000)	P Natl Acad Sci Usa	860
	4	Vitamin D status and ill health: a systematic review- Autier (2014)	Lancet Diabetes Endo	773
	5	Diabetes therapy and cancer risk- Vigneri (2009)	Nat Rev Endocrinol	748
	6	Quantitative metabolome profiling of colon and stomach cancer microenvironment by capillary electrophoresis time-of-flight mass spectrometry- Hirayama (2009)	Cancer Res	721
	7	Glucose deprivation contributes to the development of KRAS pathway mutations in tumor cells- Yun (2009)	Science	677
	8	Pyruvate kinase type M2: A key regulator of the metabolic budget system in tumor cells- Mazurek (2011)	Int J Biochem Cell B	496

	9	Nutrition and cancer: A review of the evidence for an anti-cancer diet- Donaldson (2004)	Nutr J	408
	10	PET: The merging of biology and imaging into molecular imaging- Phelps (2000)	J Nucl Med	393
	1	Serine, glycine and one-carbon units: cancer metabolism in full circle- Locasale (2013)	Nat Rev Cancer	983
	2	Quantitative metabolome profiling of colon and stomach cancer microenvironment by capillary electrophoresis time-of-flight mass spectrometry- Hirayama (2009)	Cancer Res	721
Amino acid metabolism	3	Potential of fecal microbiota for early-stage detection of colorectal cancer- Zeller (2014)	Mol Syst Biol	642
	4	Plasma free amino acid profiling of five types of cancer patients and its application for early detection- Miyagi (2011)	Plos One	310
	5	Microbial pathways in colonic sulfur metabolism and links with health and disease- Carbonero (2012)	Front Physiol	307
	6	Dietary methionine influences therapy in mouse cancer models and alters human metabolism- Gao (2019)	Nature	299

	7	Arginine deprivation and argininosuccinate synthetase expression in the treatment of cancer- Delage (2010)	Int J Cancer	295
	8	Meat as a component of a healthy diet - are there any risks or benefits if meat is avoided in the diet?- Biesalski (2005)	Meat Sci	263
	9	Reducing the renal uptake of radiolabeled antibody fragments and peptides for diagnosis and therapy: present status, future prospects and limitations- Behr (1998)	Eur J Nucl Med	245
	10	Pharmacological blockade of ASCT2-dependent glutamine transport leads to antitumor efficacy in preclinical models- Schulte (2018)	Nat Med	224
	1	The gut microbiota, bacterial metabolites and colorectal cancer- Louis (2014)	Microbiology	1571
	2	Phyto-oestrogens and western diseases- Adlercreutz (1997)	Ann Med	991
Lipid metaboslim	3	Serine, glycine and one-carbon units: cancer metabolism in full circle- Locasale (2013)	Nat Rev Cancer	983
	4	The microbiology of butyrate formation in the human colon- Pryde (2002)	FEMS Microbiol Lett	922
	5	Vitamin D status and ill health: a systematic review- Autier(2014)	Lancet Diabetes Endo	773

	6	Diabetes therapy and cancer risk- Vigneri (2009)	Nat Rev Endocrinol	748
	7	Bile acid-microbiota crosstalk in gastrointestinal inflammation and carcinogenesis- Jia (2018)	Nat Rev Gastro Hepat	739
	8	Pharmacodynamic and pharmacokinetic study of oral Curcuma extract in patients with colorectal cancer- Sharma (2001)	Clin Cancer Res	669
	9	Impact of the gut microbiota on intestinal immunity mediated by tryptophan metabolism- Gao (2018)	Front Cell Infect Mi	588
	10	Diet, microorganisms and their metabolites, and colon cancer- O'keefe (2016)	Nat Rev Gastro Hepat	568
	1	Serine, glycine and one-carbon units: cancer metabolism in full circle- Locasale (2013)	Nat Rev Cancer	983
Nucleotide metabolism	2	Quantitative metabolome profiling of colon and stomach cancer microenvironment by capillary electrophoresis time-of-flight mass spectrometry- Hirayama (2009)	Cancer Res	721
	3	Metabolic profiling of human colorectal cancer using high-resolution magic angle spinning nuclear magnetic resonance (HR-MAS NMR) spectroscopy and gas chromatography mass spectrometry (GC/MS)- Chan (2009)	J Proteome Res	367

4	The potential role of RNA N6-methyladenosine in Cancer progression- Wang (2020)	Mol Cancer	354
5	Abnormal folate metabolism and mutation in the methylenetetrahydrofolate reductase gene may be maternal risk factors for Down syndrome- James (1999)	Am J Clin Nutr	321
6	Dietary methionine influences therapy in mouse cancer models and alters human metabolism- Gao (2019)	Nature	299
7	Arginine deprivation and argininosuccinate synthetase expression in the treatment of cancer- Delage (2010)	Int J Cancer	295
8	Methylenetetrahydrofolate reductase (MTHFR) polymorphisms and risk of molecularly defined subtypes of childhood acute leukemia- Wiemels (2001)	P Natl Acad Sci Usa	283
9	Molecular basis of antifolate resistance- Assaraf (2007)	Cancer Metast Rev	269
10	Xenobiotic-induced transcriptional regulation of xenobiotic metabolizing enzymes of the cytochrome P450 superfamily in human extrahepatic tissues- Pavek (2008)	Curr Drug Metab	251

Supplementary Table 4 Top 10 cocited references related to cellular metabolism in colorectal cancer

Theme	Rank	Reference	Journal	Cocitations
Glucose metabolism	1	Understanding the Warburg effect: the metabolic requirements of cell proliferation- Heiden (2009)	Science	147
	2	On the origin of cancer cells- Warburg (1956)	Science	136
	3	Hallmarks of cancer: the next generation- Hanahan (2011)	Cell	121
	4	Why do cancers have high aerobic glycolysis?- Gatenby (2004)	Nat Rev Cancer	60
	5	Regulation of cancer cell metabolism- Cairns (2011)	Nat Rev Cancer	48
	6	The emerging hallmarks of cancer metabolism- Pavlova (2016)	Cell Metab	45
	7	Cancer statistics, 2014- Siegel (2014)	Ca-Cancer J Clin	45
	8	The biology of cancer: metabolic reprogramming fuels cell growth and proliferation- DeBerardinis (2008)	Cell Metab	43
	9	The metabolism of tumors in the body- Warburg (1927)	J Gen Physiol	43
	10	Otto Warburg's contributions to current concepts of cancer metabolism- Koppenol (2011)	Nat Rev Cancer	39
Amino acid metabolism	1	Understanding the Warburg effect: the metabolic requirements of cell proliferation- Heiden (2009)	Science	39
	2	On the origin of cancer cells- Warburg (1956)	Science	34

	3	Hallmarks of cancer: the next generation- Hanahan (2011)	Cell	33
	4	The emerging hallmarks of cancer metabolism- Pavlova (2016)	Cell Metab	29
	5	Cancer Statistics, 2021- Siegel (2021)	Ca-Cancer J Clin	23
	6	Glutamine addiction: a new therapeutic target in cancer- Wise (2010)	Trends Biochem Sci	22
	7	Glutamine supports pancreatic cancer growth through a KRAS-regulated metabolic pathway- Son (2013)	Nature	19
	8	Metabolic profiling of human colorectal cancer using high-resolution magic angle spinning nuclear magnetic resonance (HR-MAS NMR) spectroscopy and gas chromatography mass spectrometry (GC/MS)- Chan (2009)	J Proteome Res	19
	9	Metabolite profiling of human colon carcinoma--deregulation of TCA cycle and amino acid turnover- Denkert (2008)	Mol Cancer	18
	10	Serum metabolite profiling of human colorectal cancer using GC-TOFMS and UPLC-QTOFMS- Qiu (2009)	J Proteome Res	18
Lipid metabolism	1	Hallmarks of cancer: the next generation- Hanahan (2011)	Cell	133
	2	Understanding the Warburg effect: the metabolic requirements of cell proliferation- Heiden (2009)	Science	81

	3	On the origin of cancer cells- Warburg (1956)	Science	77
	4	Fatty acid synthase and the lipogenic phenotype in cancer pathogenesis- Menendez (2007)	Nat Rev Cancer	77
	5	Cellular fatty acid metabolism and cancer- Currie (2013)	Cell Metab	73
	6	Cancer Statistics, 2021- Siegel (2021)	Ca-Cancer J Clin	63
	7	The gut microbiota, bacterial metabolites and colorectal cancer- Louis (2014)	Nat Rev Microbiol	56
	8	The emerging hallmarks of cancer metabolism- Pavlova (2016)	Cell Metab	50
	9	Lipid metabolism in cancer- Santos (2012)	Febs J	47
	10	Cancer metabolism: fatty acid oxidation in the limelight- Carracedo (2013)	Nat Rev Cancer	44
	1	A candidate genetic risk factor for vascular disease: a common mutation in methylenetetrahydrofolate reductase- Frosst (1995)	Nat Genet	44
Nucleotide metabolism	2	A novel single nucleotide polymorphism within the 5' tandem repeat polymorphism of the thymidylate synthase gene abolishes USF-1 binding and alters transcriptional activity- Mandola (2003)	Cancer Res	38
	3	Functional analysis and DNA polymorphism of the tandemly repeated sequences in the 5'-terminal regulatory region of the human gene for thymidylate synthase- Horie (1995)	Cell Struct Funct	35

4	Thymidylate synthase gene polymorphism determines response and toxicity of 5-FU chemotherapy- Pullarkat (2001)	Pharmacogenomics Journal	32
5	A multivariate analysis of genomic polymorphisms: prediction of clinical outcome to 5-FU/oxaliplatin combination chemotherapy in refractory colorectal cancer- Stoehmacher (2004)	Brit J Cancer	30
6	Identification and functional analysis of single nucleotide polymorphism in the tandem repeat sequence of thymidylate synthase gene- Kawakami (2003)	Cancer Res	29
7	Methylenetetrahydrofolate reductase polymorphism, dietary interactions, and risk of colorectal cancer- Ma (1997)	Cancer Res	29
8	5-fluorouracil: mechanisms of action and clinical strategies- Longley (2003)	Nat Rev Cancer	29
9	A 6 bp polymorphism in the thymidylate synthase gene causes message instability and is associated with decreased intratumoral TS mRNA levels- Mandola (2004)	Pharmacogenetics	27
10	Association between glutathione S-transferase P1, T1, and M1 genetic polymorphism and survival of patients with metastatic colorectal cancer- Stoehmacher (2002)	J Natl Cancer I	27

Supplementary Table 5 Top 10 keywords related to glucose metabolism, amino acid metabolism, lipid metabolism, and nucleotide metabolism in CRC

Type	Rank	Keyword	Occurrences	Year	Centrality
Glucose metabolism	1	Aerobic glycolysis	78	2006	0.04
	2	Apoptosis	54	2006	0.04
	3	Positron emission tomography	53	1993	0.08
	4	Insulin resistance	46	1992	0.10
	5	Glycolysis	40	2015	0.01
	6	Metastasis	37	2012	0.01
	7	Warburg effect	37	2014	0.04
	8	Diabetes mellitus	30	1997	0.07
	9	Hypoxia	25	2011	0.01
	10	Oxidative stress	24	2011	0.03
Amino acid metabolism	1	Gut microbiota	18	2018	0.02
	2	Inflammation	15	2018	0.02
	3	Apoptosis	12	2008	0.02
	4	Mass spectrometry	12	2014	0.02
	5	Oxidative stress	11	2016	0.04

	6	Chemotherapy	10	1993	0.03
	7	Metastasis	9	2004	0.02
	8	Aerobic glycolysis	8	2005	0.01
	9	Glutamine metabolism	7	2017	0.00
	10	Metabolomics	7	2016	0.01
	1	Gut microbiota	109	2012	0.02
	2	Apoptosis	90	1995	0.05
	3	Fatty acid synthase	70	2007	0.04
	4	Inflammation	66	2015	0.01
Lipid	5	Oxidative stress	62	2008	0.03
metabolism	6	Polyunsaturated fatty acids	52	2004	0.05
	7	Bile acids	49	1991	0.00
	8	Lipid preoxidation	45	1998	0.00
	9	Inflammatory bowel disease	38	2010	0.00
	10	Dietary fiber	38	1997	0.00
Nucleotide	1	Single nucleotide polymorphisms	63	2005	0.16
metabolism	2	5 fluorouracil	25	1993	0.19
	3	Thymidylate synthase	25	1993	0.03

4	Advanced colorectal cancer	22	2004	0.03
5	Metastatic colorectal cancer	21	1999	0.05
6	Acute lymphoblastic leukemia	20	2001	0.04
7	One carbon metabolism	19	2007	0.03
8	Dihydropyrimidine dehydrogenase	15	2003	0.03
9	Genome wide association	15	2009	0.05
10	Methylenetetrahydrofolate reductase	13	2006	0.01
