MUSHROOMS AND THEIR NUTRITIONAL VALUE

Taisiya Kupriyanova, RDN, CDCES, CSOWM

- Many scientists estimate the total number of species of fungi to be in the millions, though only approximately 140,000 have been described (source: NPS)

- Well over 14,000 species of mushroom-producing fungi have been described, and that is likely only a fraction of the species that exist. Mushroom-producing fungi make up a very small group within the fungal kingdom (source: NPS)

- there are ~2000 edible varieties of mushrooms (source: Institute of Food Technologists)

- common mushrooms in grocery store:

  - white button, cremini // baby bella, portobello, shiitake, oyster, enoki, maitake, chanterelle, porcini, beech, lion's mane

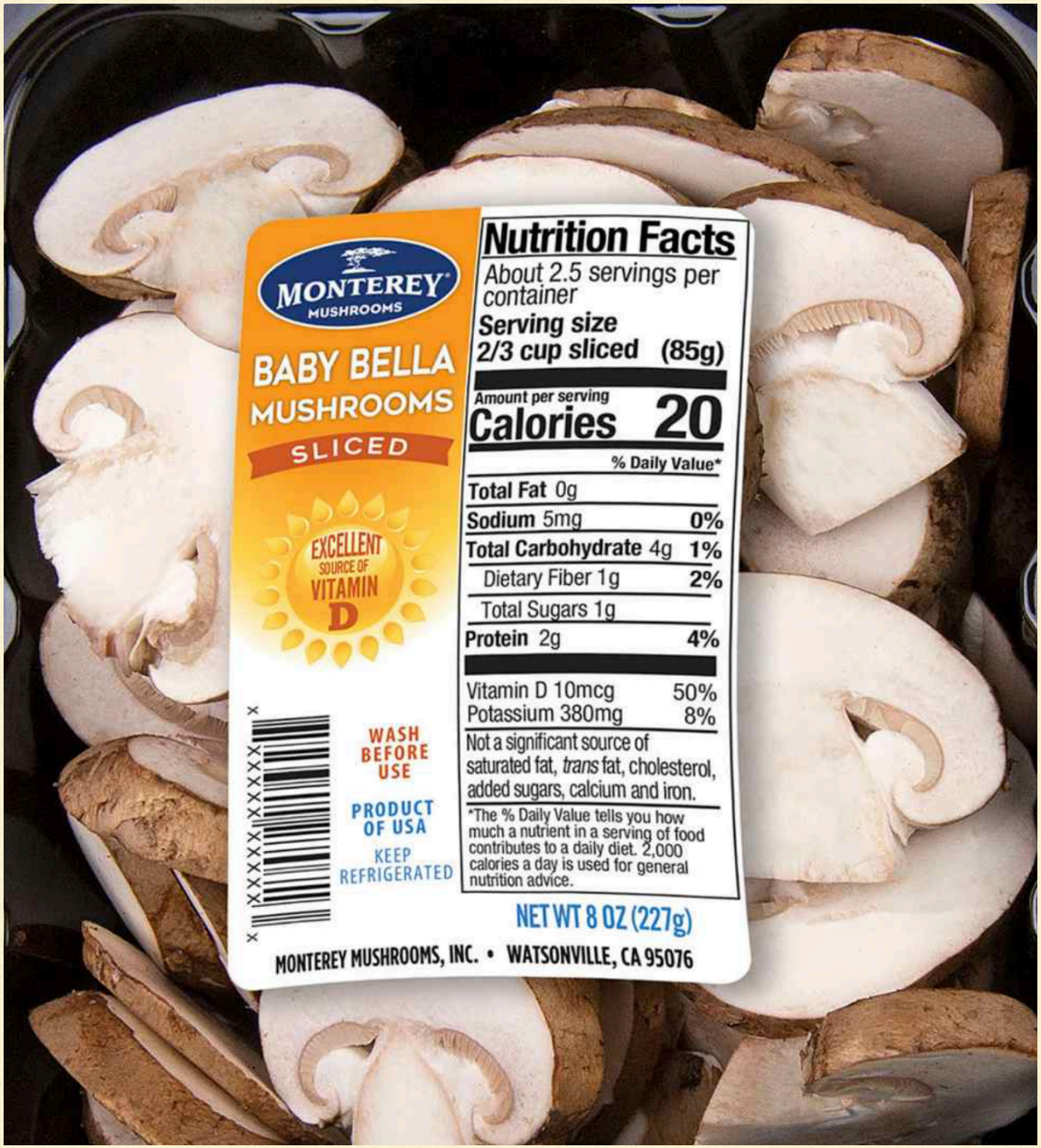
BASIC NUTRITION

- carbohydrate
- fat
- protein
- 13 vitamins
- 16 essential minerals
- water

- **Nutrient content of 100gm white button mushrooms // *Agaricus bisporus***
  - ~31kcal
  - 0.4gm fat
  - 4.08gm CHO
    - ~1.7gm fiber
  - ~2.89gm protein
  - 92gm water
  - good source: potassium, phosphorus, copper, selenium, thiamine, riboflavin, niacin, pyridoxine
  - some: calcium, magnesium, sodium, manganese, folate
  - vitamin D
  - beta-glucan 0.75gm
  - ergothioneine 4mg
  - glutathione 4mg
  - phytosterols 65mg
- (source: FoodData Central , 2021)

	100GM WHITE BUTTON	WOMEN, 19+	MEN, 19+
Calcium	5mg	1000-1200mg	1000-1200mg
Magnesium	10.2mg	310-320mg	400-420mg
Phosphorus	93mg	700mg	700mg
Potassium	373mg	2600mg	3400mg
Sodium	6mg	23000mg	2300mg
Zinc	0.51mg	8mg	11mg
Copper	389mcg	900mcg	900mcg
Iron	0.23mg	8-18mg	8mg
Mangenese	0.054mg	1.8mg	2.3mg
Selenium	20mcg	55mcg	55mcg
Thiamin / B1	0.065mg	1.1mg	1.2mg
Riboflavin / B2	0.444mg	1.1mg	1.3mg
Niacin / B3	3.88mg	14mg	16mg
Pyridoxine / B6	0.077mg	1.3mg	1.3-1.7mg
Folate / B9	35mcg	400mcg	400mcg
Vitamin D	0.9 IU	600-800IU	600-800IU

- **Vitamin D**
- vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol)
- mushroom are one the few food sources where the precursor to vitamin D occurs naturally - ergosterol
- mushroom harvested from the wild have historically contained higher amounts of vitamin D in comparison to those grown commercially (source: eatright.org)
- small amount of vitamin D2 is synthesized in the mushrooms by exposure to natural occurring UV light during growing
- conversation is accelerated by exposing mushrooms to UV light during processing
- The dose and length of treatment can affect the amount of vitamin D
- (source: USDA)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SLICED
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SOURCE OF
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D
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PRODUCT
OF USA
KEEP
REFRIGERATED
Nutrition Facts
About 2.5 servings per container
Serving size
2/3 cup sliced (85g)
Amount per serving
Calories 20
% Daily Value*
Total Fat 0g
Sodium 5mg 0%
Total Carbohydrate 4g 1%
Dietary Fiber 1g 2%
Total Sugars 1g
Protein 2g 4%
Vitamin D 10mcg 50%
Potassium 380mg 8%
Not a significant source of saturated fat, trans fat, cholesterol, added sugars, calcium and iron.
*The % Daily Value tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.
NET WT 8 OZ (227g)
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Table 2. Vitamin D content of Mushrooms

Mushroom/ Sample Location	Vitamin D_2 (µg/100 g)	Vitamin D_2 (IU/100 g)
Chanterelle, raw		
Producer 3, Lot 1	2.2	87
Producer 3, Lot 2	8.4	336
Crimini , raw		
CA_1, CA_2, NC*	0.03	1
CO, IN, VA	0.06	2
Producer 1	0.08	3
Producer 2	0.05	2
Enoki, raw		
MI	0.4	16
Producer 1, Lot 1	0.04	2
Producer 1, Lot 2	0.04	2
Producer 2, Lot 1	0.07	3
Maitake , raw		
Producer 1, Lot 1	0.08	3
Producer 1, Lot 2	0.12	5
Producer 4, Lot 1	63.2	2529
Producer 4, Lot 2	48.9	1956
Morel, raw		
Producer 5, Lot 1	4.5	181
Producer 5, Lot 2	5.4	217
Producer 6, Lot 1	4.4	176
Producer 6, Lot 2	6.3	250
Oyster , raw		
CO, VA	0.1	5
FL, MO, NY	2.6	103
MI, VA	0.07	3
Producer 1	0.08	3
Portabella , raw		
CA_1, MI	0.1	4
CA_2, NC, OK	0.8	31
CO, CT, IN	0.05	2
FL, MO, NY	0.1	4
Shiitake, raw		
CO, IN, VA	1.2	46
FL, MO, NY	0.4	16
NC, MI, VA	0.15	6
Producer 1	0.03	1
White button, raw		
AL, CA_1, MI	0.2	9
CA_2, NC, OK	0.07	3
CO, CT, IN	0.1	4
FL, MO, NY	0.06	2

Table 1. Vitamin D content of portabella mushrooms exposed to UV light

Mushroom / Sample Location	Vitamin D_2 (µg/100 g)	Vitamin D_2 (IU/100 g)
Portabella, exposed to UV light, grilled		
Producer 1, Lot 1	3.4	138
Producer 1, Lot 2	3.1	124
Producer 2, Lot 1	20.3	812
Producer 2, Lot 2	25.6	1022
Portabella, exposed to UV light, raw		
Producer 1, Lot 1	3.4	134
Producer 1, Lot 2	3.6	146
Producer 2, Lot 1	16.8	671
Producer 2, Lot 2	20.9	835

- vitamin D: 1mcg=40IU

Nutrition Facts	UNIT	RDV	Whites & "General" Mushroom				Baby Bellas				Portabellas			
			AMT PER	% DV calc.	LABEL Amt	LABEL % DV	AMT PER	% DV calc.	LABEL Amt	LABEL % DV	AMT PER	% DV calc.	LABEL Amt	LABEL % DV
Serving Size			5 med. or 2/3 C sliced 85g /3.0 oz.				5 med. or 2/3 C sliced 85g /3.0 oz.				2/3 C sliced - 85g /3.0 oz.			
Calories (per serving)	kcal	n/a	20		20		20		20		20		20	
Total Fat	g	78	0	0%	0 g	0%	0.09	0.1%	0 g	0%	0.3	0.4%	0 g	0%
Saturated Fat	g	20	0	0%	0 g	0%	0.012	0.1%	0 g	0%	0.051	0.3%	0 g	0%
Trans Fat	g	n/a	0	n/a	0 g	n/a	0	n/a	0 g	n/a	0	n/a	0 g	n/a
Cholesterol	mg	300	0	0%	0 mg	0%	0	0.0%	0 mg	0%	0	0.0%	0 mg	0%
Sodium	mg	2300	15	0.7%	15 mg	1%	5	0.2%	5 mg	0%	8	0.3%	10 mg	0%
Total Carbohydrates	g	275	3	1.1%	3 g	1%	3.65	1.3%	4 g	1%	3.29	1.2%	3 g	1%
Dietary Fiber	g	28	1	3.6%	1 g	4%	0.5	1.8%	<1 g	2%	1.1	3.9%	1 g	4%
Total Sugars	g	n/a	0	n/a	0 g	n/a	1.46	n/a	1 g	n/a	2.12	n/a	2 g	n/a
Incl. Added Sugars	g	50	0	0%	0 g	0%	0	0.0%	0 g	0%	0	0.0%	0 g	0%
Protein	g	50	3	6.0%	3 g	n/a	2.12	4.2%	2 g	n/a	1.79	3.6%	2 g	n/a
Vitamin D	mcg	20	0.2	1.0%	0 mcg	0%	0.1	0.5%	0 mcg	0%	0.3	1.5%	0 mcg	<2%
Calcium	mg	1300	0	0%	0 mg	0%	15	1.2%	20 mg	0%	3	0.2%	0 mg	0%
Iron	mg	18	2	10.0%	2 mg	10%	0.34	1.9%	0.3 mg	0%	0.26	1.4%	0.3 mg	0%
Potassium	mg	4700	300	6.4%	300 mg	6%	381	8.1%	380 mg	8%	309	6.6%	310 mg	6%
Riboflavin	mg	1.3	0.342	26.3%	0.3 mg	25%	0.416	32.0%	0.4 mg	30%	0.111	8.5%	0.1 mg	8%
Niacin	mg	16	3.07	19.2%	3 mg	20%	3.23	20.2%	3 mg	20%	3.82	23.9%	4 mg	25%
Pantothenic Acid	mg	5	1.27	25.4%	1 mg	25%	1.275	25.5%	1 mg	25%	0.9	18.0%	1 mg	20%
Selenium	mcg	55	7.9	14.4%	8 mcg	15%	22.1	40.2%	22 mcg	40%	15.6	28.4%	16 mcg	30%
Copper	mg	0.9	0.27	30.0%	0.3 mg	30%	0.425	47.2%	0.4 mg	50%	0.3	33.3%	0.3 mg	35%

Sourced from FDA and USDA databases

- Source: Monterey Mushroom, LCC. Last updated 6/2022.

Nutrition Facts	UNIT	RDV	Shiitake Mushrooms AMT PER	Shiitake Mushrooms % DV calc.	Shiitake Mushrooms LABEL Amt	Shiitake Mushrooms LABEL % DV	Oyster Mushrooms AMT PER	Oyster Mushrooms % DV calc.	Oyster Mushrooms LABEL Amt	Oyster Mushrooms LABEL % DV
Serving Size			85g /3.0 oz.				85g /3.0 oz.			
Calories (per serving)	kcal	n/a	28.9		30		28.1		30	
Total Fat	g	78	0.417	0.53%	0 g	1%	0.35	0.4%	0 g	0%
Saturated Fat	g	20	0	0%	0 g	0%	0.05	0.3%	0 g	0%
Trans Fat	g	n/a	0	n/a	0 g	n/a	0	n/a	0 g	n/a
Cholesterol	mg	300	0	0%	0 mg	0%	0	0.0%	0 mg	0%
Sodium	mg	2300	7.65	0.3%	10 mg	0%	15.3	0.7%	15 mg	0%
Total Carbohydrates	g	275	5.77	2.1%	6 g	2%	5.18	1.9%	5 g	2%
Dietary Fiber	g	28	2.13	7.6%	2 g	8%	1.96	7.0%	2 g	6%
Total Sugars	g	n/a	2.02	n/a	2 g	n/a	0.94	n/a	1 g	n/a
Incl. Added Sugars	g	50	0	0%	0 g	0%	0	0%	0 g	0%
Protein	g	50	1.9	n/a	2 g	n/a	2.81	n/a	3 g	n/a
Vitamin D	mcg	20	0.34	1.7%	0.3 mcg	2%	0.6	3.0%	0.6 mcg	2%
Calcium	mg	1300	1.7	0.1%	0 mg	0%	2.55	0.2%	0 mg	0%
Iron	mg	18	0.349	1.9%	0.3 mg	2%	1.13	6.3%	1.1 mg	6%
Potassium	mg	4700	258	5.5%	260 mg	6%	357	7.6%	360 mg	8%
Riboflavin	mg	1.3	0.184	14.2%	0.2 mg	15%	0.3	22.8%	0.3 mg	25%
Niacin	mg	16	3.295	20.6%	3.3 mg	20%	4.21	26.3%	4.2 mg	25%
Pantothenic Acid	mg	5	1.275	25.5%	1.3 mg	25%	1.1	22.0%	1.1 mg	20%
Selenium	mcg	55	4.845	8.8%	5 mcg	8%	2.21	4.0%	3 mcg	4%
Copper	mg	0.9	0.121	13.4%	0.1 mg	15%	0.21	23.0%	0.2 mg	25%

Sourced from FDA and USDA databases

- **glutathione**
- amino acid (glycine, cysteine, glutamic acid)
- anti-inflammatory // antioxidant
- we produce in body (in liver)
- other food sources: avocado, spinach, asparagus, okra; consuming sulfur rich foods, vitamin C foods, selenium rich foods

mushroom, 100gm	glutathione
Enoki // *Flammulina filiformis*	26mg
Maitake // *Grifola frondosa*	26mg
Pioppini // *Cyclocybe aegerita*	24mg
Oyster // *Pleurotus ostreatus*	18mg
Shiitake // *Lentinula edodes*	13mg
King oyster // *Pleurotus eryngii*	16mg
Lion's mane // *Hericium erinaceus*	16mg
Beech // *Hypsizygus tessulatus*	10mg
Cremini // *Agaricus bisporus*	6mg
Portabella // *Agaricus bisporus*	5mg
White button // *Agaricus bisporus*	4mg

- **ergothioneine**
- amino acid
- anti-inflammatory agent // antioxidant
- not synthesized in animal and human, obtained through dietary intake
- ergothioneine is proposed to be useful antioxidant in chronic inflammatory disease such as CVD, COPD, acute respiratory distress syndrome, pre-eclampsia (source: NIH)
- mushrooms have been shown to have very substantial effects on cognitive function due to ergothioneine (source: NIH)
- other food sources: kidney, liver, black and red beans, oat bran, tempeh

mushroom, 100gm	ergothioneine
Enoki // *Flammulina filiformis*	26mg
King oyster // *Pleurotus eryngii*	24mg
Pioppini // *Cyclocybe aegerita*	23mg
Lion's mane // *Hericium erinaceus*	17mg
Oyster // *Pleurotus ostreatus*	14mg
Shiitake // *Lentinula edodes*	11mg
Beech // *Hypsizygus tessulatus*	5mg
White button // *Agaricus bisporus*	4mg
Portabella // *Agaricus bisporus*	2mg
Maitake // *Grifola frondosa*	2mg
Cremini // *Agaricus bisporus*	1gm

Source: USDA, 2021

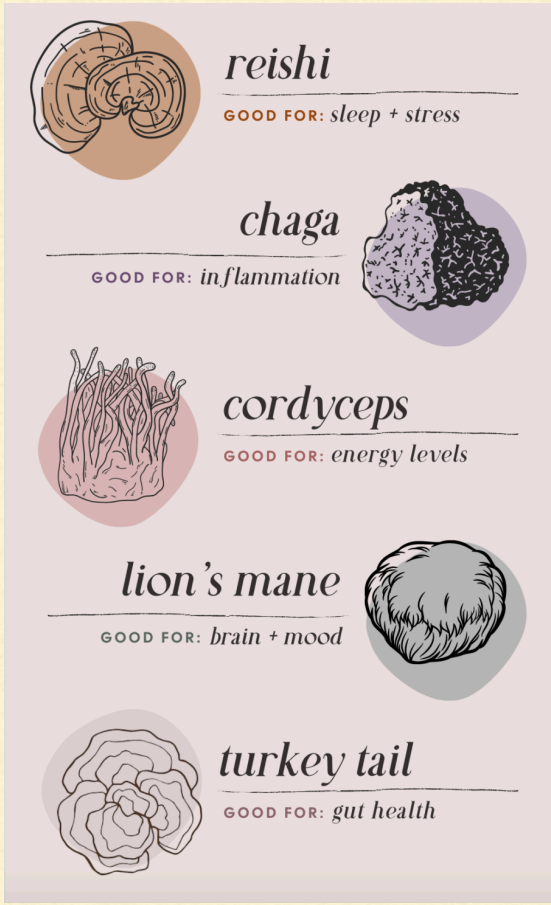
- **Beta-glucan**
- polysaccharides // fiber
- beneficial role in insulin resistance, high cholesterol, high blood pressure, obesity
- prebiotic
- microbiome
- other sources: oats, barley, rye, corn, seaweed
- (source: NIH)

mushroom, 100gm	beta-glucan
King oyster // *Pleurotus eryngii*	4.4gm
Oyster // *Pleurotus ostreatus*	3gm
Pioppini // *Cyclocybe aegerita*	2gm
Beech // *Hypsizygus tessulatus*	2.9gm
Shiitake // *Lentinula edodes*	2.8gm
Maitake // *Grifola frondosa*	2.5gm
Lion's mane // *Hericium erinaceus*	2.4gm
Enoki // *Flammulina filiformis*	2.2gm
Portabella // *Agaricus bisporus*	1.15gm
Cremini // *Agaricus bisporus*	0.9gm
White button // *Agaricus bisporus*	0.75gm

Source: USDA, 2021

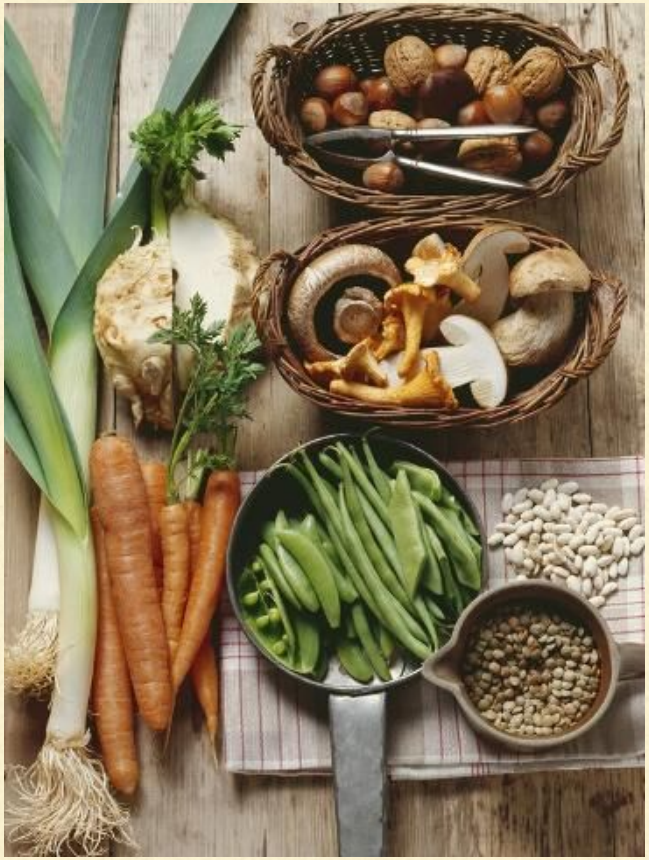
- **phytosterols:**
  - stigmasterol, campesterol, beta-sitosterol, ergosta-7-enol, ergosta-5,7-dienol, erogsta-7,22-dienol, ergosterol, beta-sitostanol, delta-5-avenasterol, delta-7-stigmastenol
- total: ~65mg in 100gm of white button mushrooms (source: USDA, 2021)
- daily consumption of 2gm of phytosterol could reduce reduce LDL by 8-10% (source: Cleveland Clinic)
- other food sources: rice bran, wheat germ, oat bran, bran, whole wheat, brown rice, legumes, dried peas, dried beans, lentils, peanuts, almonds, walnuts, pecans, sunflower, pumpkin and sesame seeds, fruit and vegetables

- **adoptogenic mushrooms**
- may help reduce the effects of stress in body
- cordyceps, lion's mane, reishi, chaga, shiitake, turkey tail, himematsutake
- (source: Healthline)



- **health implications**
- cardiovascular health: high cholesterol, high blood pressure
- neurodegenerative disease (Alzheimer's, Parkinson's, etc…)
- cancer
- gut health
- immune system
- insulin resistance, diabetes
- purine
- FODMAP

- **culinary use of mushrooms:**
- method of cooking
- types of oils used
- other ingredients used
- umami



Thank you