

# EBT4フィルムの基礎特性

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# ガフクロミックフィルム

Film model	Configuration	Active layer			Substrate #1		Substrate #2		adhesive layer	Useful dose range (Gy)	
		Marker dye	Alumina	Nominal thickness (μm)	Polyester	Nominal thickness (μm)	Polyester	Nominal thickness (μm)	Nominal thickness (μm)		Sizes
HD-V2	Type 1	Yes	Yes	12	Clear transparent	97	–	–	–	8" × 10"	10–1000
MD-V3 <sup>a</sup>	Type 2	Yes	Yes	10	Clear transparent	125	Clear transparent	50	7	5" × 5"	1–100
EBT2 <sup>a</sup>	Type 2	Yes	Yes	28	Clear transparent	175	Clear transparent	50	20	8" × 10" 12.8" × 17"	0.01–20
EBT3 <sup>a</sup>	Type 3	Yes	Yes	28	Clear transparent	125	Clear transparent	125	–	8" x 10" 12.8" x 17"	0.01–20
EBT3 unlaminated	Type 1	Yes	Yes	14	Clear transparent	125	–	–	–	8" × 10"	0.01–20
EBT-XD <sup>a</sup>	Type 3	Yes	Yes	24	Clear transparent	125	Clear transparent	125	–	8" × 10"	0.04–40
RTQA2	Type 2	Yes	Yes	17	Opaque white	97	Yellow transparent	97	20	10" × 10" 12.8" × 17" 1.25" × 11"	0.02–8

2004 EBT  
 2009 EBT2  
 2011 EBT3  
 2015 EBT-XD

AAPM Task Group 235

# EBT シリーズ

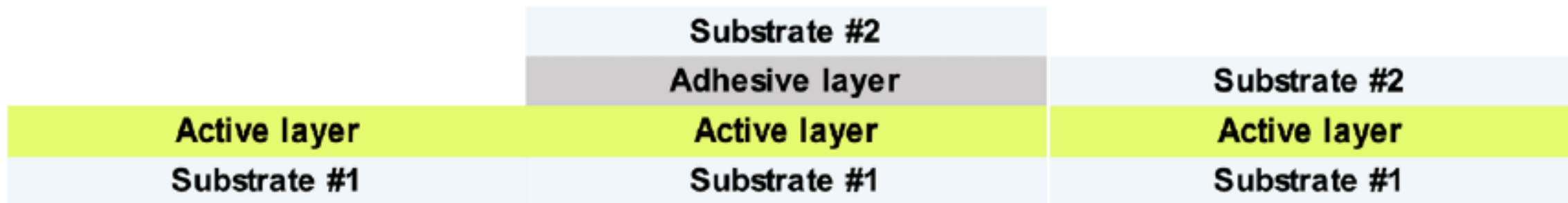
EBT-2

EBT-3

Type 1 Configuration

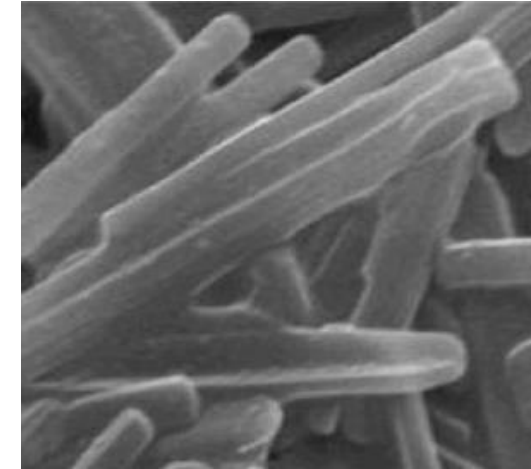
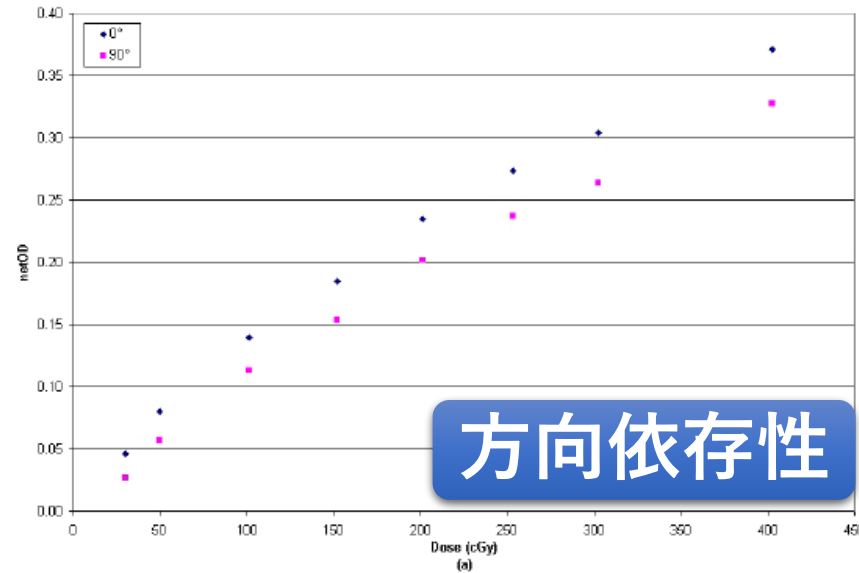
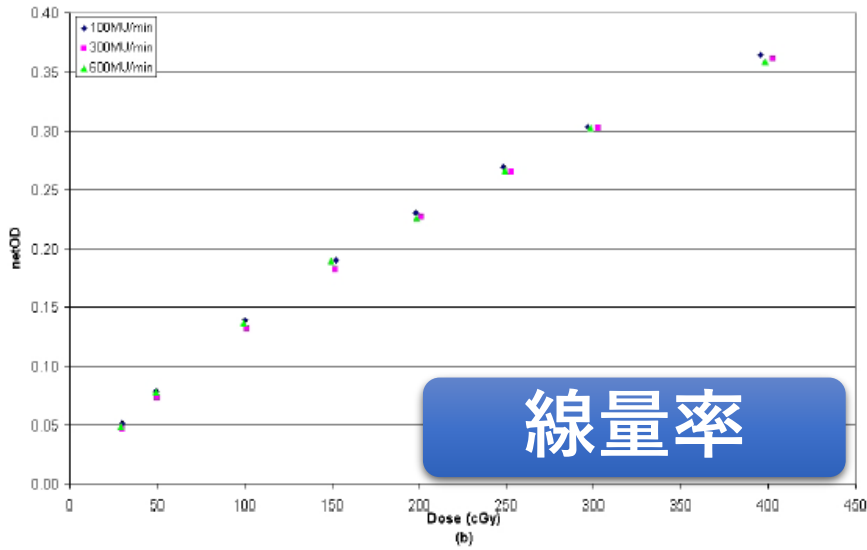
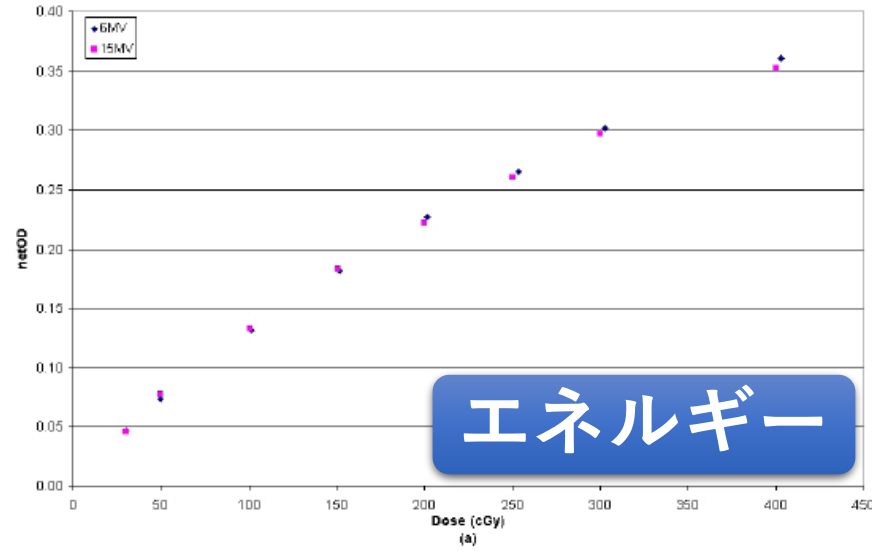
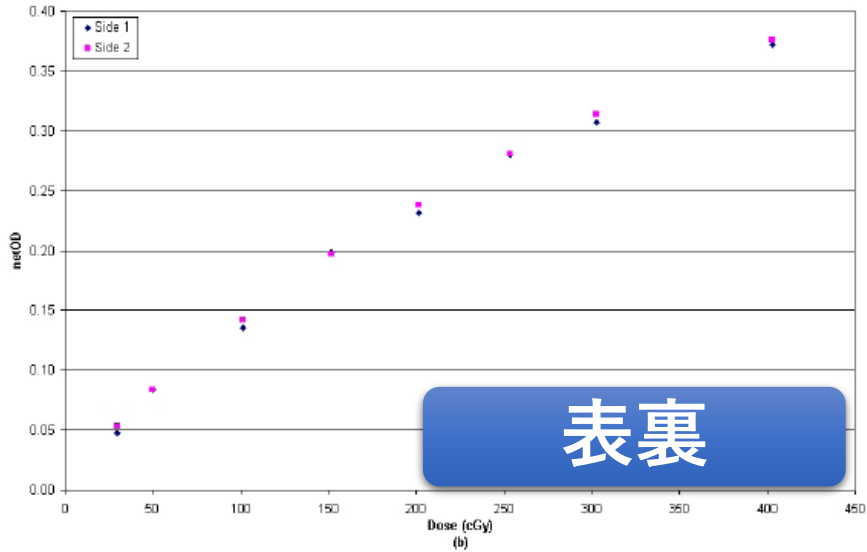
Type 2 Configuration

Type 3 Configuration



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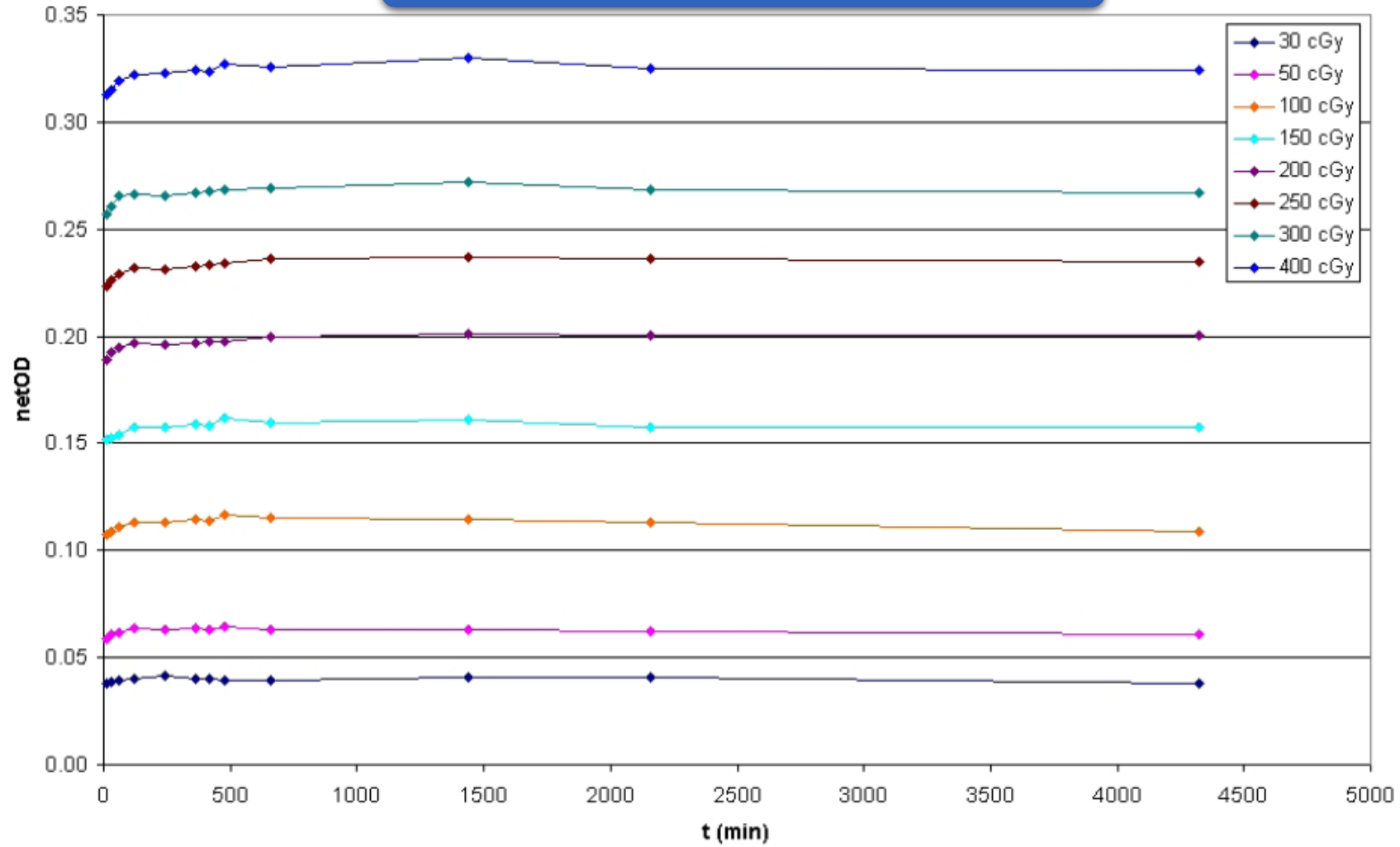
# EBT3

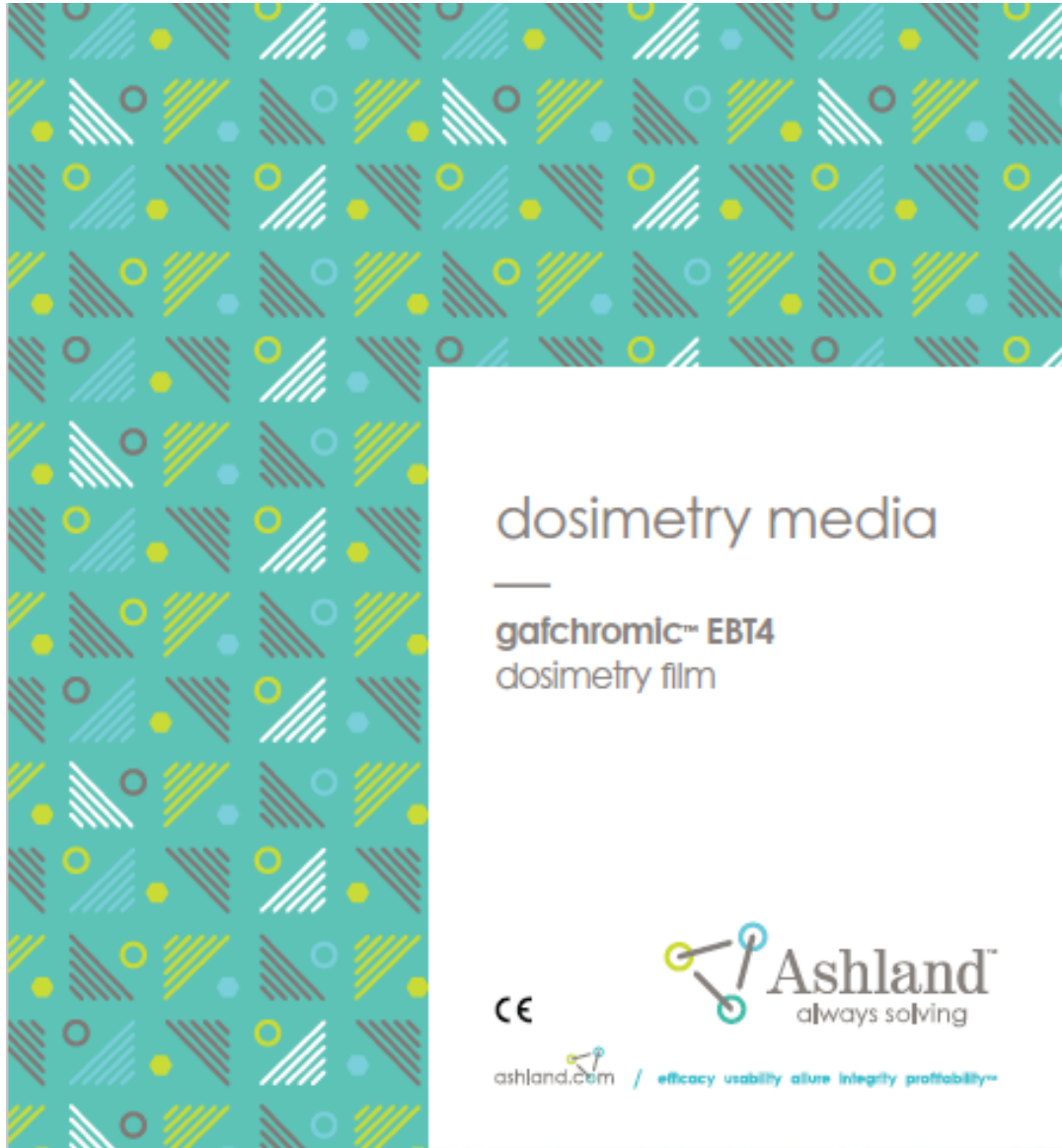


Gafchromic EBT film specifications

# EBT3

## スキャン時間依存性





2022/11/8アクセス確認

# 外観

EBT-3



EBT-4



**EBT-4の方が濃い黄色になった**

\*デジカメで撮影しているので周囲光あり

# 構造

## EBT-3

Matte Surface Clear Polyester Base, 125  $\mu\text{m}$

Active Layer, 28  $\mu\text{m}$

Matte Surface Clear Polyester Base, 125  $\mu\text{m}$

## EBT-4

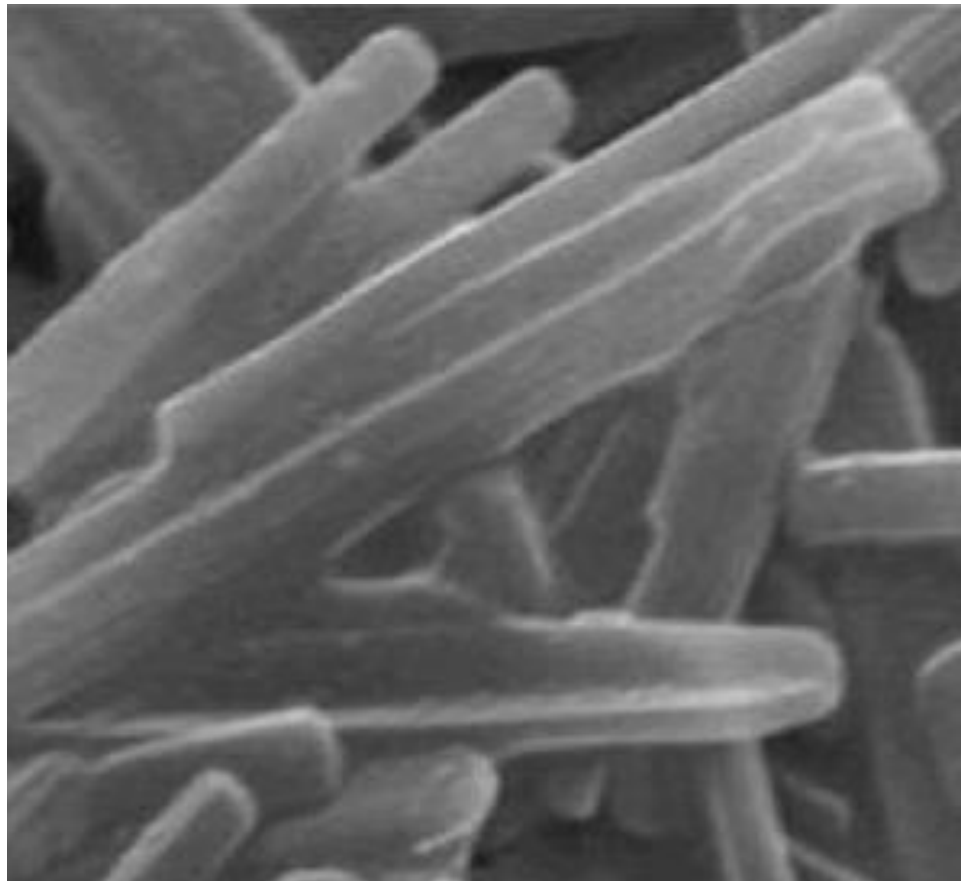
matte surface clear polyester base, 125  $\mu\text{m}$

active layer, 28  $\mu\text{m}$

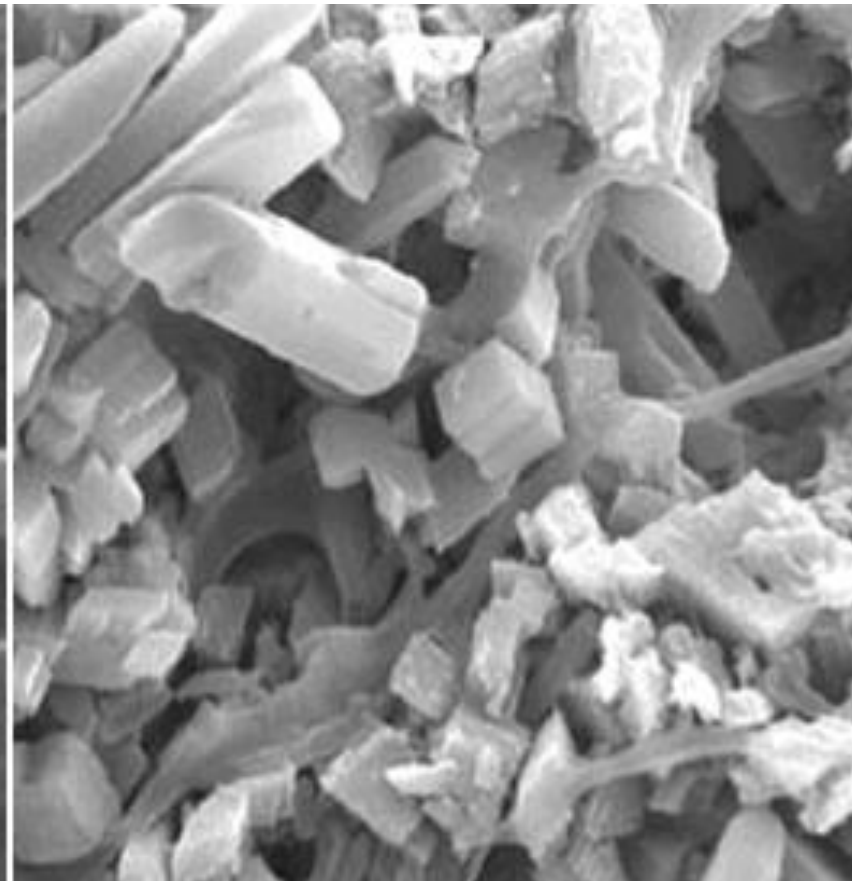
matte surface clear polyester base, 125  $\mu\text{m}$



# 粒子サイズ



EBT3



EBT-XD (参考)

EBT4の写真はないです

EBT-XDではactive particlesのサイズが従来のEBT2/3と比べて小さくなっている。これにより光散乱や偏光による影響が軽減し、スキャン時のlateral effectを減少。

# EBT4

## specifications

property	gafchromic™ EBT4 film
configuration	active layer (28 μm) sandwiched between 125 μm matte-surface polyester substrates
size	8" x 10", other sizes available upon request
optimum dose range	0.2 Gy to 10 Gy
energy dependency	<5% difference in net optical density when exposed at 100 keV and 18 MeV
dose fractionation response	<5% difference in net optical density for a single 25 Gy dose and five cumulative 5 Gy doses at 30 min intervals
dose rate response	<5% difference in net optical density for 10 Gy exposures at rates of 3.4 Gy/min and 0.034 Gy/min
stability in light	<5 x 10 <sup>-3</sup> change in optical density per 1000 lux-day
stability in dark (pre-exposure stability)	<5 x 10 <sup>-4</sup> optical density change/day at 23 °C and <2 x 10 <sup>-4</sup> density change/day refrigerated
uniformity	better than ±3% in sensitometric response from mean; dose uniformity better than ±2% with FilmQAPro™ and triple-channel dosimetry

# EBT3

Property	GAFChromic™ EBT3 Film
Configuration	Active layer (28 μm) sandwiched between 125 μm matte-surface polyester substrates
Size	8" x 10", other sizes available upon request
Dynamic Dose Range	<u>0.1</u> to 20 Gy
Energy dependency	<5% difference in net optical density when exposed at 100 keV and 18 MeV
Dose fractionation response	<5% difference in net optical density for a single 25 Gy dose and five cumulative 5 Gy doses at 30 min. intervals
Dose rate response	<5% difference in net optical density for 10 Gy exposures at rates of 3.4 Gy/min. and 0.034 Gy/min.
Stability in light	<5x10 <sup>-3</sup> change in optical density per 1000 lux-day
Stability in dark (pre-exposure stability)	<5x10 <sup>-4</sup> optical density change/day at 23 °C and <2x10 <sup>-4</sup> density change/day refrigerated
Uniformity	Better than ±3% in sensitometric response from mean; dose uniformity better than ±2% with FilmQAPro and triple-channel dosimetry

フィルムサイズ  $4 \times 4 \text{ cm}$

TrueBeam STx

エネルギー 6MV

照射野サイズ  $10 \times 10$

Tough water 10cm 深さ

0, 25, 50, 100, 150, 200, 300, 400,  
500, 600, 800, 1000, 1500, 2000, 3000, 4000 cGy.



# スキャン

- EPSON (ES-G11000)
- 解像度:75 dpi
- TIFF (RGB)
- 補正オフ
- Image J ver1.49
- Net Optical Density(OD)= $\log_{10}(I_{unexposed}/I_{exposed})$



- Portrait and landscape orientations Devic et al. Med Phys. 2005;32(7):2245-53

- 照射後の24時間後にスキャン

\* 臨床では24時間も待てないので、テーブル作成時と患者QA時の時間を考慮してください

\* AAPM-TG55参考

# 線量応答特性

0cGy

200cGy

600cGy

1000cGy

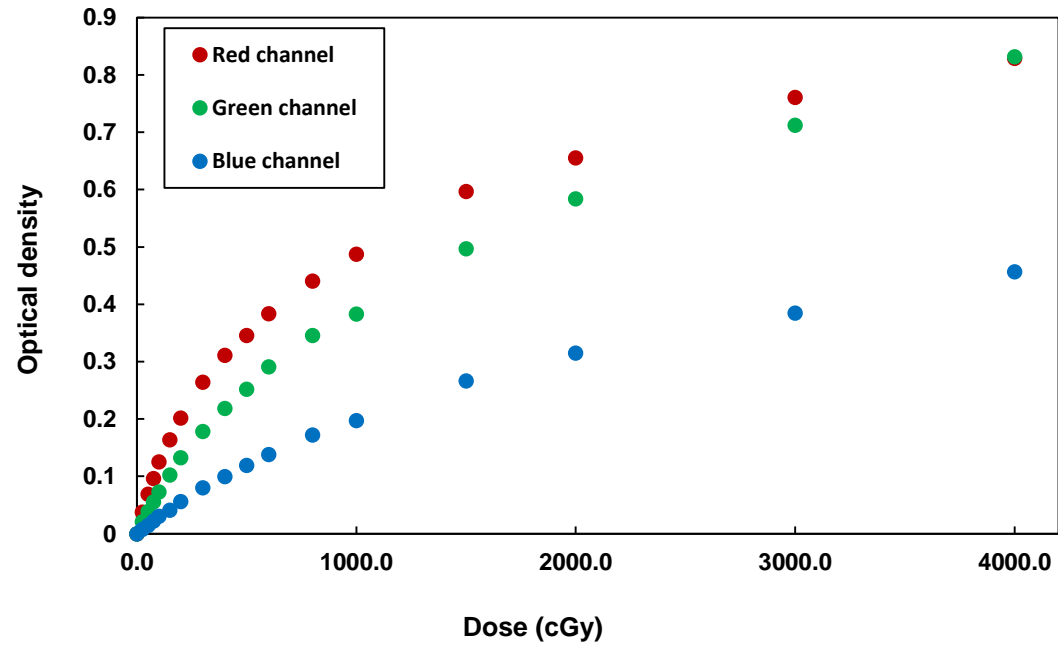
EBT-3

EBT-4

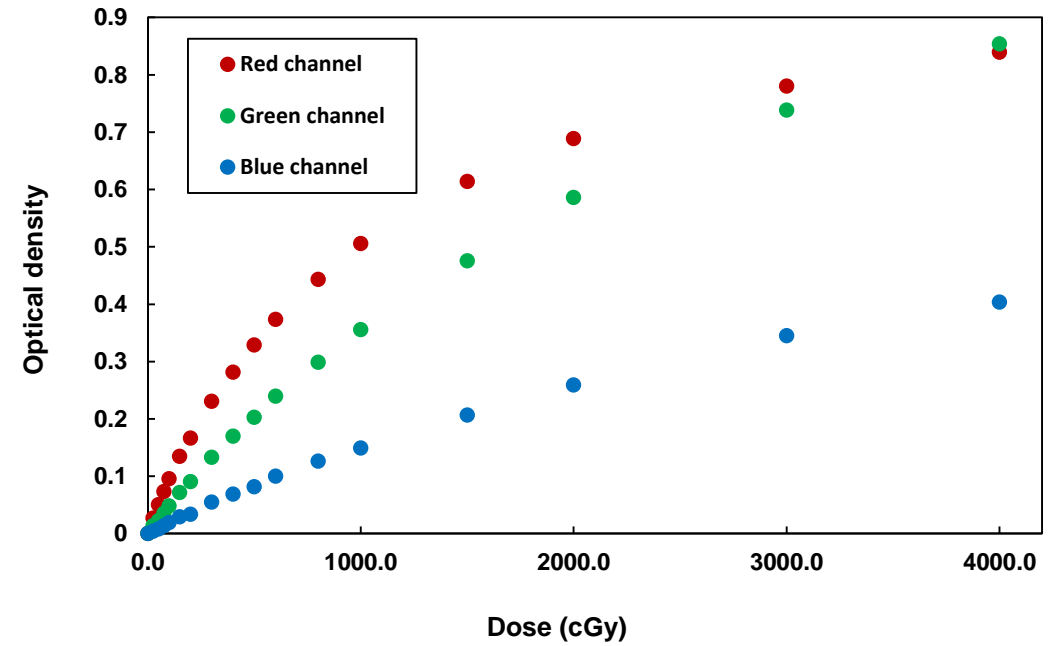


# 線量応答特性

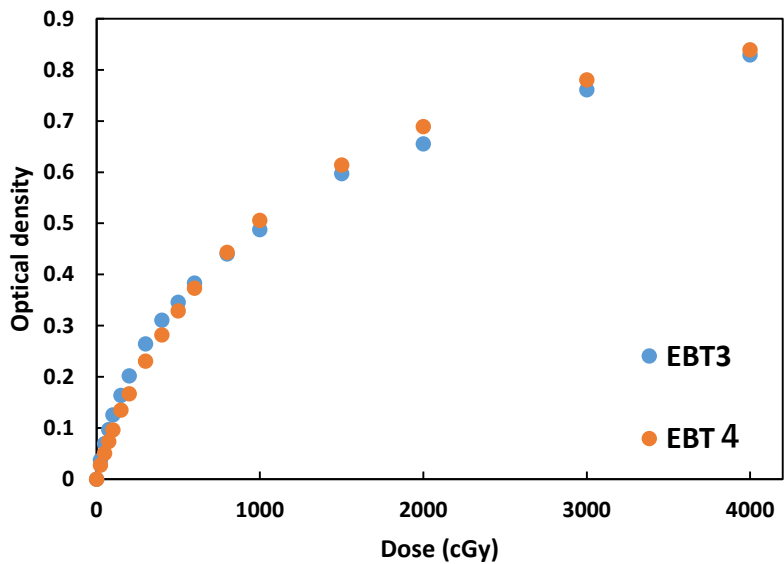
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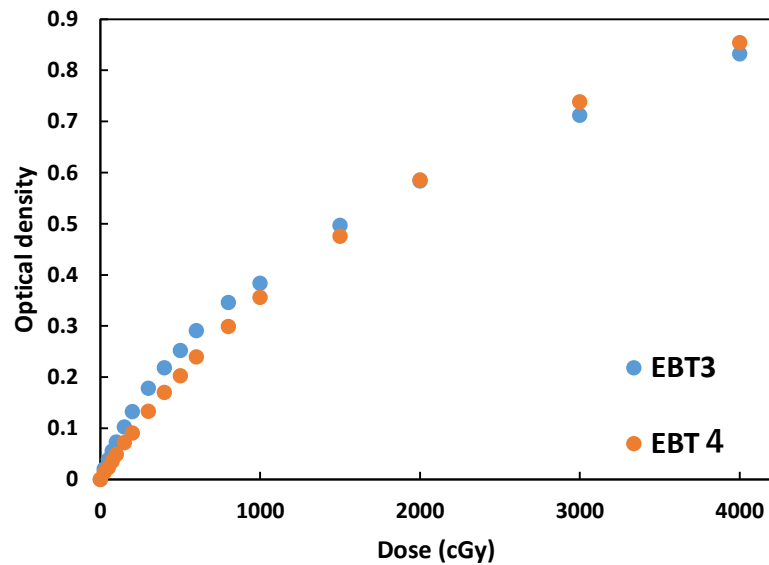
## EBT-4



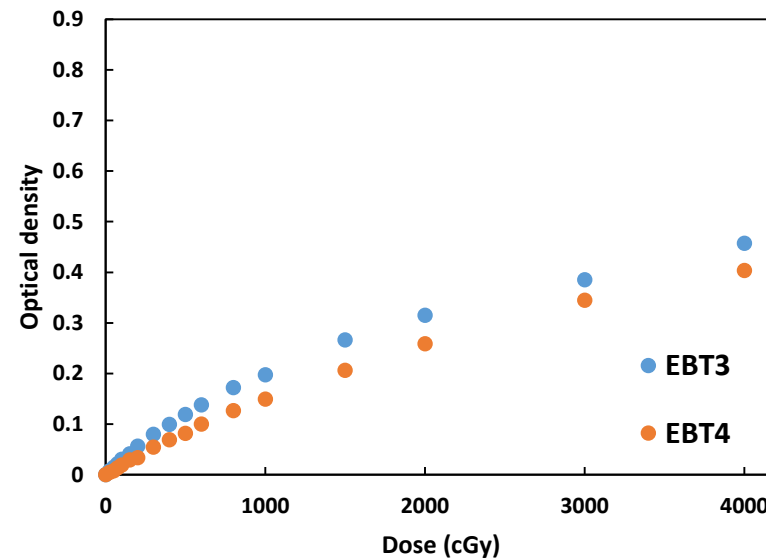
# 線量応答特性



RED



GREEN

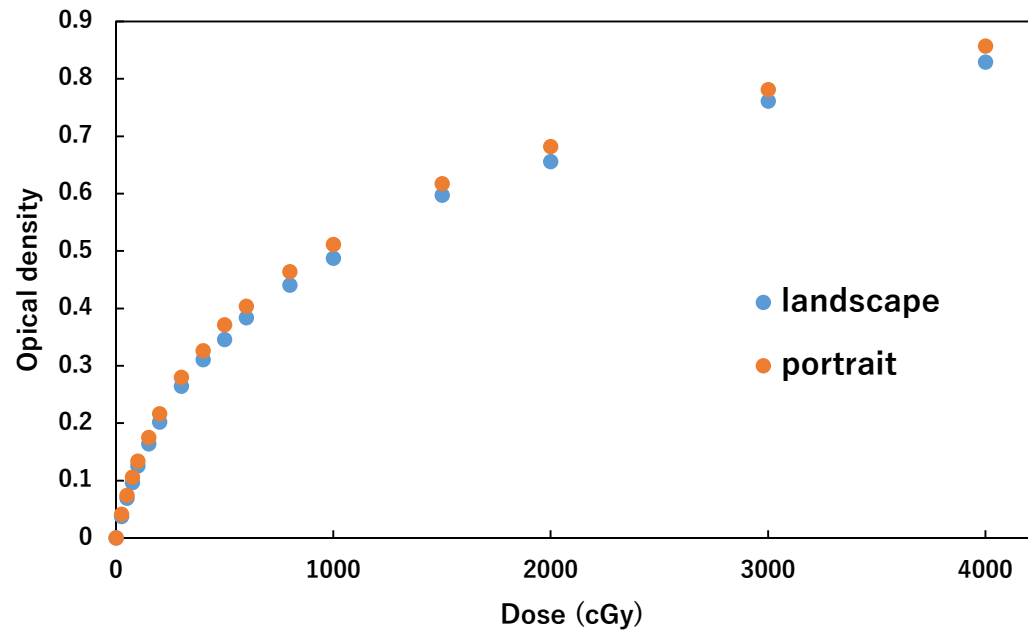


Blue



# スキャン方向依存性

## EBT-3



## EBT-4

