XXVIII IFSO World Congress

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IFSO 2025 Santiago

Combined Therapies, The Dawn of a New Era

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Disclosure Slide

X	No, nothing to disclose
	Yes, please specify:

Relationship between Cancer and Metabolic Surgery

Introduction

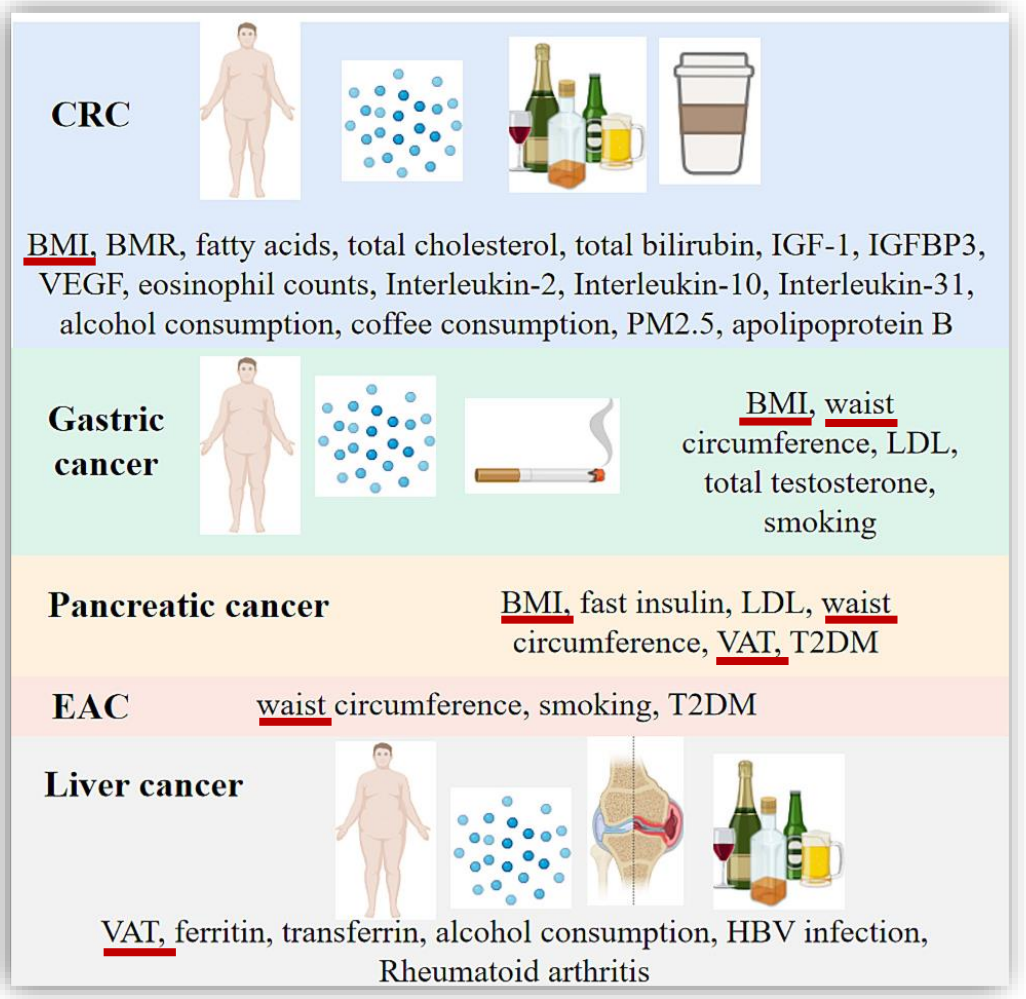
- Obesity & Cancer
- Mechanisms
- Pre MBS screening of Cancer
- MBS & Cancer outcomes
- Procedure Specific outcomes
- Future direction
- Conclusion

Relationship between high BMI & Types of cancer

Strength of evidence for a cancer-preventive effect of the absence of excess body fat according to the site or type of cancer		
Location or type of cancer	**Strength of evidence in humans**	**Relative risk of higher versus normal BMI (95%CI)**
Esophagus adenocarcinoma	Sufficient	4.8 (3.0-7.7)
Cardia	Sufficient	1.8 (1.3-2.5)
Colorectal	Sufficient	1.3 (1.3-1.4)
Liver	Sufficient	1.8 (1.6-2.1)
Gallbladder	Sufficient	1.3 (1.2-1.4)
Pancreas	Sufficient	1.5 (1.2-1.8)
Breast, post-menopausal	Sufficient	1.1 (1.1-1.2)
Uterus (body)	Sufficient	7.1 (6.3-8.1)
Ovary	Sufficient	1.1 (1.1-1.2)
Kidney (renal cell)	Sufficient	1.8 (1.7-1.9)
Meningioma	Sufficient	1.5 (1.3-1.8)
Thyroid	Sufficient	1.1 (1.0-1.1)
Myeloma	Sufficient	1.5 (1.2-2.0)
Male Breast Cancer	Limited	Not applicable
Prostate Cancer (fatal)	Limited	Not applicable
Diffuse Large B-cell Lymphoma	Limited	Not applicable

Lauby-Secretan B et al. N Engl J Med. 2016;375(8):794-8

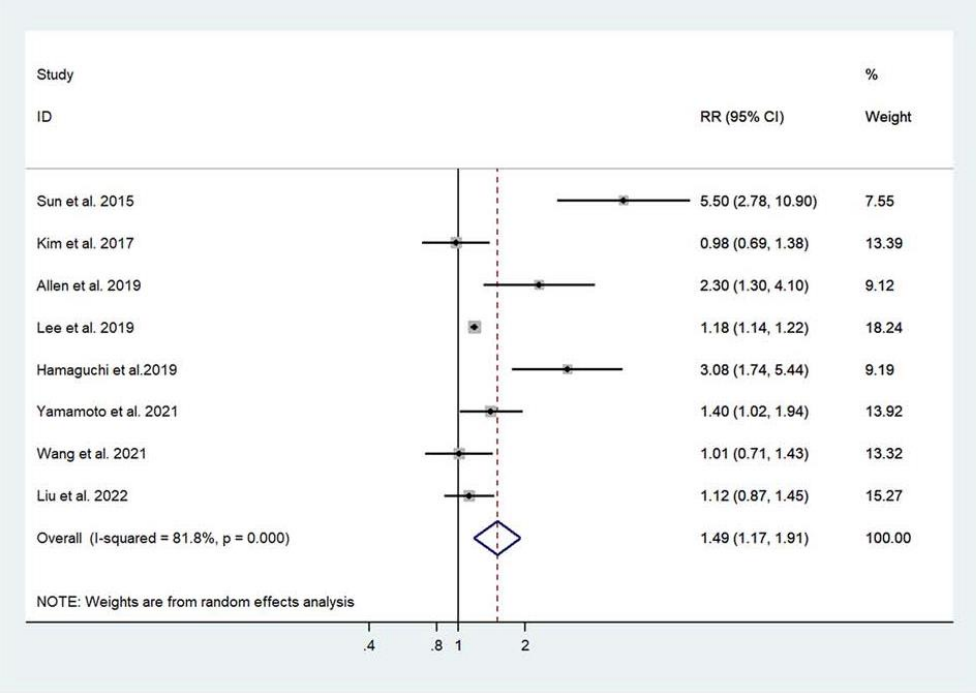
Risk factors for Gastrointestinal Cancers from Mendelian Randomization studies

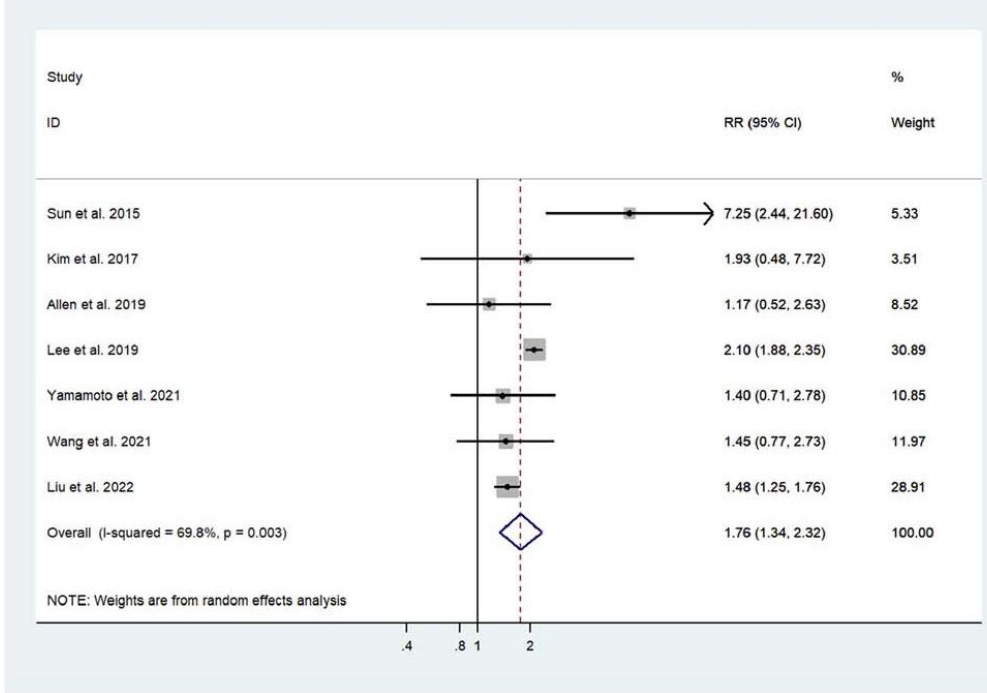


Y.-X. Huang et al. Preventive Medicine 189 (2024) 108147

MAFLD and GC / EC cancer

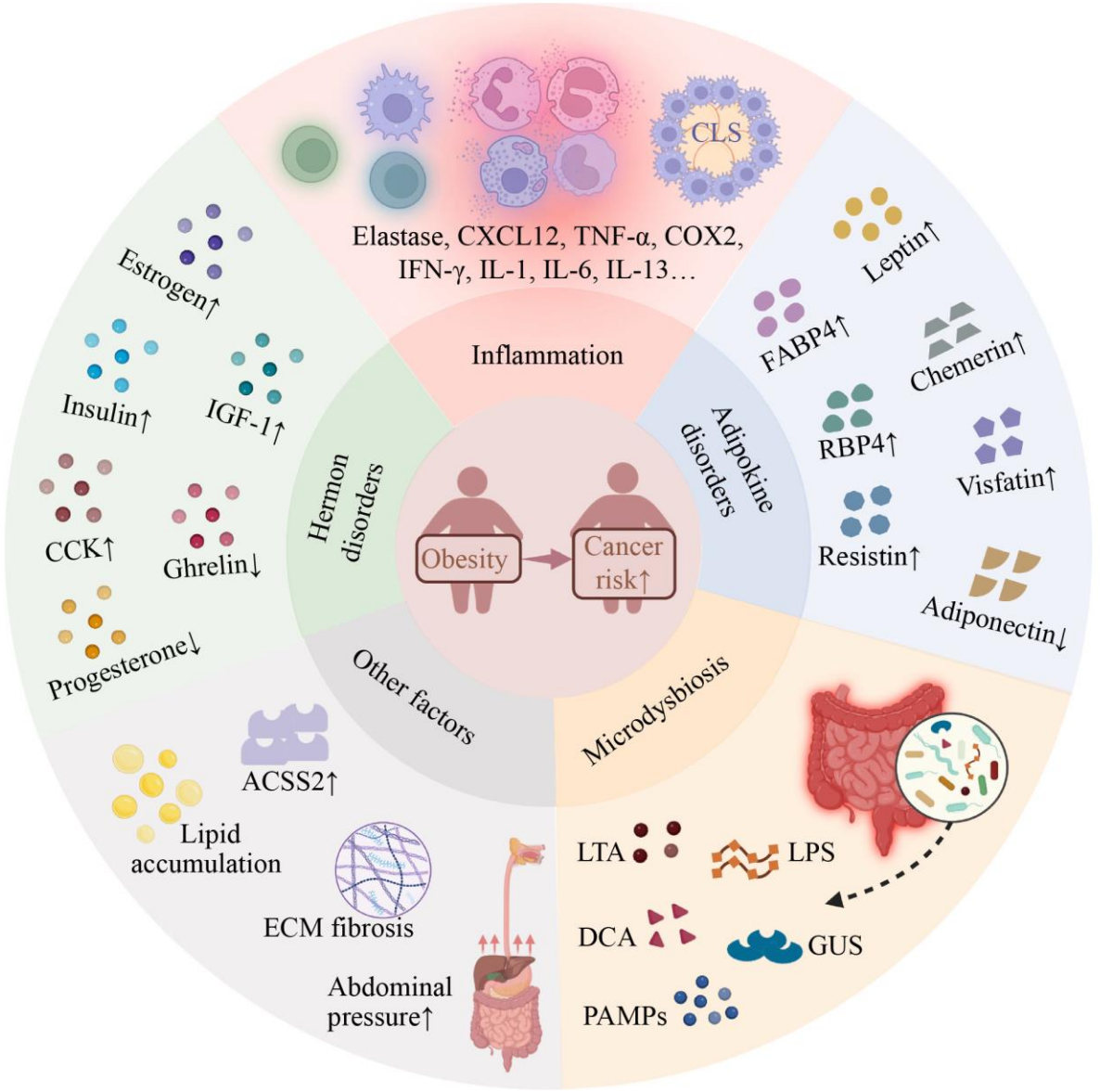
- 8 studies comprising a total of 8629525 participants
- Pooled RR values for the risk of
  - GC in patients with MAFLD was 1.49 (95%CI:1.17–1.91)
  - EC in patients with MAFLD was1.76(95%CI:1.34–2.32)





QuZou et al. Jpn J Clin Oncol, 2023, Vol. 53, No. 8

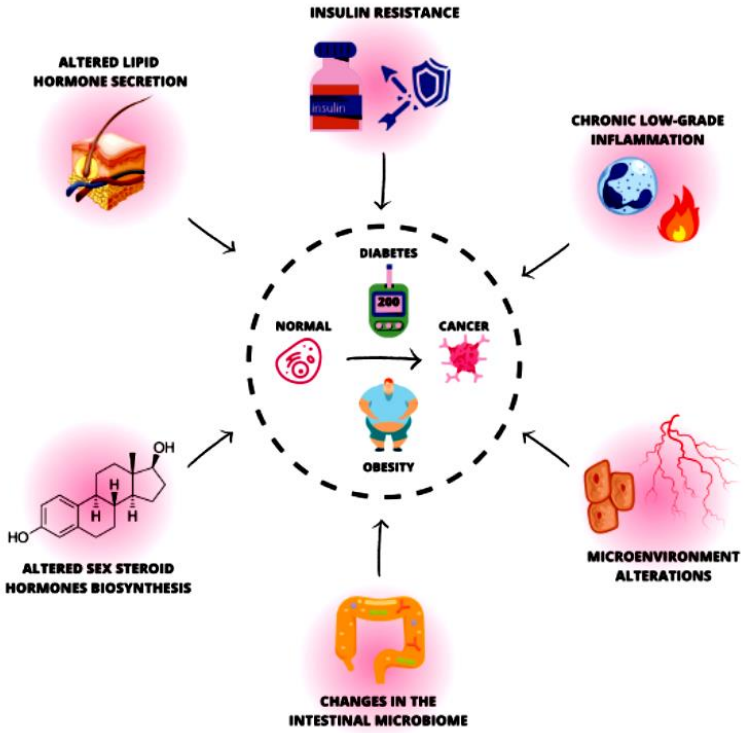
Mechanisms linking Obesity & Cancer risk



Xiaoye Shi et al. Front. Med. 2024, 18(6): 945–968

T2DM Obesity & Cancer

- Increased risk for cancer in patients with T2DM
- Hyperglycemia induces oxidative stress and DNA damage, initiating tumorigenesis
- Endogenous hyperinsulinemia - reduced insulin sensitivity activates insulin receptors, IGF-1 receptors, and hybrid insulin/IGF-1 receptors, promoting cancer cell proliferation, survival, and metastasis
- Women with T2DM & HbA1C ≥ 8% appear to have an increased risk of developing a tumor than men
- Endocrine interactions between the insulin signaling & gonadal axis leading to increased estrogen levels are thus higher in premenopausal women than in men



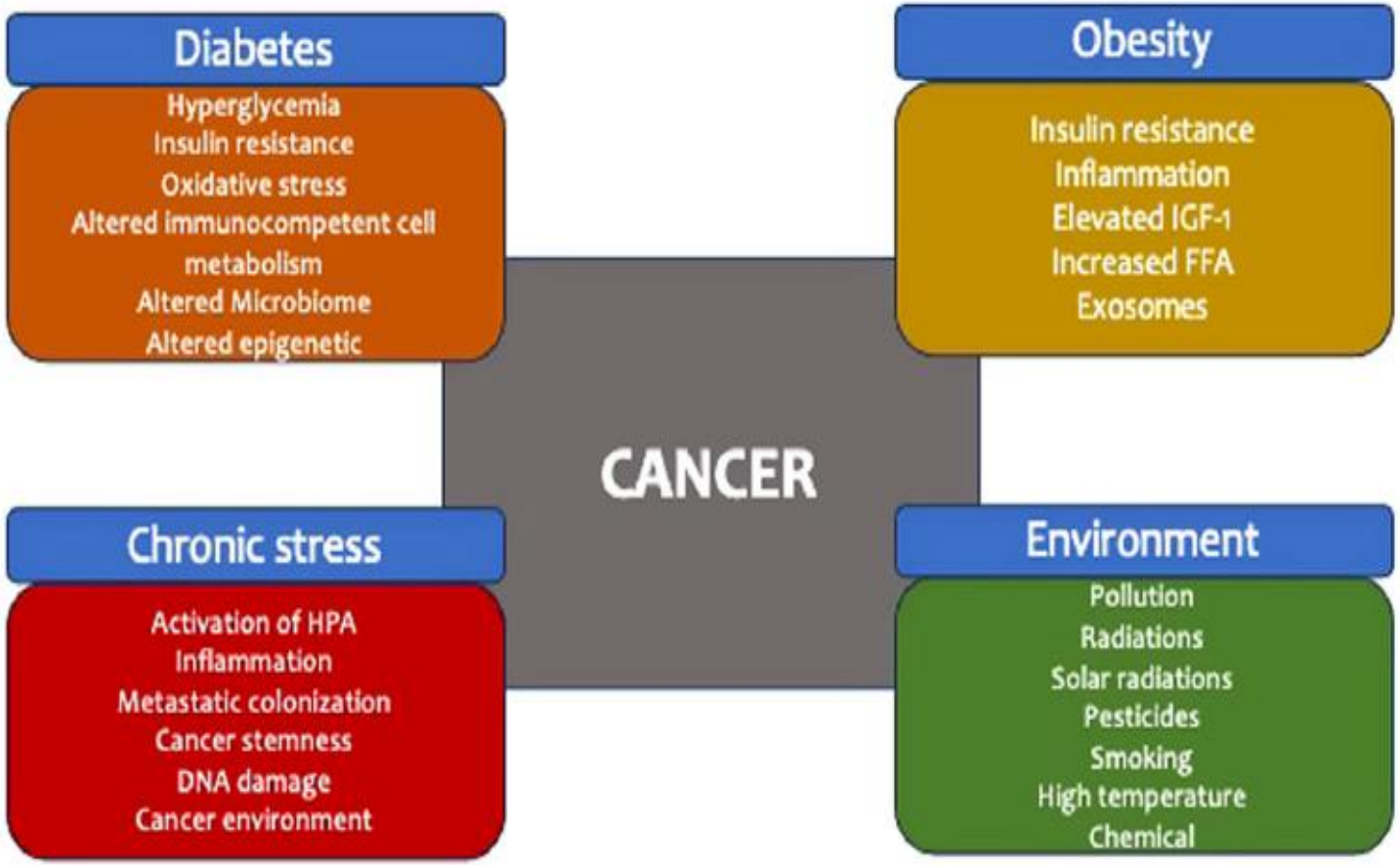
Angelo Avogaro. Endocrine (2024) 86:48–57

Impact of MBS on Diabesity

- Direct mechanisms
  - Reduced circadian blood glucose fluctuations
  - Reduced or even discontinued insulin therapy
- Similar effects for LSG VS RYGB
- Indirect mechanisms that lead to a risk reduction for cancer
  - increased postprandial secretion of satiety hormones such as GLP-1, PYY, and oxyntomodulin
  - Increased postop GLP-1 levels and their effect on insulin are discussed as a possible mediator of angiogenesis and cell growth
  - Accordingly, to these mechanisms, this effect is increased in insulin-dependent type 2 diabetes mellitus patients

Lunger et al. Front. Surg. 9:918272. doi: 10.3389/fsurg.2022.918272

T2DM Obesity & Cancer



Angelo Avogaro. Endocrine (2024) 86:48–57

Preop Screening for Cancer

An age & family history-related, risk-based tumor screening before MBS is recommended - *American Association of Clinical Endocrinologists (AACE)/American College of Endocrinology (ACE), The Obesity Society (TOS), the American Society for Metabolic and Bariatric Surgery (ASMBS), the Obesity Medicine Association (OMA), and the American Society of Anesthesiologist (ASA)*

Lunger et al. Front. Surg. 9:918272. doi: 10.3389/fsurg.2022.918272

Preop Screening for Cancer

- Absolute necessity of OGD is debatable
  - Preoperative gastroscopy reveals not only an HP- and reflux-related esophagitis or Barrett's metaplasia, but also other asymptomatic gastrointestinal pathologies, which has a great impact on the choice of the bariatric and metabolic procedure
  - High costs & only 0.4% of surgery was delayed or cancelled
- Colonoscopy, CT scans, ultrasound or other screening examinations for cancer are not routinely recommended
  - Tremendous effort required for the patient and the associated additional health costs

Lunger et al. Front. Surg. 9:918272. doi: 10.3389/fsurg.2022.918272

MBS and Cancer

- 1035 MBS patients vs 5000 non-operated patients
- Cancer incidence decrease 4 fold
  - 2.03% [MBS], while in the non-surgical group was 8.49%
- Decrease in the number of hospitalizations for cancer
  - 54.95/1,000 person-years in the non-operated group *versus* only 11.80 in the operated group

Christou NV et al. Ann Surg. 2004;240(3):416-23

MBS and Cancer Risk Reduction

- Retrospective cohort study 2005 - 2012 with follow-up through 2014.

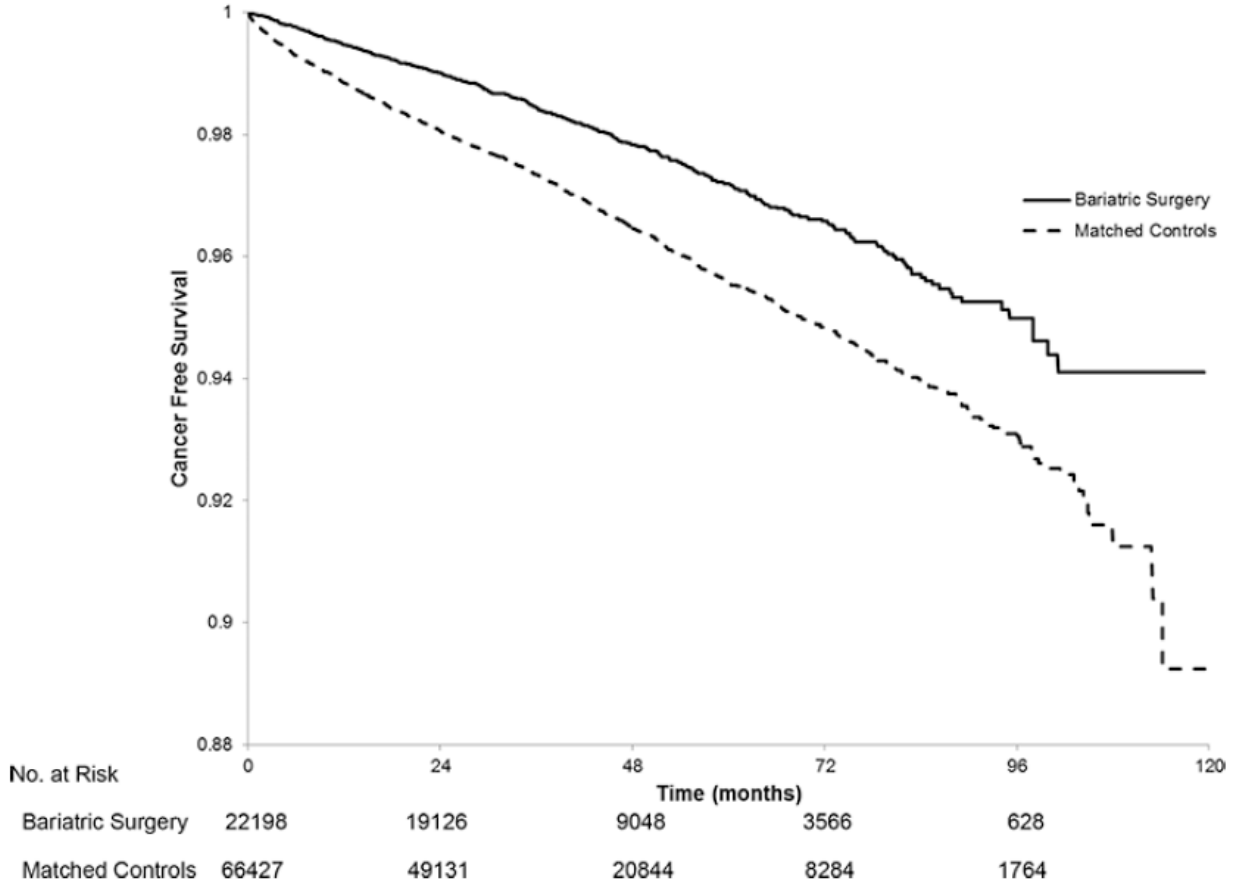
  Data from a large integrated health insurance and care delivery systems

- 22,198 subjects who had MBS & 66,427 non-surgical subjects matched on sex, age, study site, BMI and Elixhauser comorbidity index.

- Incidence of cancer up to 10 years

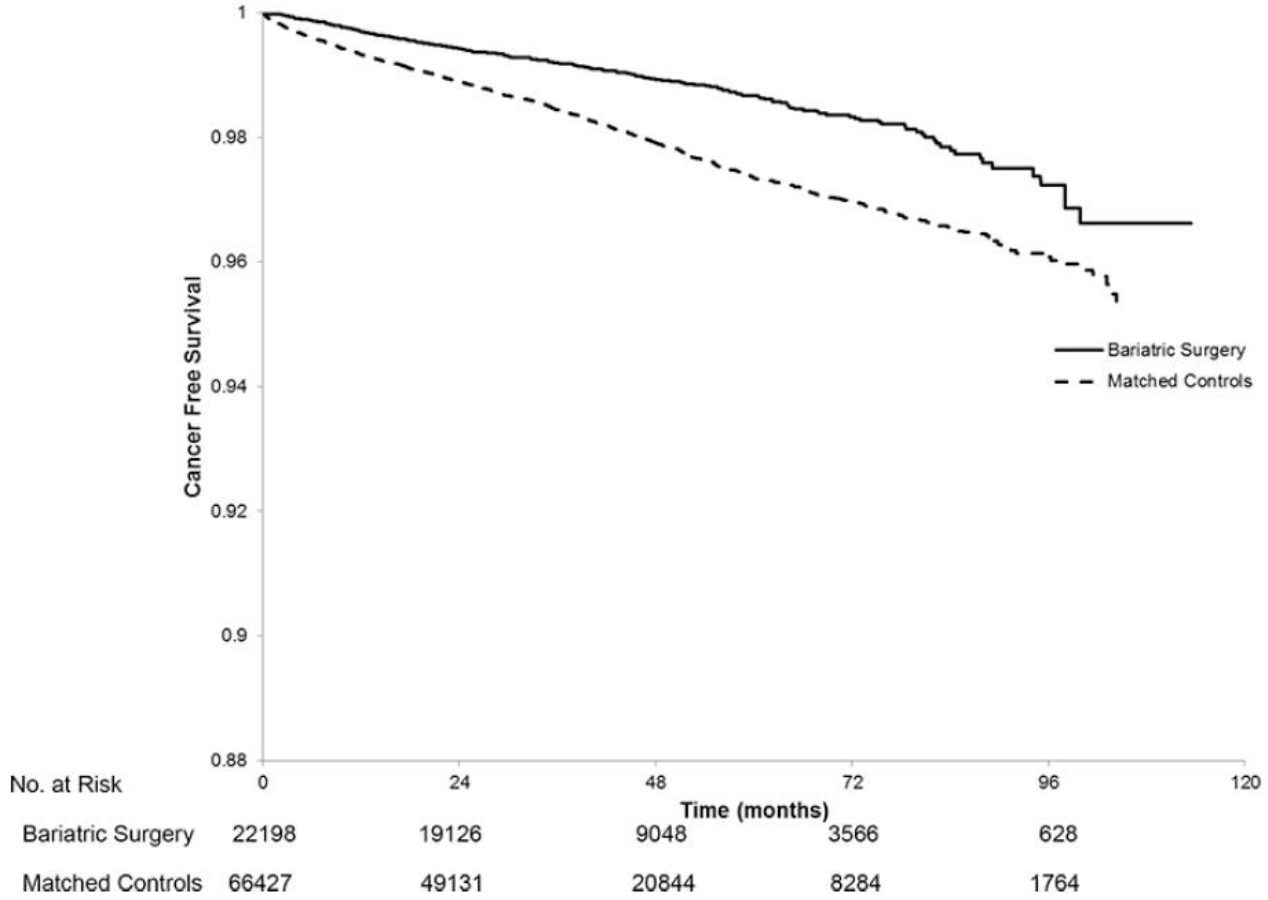
Schauer et al. Ann Surg. 2019 January ; 269(1): 95–101

All Cancers Outcome



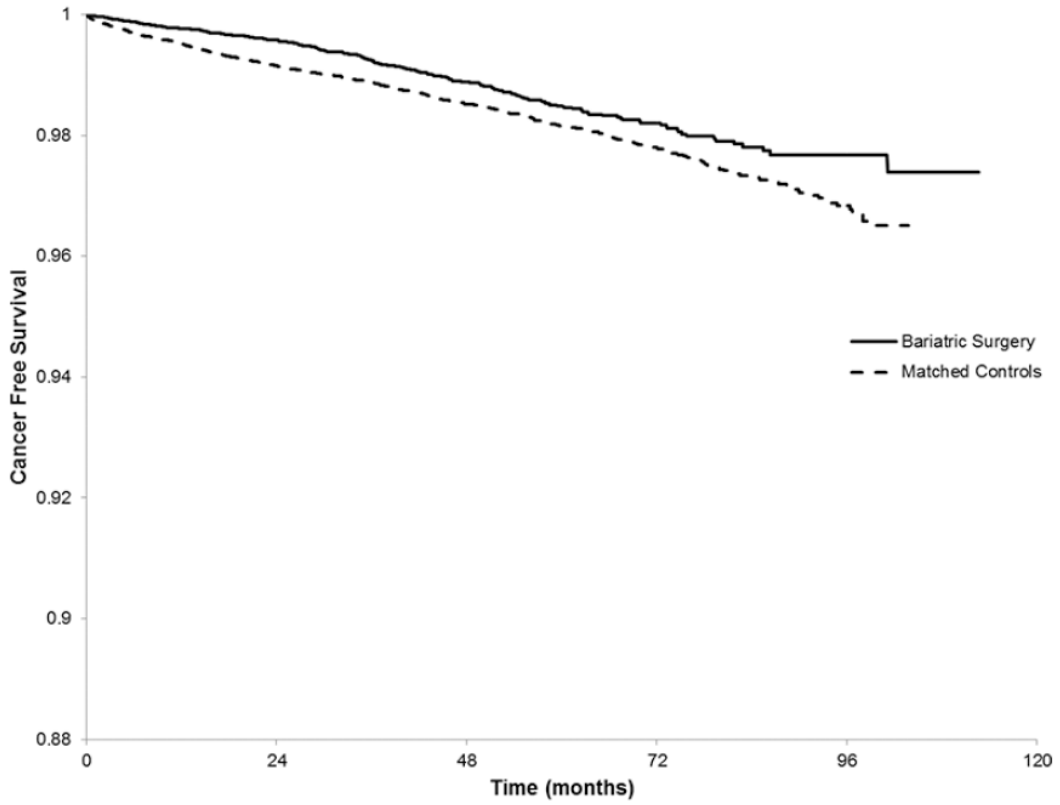
Schauer et al. Ann Surg. 2019 January ; 269(1): 95–101

Obesity Associated Cancer Outcome



Schauer et al. Ann Surg. 2019 January ; 269(1): 95–101

Cancers not associated with obesity Outcome



No. at Risk					
Bariatric Surgery	22198	19126	9048	3566	628
Matched Controls	66427	49131	20844	8284	1764

Schauer et al. Ann Surg. 2019 January ; 269(1): 95–101

MBS and Cancer Risk Reduction

- MBS pts had a 33% lower hazard of developing any cancer (HR 0.67, 95% C.I. 0.60, 0.74)
- Obesity-associated cancers 41% lower hazard (HR 0.59, 95% C.I. 0.51, 0.69)
  - Postmenopausal breast 42% (HR 0.58, 95% C.I. 0.44, 0.77)
  - Colon 41% (HR 0.59, 95% C.I. 0.36, 0.97)
  - Endometrial 50% (HR 0.50, 95% C.I. 0.37, 0.67)
  - Pancreatic cancer 54%(HR 0.46, 95% C.I. 0.22, 0.97)

Schauer et al. Ann Surg. 2019 January ; 269(1): 95–101

MBS & Cancer

- Systematic review and meta-analysis demonstrated that BS is associated with a reduced
  - Overall incidence of cancer (RR 0.62, 95% CI 0.46–0.84)
  - Obesity-related cancer (RR 0.59, 95%CI 0.39–0.90)

Wilson RB et al. Int J Mol Sci. 2023;24(7):6192

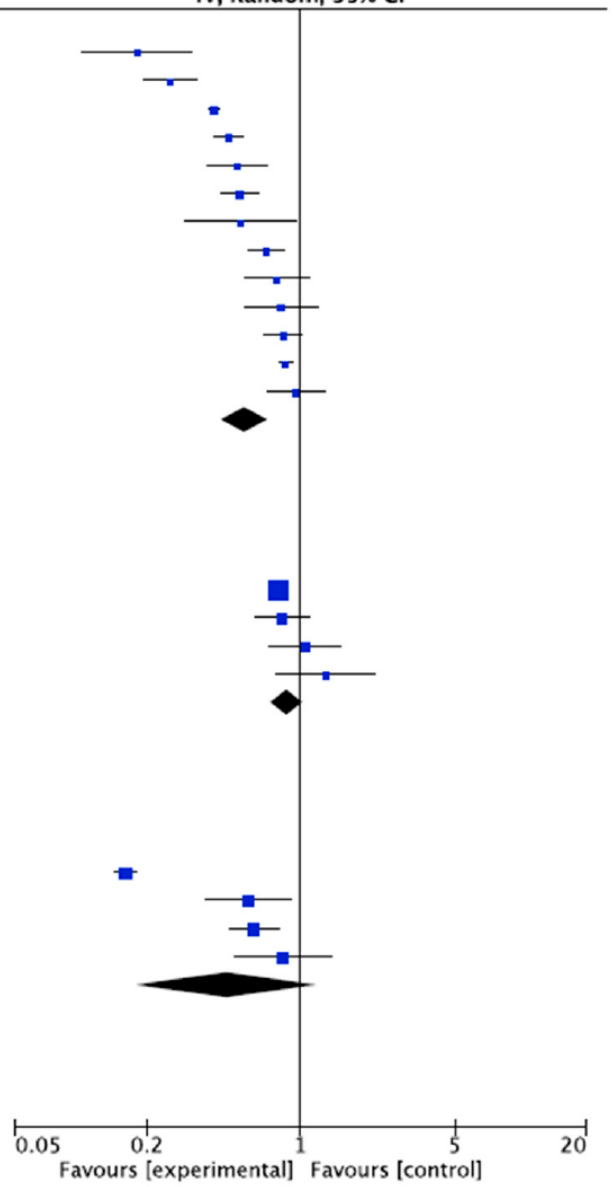
Post MBS Recurrent Weight Gain & Cancer

- Multi-center population-based study
- Cumulative incidence of cancers among patients with weight recurrence was significantly lower (52%) in the MBS compared to the nonsurgical control group (HR 0.48, 95%CI 0.459–0.507)
- This protective effect extends to specific cancers such as breast, endometrial, & colorectal cancers

Aminian A et al. JAMA. 2022;327(24):2423-33

MBS and Breast Cancer

Study or Subgroup	Bariatric Surgery Events	Total	No Surgery Events	Total	Weight	Risk Ratio IV, Random, 95% CI
1.3.1 Overall						
Christou 2008	12	679	362	3678	5.9%	0.18 [0.10, 0.32]
Mackenzie 2018	61	7069	239	7069	7.8%	0.26 [0.19, 0.34]
Lazzati 2022	1360	235410	6713	469746	8.6%	0.40 [0.38, 0.43]
Tao 2020	179	36533	3328	318596	8.4%	0.47 [0.40, 0.54]
Doumouras 2022	59	12724	114	12724	7.6%	0.52 [0.38, 0.71]
Aravani 2018	101	30436	3806	606005	8.2%	0.53 [0.43, 0.64]
Hassinger 2019	17	2430	32	2430	5.8%	0.53 [0.30, 0.95]
Feigelson 2020	133	17998	567	53889	8.3%	0.70 [0.58, 0.85]
Aminian 2022	39	3884	252	19514	7.5%	0.78 [0.56, 1.09]
Anveden 2017	48	1420	60	1447	7.2%	0.82 [0.56, 1.18]
Khalid 2021	256	15828	153	7914	8.2%	0.84 [0.69, 1.02]
Tsui 2021	834	55781	4313	247102	8.6%	0.86 [0.80, 0.92]
Adams 2009	73	5654	107	7872	7.7%	0.95 [0.71, 1.28]
Subtotal (95% CI)		**425846**		**1757986**	**100.0%**	**0.56 [0.44, 0.71]**
Total events	3172		20046			
Heterogeneity: $Tau^2 = 0.18$; $Chi^2 = 340.97$, df = 12 ($P < 0.00001$); $I^2 = 96\%$						
Test for overall effect: $Z = 4.65$ ($P < 0.00001$)						
1.3.2 Pre-menopausal						
Lazzati 2022	1029	235410	2576	469746	52.5%	0.80 [0.74, 0.86]
Feigelson 2020	65	17998	236	53889	23.0%	0.82 [0.63, 1.08]
Adams 2009	49	5654	65	7872	15.4%	1.05 [0.73, 1.52]
Aminian 2022	18	3884	70	19514	9.1%	1.29 [0.77, 2.17]
Subtotal (95% CI)		**262946**		**551021**	**100.0%**	**0.88 [0.74, 1.04]**
Total events	1161		2947			
Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 5.22$, df = 3 ($P = 0.16$); $I^2 = 43\%$						
Test for overall effect: $Z = 1.54$ ($P = 0.12$)						
1.3.3 Post-menopausal						
Lazzati 2022	331	235410	4137	469746	25.9%	0.16 [0.14, 0.18]
Aminian 2022	21	3884	182	19514	24.5%	0.58 [0.37, 0.91]
Feigelson 2020	68	17998	331	53889	25.5%	0.62 [0.47, 0.80]
Adams 2009	24	5654	40	7872	24.2%	0.84 [0.50, 1.38]
Subtotal (95% CI)		**262946**		**551021**	**100.0%**	**0.46 [0.18, 1.18]**
Total events	444		4690			
Heterogeneity: $Tau^2 = 0.88$; $Chi^2 = 136.05$, df = 3 ($P < 0.00001$); $I^2 = 98\%$						
Test for overall effect: $Z = 1.62$ ($P = 0.10$)						



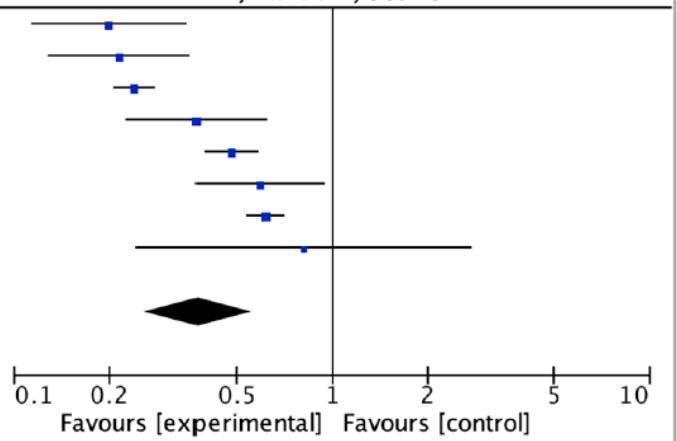
Wilson RB et al. Int J Mol Sci. 2023;24(7):6192

MBS Endometrial Ovarian and Cancers

Study or Subgroup	Bariatric Surgery Events	Total	No Surgery Events	Total	Weight	Risk Ratio IV, Random, 95% CI
Adams 2009	14	5654	98	7872	11.7%	0.20 [0.11, 0.35]
Mackenzie 2018	18	7069	84	7069	12.2%	0.21 [0.13, 0.36]
Lazzati 2022	203	235410	1692	469746	15.1%	0.24 [0.21, 0.28]
Aminian 2022	16	3884	215	19514	12.2%	0.37 [0.23, 0.62]
Tao 2020	113	36533	2050	318596	14.9%	0.48 [0.40, 0.58]
Anveden 2017	28	1420	48	1447	12.7%	0.59 [0.38, 0.94]
Tsui 2021	260	55781	1873	247102	15.2%	0.61 [0.54, 0.70]
Christou 2008	3	679	20	3678	6.1%	0.81 [0.24, 2.73]
Total (95% CI)		**346430**		**1075024**	**100.0%**	**0.38 [0.26, 0.55]**
Total events	655		6080			

Heterogeneity: $Tau^2 = 0.25$; $Chi^2 = 109.50$, df = 7 ($P < 0.00001$); $I^2 = 94\%$

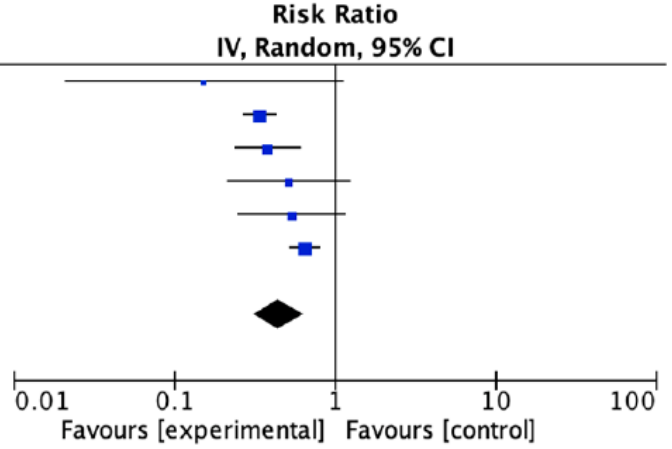
Test for overall effect: Z = 4.97 ($P < 0.00001$)



Study or Subgroup	Bariatric Surgery Events	Total	No Surgery Events	Total	Weight	Risk Ratio IV, Random, 95% CI
Aminian 2022	1	3884	33	19514	3.0%	0.15 [0.02, 1.11]
Lazzati 2022	87	235410	512	469746	26.5%	0.34 [0.27, 0.43]
Khalid 2021	31	15828	41	7914	19.8%	0.38 [0.24, 0.60]
Adams 2009	7	5654	19	7872	11.0%	0.51 [0.22, 1.22]
Anveden 2017	10	1420	19	1447	12.8%	0.54 [0.25, 1.15]
Tsui 2021	102	55781	701	247102	27.0%	0.64 [0.52, 0.79]
Total (95% CI)		**317977**		**753595**	**100.0%**	**0.45 [0.31, 0.64]**
Total events	238		1325			

Heterogeneity: $Tau^2 = 0.11$; $Chi^2 = 19.06$, df = 5 ($P = 0.002$); $I^2 = 74\%$

Test for overall effect: Z = 4.38 ($P < 0.0001$)



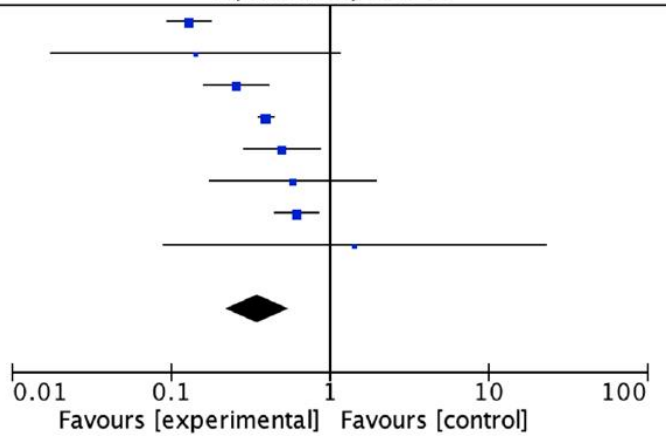
Wilson RB et al. Int J Mol Sci. 2023;24(7):6192

MBS HPB and Renal Cancers

Study or Subgroup	Bariatric Surgery Events	Total	No Surgery Events	Total	Weight	Risk Ratio IV, Random, 95% CI
Lazzati 2022	40	288604	914	851743	17.7%	0.13 [0.09, 0.18]
Kwak 2020	1	2057	7	2055	3.8%	0.14 [0.02, 1.16]
Tao 2020	18	49096	617	433476	16.0%	0.26 [0.16, 0.41]
Yang 2016	336	178192	74402	15584065	19.1%	0.39 [0.35, 0.44]
Khalid 2021	25	19272	25	9636	15.0%	0.50 [0.29, 0.87]
Aminian 2022	3	5053	26	25625	8.3%	0.59 [0.18, 1.93]
Tsui 2020	44	71000	324	323197	17.7%	0.62 [0.45, 0.85]
Adams 2009	1	6596	1	9442	2.4%	1.43 [0.09, 22.88]
Total (95% CI)		**619870**		**17239239**	**100.0%**	**0.35 [0.22, 0.55]**
Total events	468		76316			

Heterogeneity: $Tau^2 = 0.28$; $Chi^2 = 59.80$, df = 7 ($P < 0.00001$); $I^2 = 88\%$

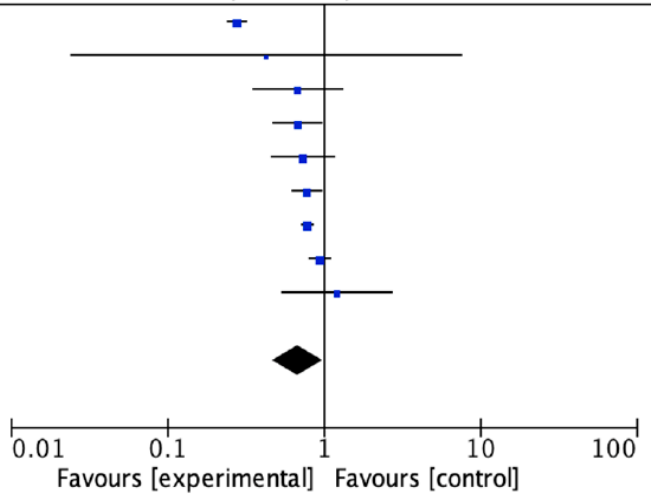
Test for overall effect: $Z = 4.52$ ($P < 0.00001$)



Study or Subgroup	Bariatric Surgery Events	Total	No Surgery Events	Total	Weight	Risk Ratio IV, Random, 95% CI
Lazzati 2022	210	288604	2241	851743	14.0%	0.28 [0.24, 0.32]
Christou 2008	0	1035	6	5746	1.5%	0.43 [0.02, 7.57]
Aminian 2022	10	5053	75	25625	9.9%	0.68 [0.35, 1.31]
Aravani 2018	31	39747	1110	962860	12.6%	0.68 [0.47, 0.97]
Khalid 2021	44	19272	30	9636	11.7%	0.73 [0.46, 1.17]
Tao 2020	87	49096	990	433476	13.6%	0.78 [0.62, 0.97]
Botero-Fonnegra 2022	684	296041	5935	2004804	14.2%	0.78 [0.72, 0.84]
Tsui 2020	194	71000	937	323197	13.9%	0.94 [0.81, 1.10]
Adams 2009	11	6596	13	9442	8.6%	1.21 [0.54, 2.70]
Total (95% CI)		**776444**		**4626529**	**100.0%**	**0.69 [0.47, 0.99]**
Total events	1271		11337			

Heterogeneity: $Tau^2 = 0.25$; $Chi^2 = 187.60$, df = 8 ($P < 0.00001$); $I^2 = 96\%$

Test for overall effect: $Z = 1.99$ ($P = 0.05$)



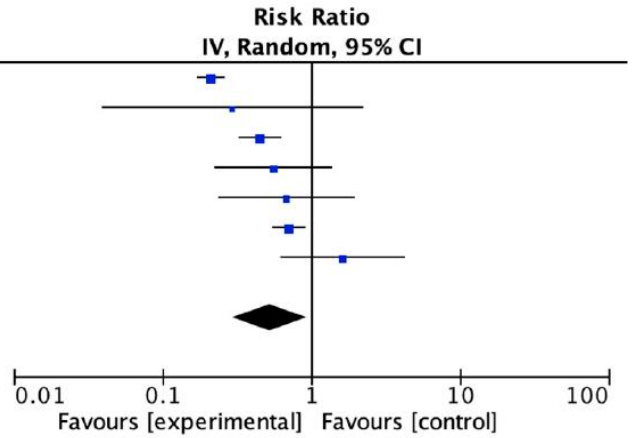
Wilson RB et al. Int J Mol Sci. 2023;24(7):6192

MBS Pancreas & Gall Bladder

Study or Subgroup	Bariatric Surgery Events	Total	No Surgery Events	Total	Weight	Risk Ratio IV, Random, 95% CI
Lazzati 2022	98	288604	1382	851743	19.0%	0.21 [0.17, 0.26]
Christou 2008	1	1035	19	5746	5.8%	0.29 [0.04, 2.18]
Tao 2020	41	49096	808	433476	18.4%	0.45 [0.33, 0.61]
Khalid 2021	10	19272	9	9636	13.2%	0.56 [0.23, 1.37]
Aminian 2022	4	5053	30	25625	11.9%	0.68 [0.24, 1.92]
Tsui 2020	74	71000	481	323197	18.8%	0.70 [0.55, 0.89]
Adams 2009	9	6596	8	9442	12.7%	1.61 [0.62, 4.17]
Total (95% CI)		**440656**		**1658865**	**100.0%**	**0.52 [0.29, 0.93]**
Total events	237		2737			

Heterogeneity: $Tau^2 = 0.44$; $Chi^2 = 68.39$, df = 6 ($P < 0.00001$); $I^2 = 91\%$

Test for overall effect: $Z = 2.20$ ($P = 0.03$)



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Tsui 2020	74	71000	481	323197	18.8%	0.70 [0.55, 0.89]
Adams 2009	9	6596	8	9442	12.7%	1.61 [0.62, 4.17]
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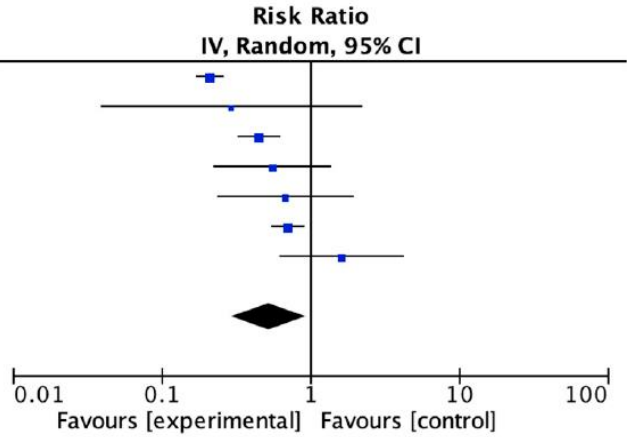
Test for overall effect: $Z = 2.20$ ($P = 0.03$)



Wilson RB et al. Int J Mol Sci. 2023;24(7):6192

MBS and Specific Cancers

- MBS was associated with a reduction in the future incidence of
  - Hepatocellular carcinoma (RR 0.35, 95%CI 0.22–0.55)
  - Colorectal cancer (RR 0.63, 95%CI 0.50–0.81)
  - Pancreatic cancer (RR 0.52, 95%CI 0.29–0.93)
  - Gallbladder cancer (RR 0.41, 95%CI 0.18–0.96)
  - Breast cancer (RR 0.56, 95%CI 0.44–0.71)
  - Endometrial cancer (RR 0.38, 95%CI 0.26–0.55,
  - Ovarian cancer (RR 0.45, 95%CI 0.31–0.64)

Wilson RB et al. Int J Mol Sci. 2023;24(7):6192

MBS and Specific Cancers

- No significant reduction in the incidence of
  - Esophageal
  - Gastric
  - Thyroid
  - Renal
  - prostate cancer
  - Multiple myeloma

Wilson RB et al. Int J Mol Sci. 2023;24(7):6192

MBS & UGI cancer

- 748,932 pts with obesity, of whom 91,731 underwent MBS
- Predominantly RYGB (n=70,176; 76.5%)
- Adjusted risk of esophageal cancer decreased over time from 2.2 after 2 to 5 years to 0.6 after 10 to 40 years
- RYGB was followed by a strongly decreased adjusted risk of esophageal adenocarcinoma (HR 0.3, 95%CI 0.1–0.8) but not of cardia adenocarcinoma (HR 0.9, 95%CI 0.5–1.6)

Åkerström JH et al. Ann Surg. 2023;278(6):904-9.

CRC

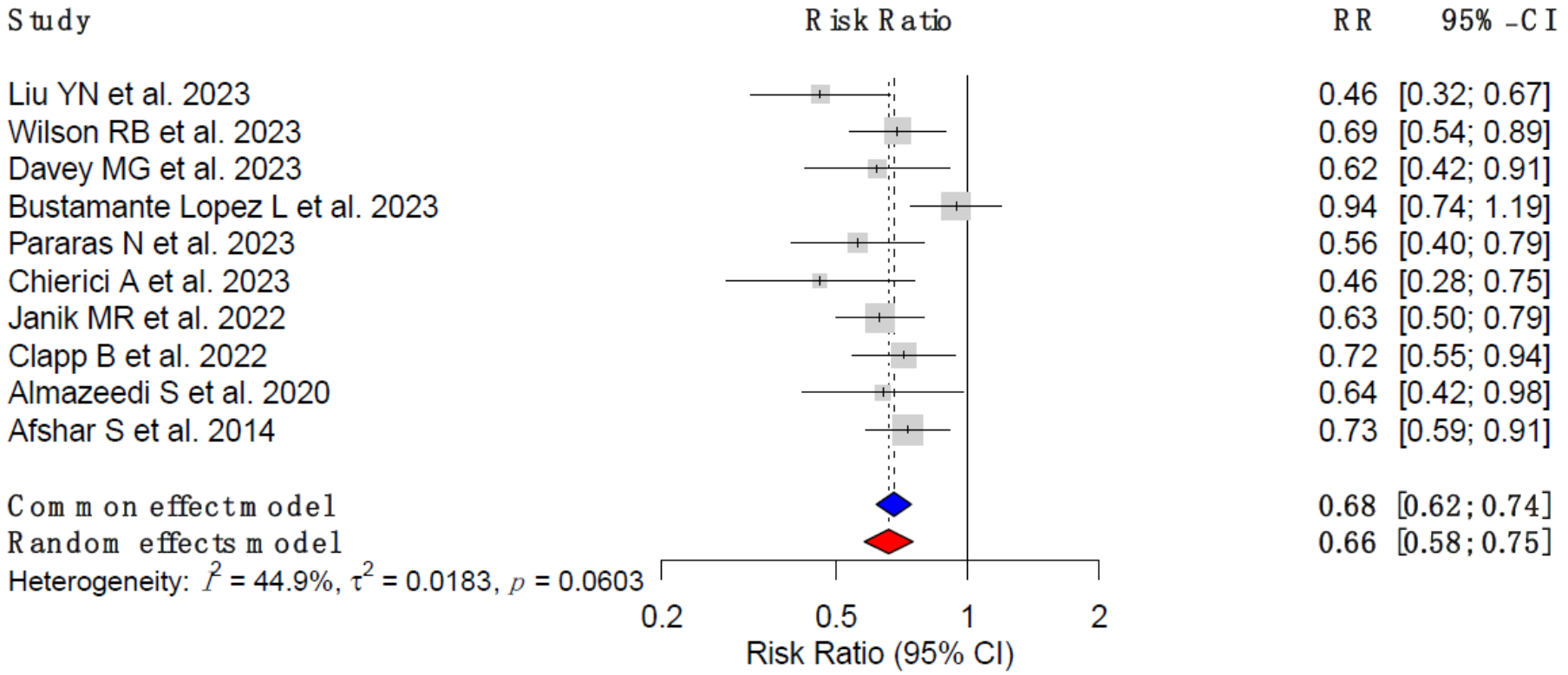


Figure 2. Forest plot depicting the reduction in the risk of colorectal cancer (CRC) following metabolic bariatric surgery (MBS)

Aman Goyal et al. Cancers 2025, 17, 670

LSG and Cancer

- Reduction in overall cancer incidence compared to nonsurgical treatment in patients undergoing SG was 0.44 (OR) (95%CI 0.27–0.70)
- Notable concern for esophageal cancer due to increased GERD (41%) and Barrett's esophagus (18%)
- SG is generally lower for most cancer types, vigilance for esophageal cancer remains necessary.

Chen ZW et al. Surg Obes Relat Dis. 2024;20(5):467-81

Sebastianelli L et al. Obes Surg. 2019;29(5):1462-9

RYGB & Cancer

- Systematic review
  - Post-RYGB gastroesophageal cancer in 27/44 occur in the gastric tube

    Chemaly R et al. Obes Surg. 2022;32(4):1300-11.

  - 21 cases of remnant gastric cancer after RYGB, with a median time to diagnosis of 11 years postoperatively

    Dong SL et al. https://doi.org/10.3760/cma.j.cn441530-20211221-00515

- Gastric cancer in the excluded stomach post-RYGB - 77% of these cancers diagnosed at an advanced stage

  Doukas SG et al. Obes Surg. 2023;33(6):1876-88.

MBS – OAGB

- Gastroesophageal cancer incidence similar to RYGB
- Systematic review and meta-analysis
  - 37.5% of gastroesophageal cancers after OAGB were located in the gastric tube vs 61% after RYGB OR of 0.38
  - Indicating no significant increase in cancer occurrence in the gastric tube after OAGB compared to RYGB
- The arguments that bile reaches the terminal ileum diluted are unfounded, since physiology studies show that 90% of bile reaches that location intact, where it is later reabsorbed
- OAGB should be used with great caution, since the potential harmful effects, such as the development of cancer in the gastric remnant and esophagus, may only become apparent 30 to 40 years postoperatively

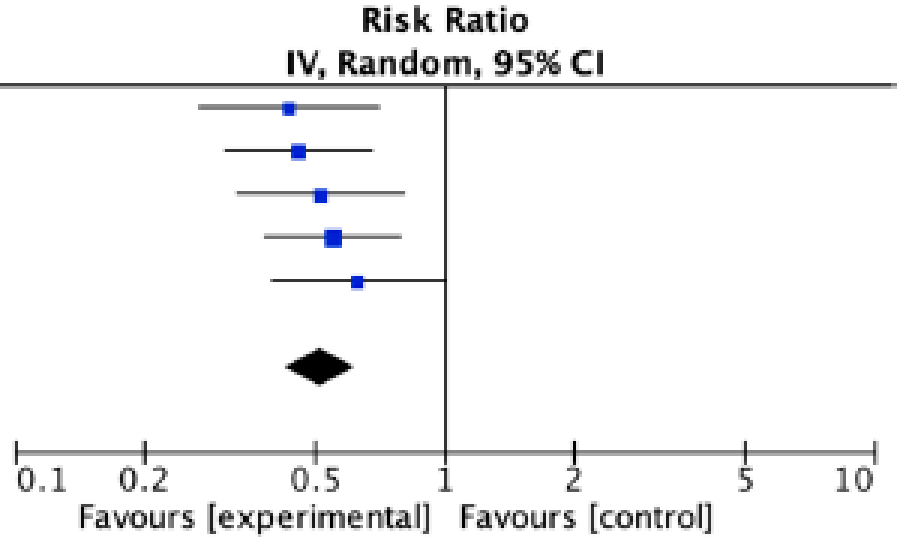
Chemaly R et al. Obes Surg. 2022;32(4):1300-11.
Basso L et al J Clin Med. 2022;11(6):1498.

MBS & Cancer Related Mortality

- MBS was associated with a significant reduction in the incidence of cancer-related mortality (RR 0.51, 95% CI 0.42–0.62)

Study or Subgroup	Bariatric Surgery Events	Total	No Surgery Events	Total	Weight	Risk Ratio IV, Random, 95% CI
Gribsholt 2016	17	9895	983	247366	15.4%	0.43 [0.27, 0.70]
Doumouras 2020	36	13679	79	13679	22.8%	0.46 [0.31, 0.68]
Aminian 2022	21	5053	205	25265	17.6%	0.51 [0.33, 0.80]
Adams 2009	41	6596	107	9442	27.4%	0.55 [0.38, 0.79]
Sjostrom 2013	29	2010	47	2037	16.8%	0.63 [0.40, 0.99]
Total (95% CI)		**37233**		**297789**	**100.0%**	**0.51 [0.42, 0.62]**
Total events	144		1421			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.69$, df = 4 (P = 0.79); $I^2 = 0\%$
Test for overall effect: Z = 6.98 (P < 0.00001)



Robert B. Wilson et al. Int. J. Mol. Sci. 2023, 24, 6192

GLP-1 and Breast Cancer

- Addressing obesity in breast cancer patients is critical for improving prognosis and quality of life.
- While current data do not suggest adverse safety signals with GLP-1 receptor agonists

Study	Population	Intervention	Duration	Risk of breast cancer	References
Sun et al. (2024)	Adults with and without cancer	GLP-1 RA	Variable	Reduced risk of breast cancer (OR 0.92, 95% CI 0.88–0.96)	[94]
Levy et al. (2024)	Adults with obesity	GLP-1 RA	5-year follow-up	Reduced risk of breast cancer (HR 0.72, 95% CI 0.64–0.82)	[95]
Piccoli et al. (2021)	Adults with obesity and/or diabetes	GLP-1 RA	Variable, minimum 24 weeks	No increased risk of breast cancer (RR 0.98, 95% CI 0.76–1.26)	[47]
Hicks et al. (2016)	Women with type 2 diabetes	GLP-1 vs. DPP-4 inhibitors	Variable, mean follow-up 3.5 years	No increased risk of breast cancer compared to DPP-4 (HR 1.40, 95% CI 0.91–2.16)	[96]

Kayla Parsons et al. Cancer Medicine, 2025; 14:e70932

GLP-1 and Cancers

- Steepest weight regain after the cessation of semaglutide occurred in patients who had previously lost >20% of their TBW
- This reflects the persistence of neurohormonal and behavioural pathways in patients with obesity
- How pharmacological treatment translates to a long-term reduction in cancer incidence in obese patients remains to be shown

Kayla Parsons et al. Cancer Medicine, 2025; 14:e70932

The Future state

- There is an opportunity for research to be conducted on the effect of MBS for cancers given the considerable variability in the existing data
- Additional research is required on the subtypes of various cancers and specific patient populations, such as pre- and postmenopausal breast cancer and ER-negative and ER-positive breast cancer, which would enable clarity on the molecular mechanisms involved and enable development of management strategies

In Conclusion

- Obesity is associated with elevated risk of cancers
- Level 1 evidence reports reduced overall incidence of cancer, obesity related cancer and cancer related mortality following MBS
- Procedure specific (MBS) concerns warrant continued research
- The tumor's biology, behavior, and aggressiveness depend not only on the gender but also on the patient's age and metabolic and biological conditions
- Whether pharmacological treatment translates to a long-term reduction in cancer incidence in obese patients remains to be shown