

การเปรียบเทียบ Hp(3) ที่ประเมินจากค่าสัมประสิทธิ์การแปลงจาก air kerma ไปเป็นปริมาณรังสีส่วนบุคคล
ที่เทียบเท่ากับการวัดปริมาณรังสีของเลนส์ตาที่ปรับเทียบบน PMMA phantom ทรงกระบอกแบบใหม่
Comparing Hp(3) evaluated from the conversion coefficients from air kerma to personal dose
equivalent for eye lens dosimetry calibrated on a new cylindrical PMMA phantom

ช่วงเวลาดำเนินการ ปี พ.ศ. 2559

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รายละเอียดสรุป

Based on a new occupational dose limit recommended by ICRP (2011), the annual dose limit for the lens of the eye for workers should be reduced from 150 mSv/y to 20 mSv/y averaged over 5 consecutive years in which no single year exceeding 50 mSv. This new dose limit directly affects radiologists and cardiologists whose work involves high radiation exposure over 20 mSv/y. Eye lens dosimetry (Hp(3)) has become increasingly important and should be evaluated directly based on dosimeters that are worn closely to the eye. Normally, Hp(3) dose algorithm was carried out by the combination of Hp(0.07) and Hp(10) values while dosimeters were calibrated on slab PMMA phantom. Recently, there were three reports from European Union that have shown the conversion coefficients from air kerma to Hp(3). These conversion coefficients carried out by ORAMED, PTB and CEA Saclay projects were performed by using a new cylindrical head phantom. In this study, various delivered doses were calculated using those three conversion coefficients while nanoDot, small OSL dosimeters, were used for Hp(3) measurement. These calibrations were performed with a standard X-ray generator at Secondary Standard Dosimetry Laboratory (SSDL). Delivered doses (Hp(3)) using those three conversion coefficients were compared with Hp(3) from nanoDot measurements. The results showed that percentage differences between delivered doses evaluated from the conversion coefficient of each project and Hp(3) doses evaluated from the nanoDots were found to be not exceeding -11.48 %, -8.85 % and -8.85 % for ORAMED, PTB and CEA Saclay project, respectively.

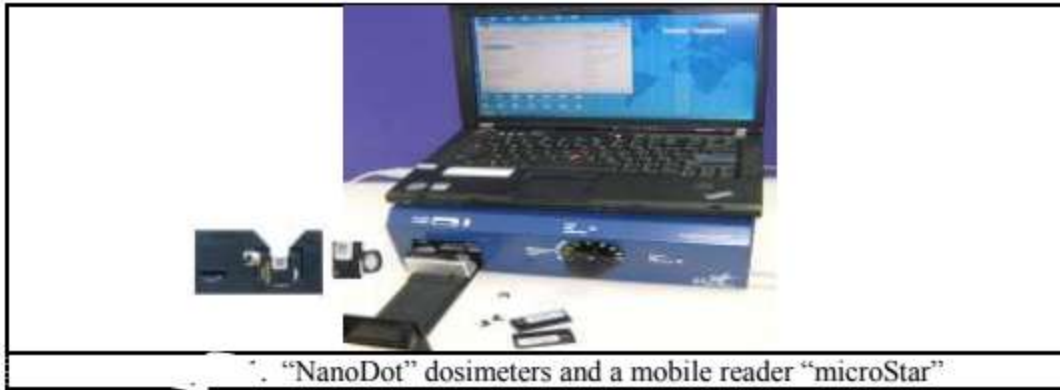


Figure 1. “NanoDot” dosimeters and a mobile reader “microStar”



Figure 2. The nanoDot dosimeters were placed in the cylindrical phantom at the depth of 3 mm.

Table 1. Delivered $H_p(3)$ doses evaluated from the conversion coefficients of ORAMED, PTB and CEA Saclay compared with $H_p(3)$ evaluated from nanoDot measurements.

Radiation quality	ORAMED			PTB			CEA Saclay		
	Delivered μSv	nanoDot μSv	% difference	Delivered μSv	nanoDot μSv	% difference	Delivered μSv	nanoDot μSv	% difference
N-40	120.66	126.12	4.53	128.00	126.12	-1.47	128.94	126.12	-2.18
	1207.98	1272.99	5.38	1281.46	1272.99	-0.66	1290.87	1272.99	-1.39
	2415.96	2542.99	5.26	2562.92	2542.99	-0.78	2581.74	2542.99	-1.50
N-60	146.91	141.57	-3.63	154.00	141.57	-8.07	155.26	141.57	-8.82
	1467.88	1565.51	6.65	1538.73	1565.51	1.74	1551.32	1565.51	0.91
	2935.77	3155.46	7.48	3077.45	3155.46	2.53	3102.63	3155.46	1.70
N-80	162.80	173.90	6.82	166.00	173.90	4.76	166.95	173.90	4.17
	1628.08	1660.74	2.01	1660.08	1660.74	0.04	1669.58	1660.74	-0.53
	3256.16	3272.38	0.50	3320.17	3272.38	-1.44	3339.17	3272.38	-2.00
N-100	161.30	152.33	-5.56	163.75	152.33	-6.97	164.50	152.33	-7.40
	1604.89	1673.13	4.25	1629.28	1673.13	2.69	1636.77	1673.13	2.22
	3209.77	3255.55	1.43	3258.55	3255.55	-0.09	3273.55	3255.55	-0.55
N-120	156.70	138.69	-11.49	158.00	144.01	-8.85	158.00	144.01	-8.85
	1569.07	1468.87	-6.39	1582.09	1468.87	-7.16	1582.09	1468.87	-7.16
	3134.73	3004.37	-4.16	3160.74	3004.37	-4.95	3160.74	3004.37	-4.95
N-150	153.20	141.82	-7.43	152.00	141.82	-6.70	153.40	141.82	-7.55
	1529.14	1495.11	-2.23	1517.16	1495.11	-1.45	1531.11	1495.11	-2.35
	3063.24	2995.71	-2.20	3039.25	2995.71	-1.43	3067.19	2995.71	-2.33