Research Article   **Open Access**

Derivation of a Unique Body Surface Area (Bsa) Formula for Calculation of Relatively Safe Doses of Dog and Human Anticancer Drugs

Saganuwan Alhaji Saganuwan*

Department of Veterinary Physiology, Pharmacology and Biochemistry, College of Veterinary Medicine, University of Agriculture, Makurdi, Benue State, Nigeria

Abstract

The safety of anticancer dosing has become a serious concern due to high incidence of life-threatening toxicity signs. More so, dogs are used as models of research for human cancers. In view of these a uniform body surface area (BSA) formula has been derived for human and dog with a view to having low, safe, effective therapeutic doses of anticancers. The derived formula ($BSA=BW^{0.528} \times H^{0.528} \times K$) was used to calculate BSAs of greyhound, toy, companion, terrier, hunting and working dogs and yielded low effective therapeutic doses of dacarbazine, asparaginase, streptozotocin, dactinomycin, epirubicine and prednisolone. Hunting and working dogs have high body weight, BMI and BSAs similar to that of human and may be prone to obesity and obesity associated diseases. Whereas BSAs and doses of anticancer agents of light and relatively tall dogs are relatively higher in comparison with that of short and light dogs. Greyhounds have higher BSA in comparison with toys, companions and terriers. Working breeds of dog such as Treeing Walker Coon haired (65.0 kg), Great Swiss mountain dog (59.0 kg), longhaired St. Bernard (55.0 kg), French Mastiff (50.0 kg) and female Komondor (59.0 kg) have same BSA values with humans weighing 51.3, 46.7, 44.8, 44.0 and 43.0 kg, respectively. Calculated common exponent (0.528) for body weight and height may be the common relationship between basal metabolism of dog and human.

Keywords: Complex analysis; Body surface area formula; Boyd; Human; Dog; Cancer relapse; Toxicity

Abbreviations: BSA: Body Surface Area; BW: Body Weight; K: Metabolism Constant; BMI: Body Mass Index

Introduction

Ever since the so-called "Peat Bog Dogs" raised by Neolithic Palafitte dwellers, the appearance of new breeds similar to those we know today took place without pause due to natural mutation, climate, environment or crossings engineered by man in the process of domestication. The breeds became ever more numerous and specialized until they reached the point of modern classification, which is based on the aptitude of the breed and the use: hunting, shepherding, guarding, work and company. Perhaps the first fully distinct breed was saluki, an Arabian Greyhound whose name means 'noble' [1]. The concept of breeds was defined by the Arabs first in relating to horses and later to dogs. Aristotle named dogs according to their country of origination. It is estimated that the canine population of the world is 120-150 million. In the USA alone, there are approximately 35 million dogs, and 7-8 million live in France, 5-6 million in Germany, 4 million in Italy, 1 million in Belgium and 400,000 in Switzerland [1]. Not all of them are happy dogs as result of diseases, abandonment by ungrateful masters and vivisection. Brazil has the largest number of dog population studies [2]. The safety of drug dosing has become a concern, because of high incidence of serious or life-threatening toxicity associated with many anticancer drugs [3]. Allometry is the relationship between the physiological, anatomical and pharmacokinetic parameters and body size. Precise calculation of total body surface area is of great importance in many biomedical applications, most especially for calculation of doses of anticancer agents [4]. In human medicine, the DuBois formula has been recommended in cancer chemotherapy above other formulas [5] followed by Wang et al. formula [6]. Because of a presumed narrow therapeutic index for most anticancer agents as shown in breast cancer, testicular cancer, lymphoma, and other cancers, cancer chemotherapy can be challenging for not only human medical oncologist [7] but also veterinary medical oncologist. However, the formula commonly used for calculation of anticancer doses for dogs is Cowgill and Drabkin's formula [8] which does not put linearity into consideration. Because

of high risk of toxicity caused by use of the formula, there is need to compare some human BSA formulas with dog BSA formula with a view to deriving a human-dog equivalent BSA formula. Cancer being exacerbated by the modern life style as revealed by study [9] requires a radical therapeutic approach that put into consideration, the use of BSA that would give less toxic and moderate effective doses of anti-cancer agents [10]. In view of this, new body surface area formula and doses of twenty-eight anticancer drugs were calculated for 334 breeds of greyhound, toy, companion, terrier, hunting and working dogs.

Materials and Methods

Derivation of dog BSA from human BSA formulas

The BSA of randomly selected twelve dogs from ten breeds were initially calculated using the human BSA formulas developed by various authors (Table 1). But for derivation of a new formula for dogs, the height of all the breeds of dogs were multiplied by 2 [11-15]. Ten breeds of dog used in this study are Great Pyrene, New Foundland, Lemberger, Black Russian, Saint Bernard, Neapolitan Mastiff, Great Danes, Scottish Deerhound, Bullmastiff and Wolfhound [16,17]. The new formula was derived from DuBois [5], Haycock et al. [12], Boyd [14] and Fujimoto [16] formulas using average of their body weight and height exponents. Takashira, [15], Wang et al. [6] and Saganuwan and Ndakotsu [10] formulas were not used because they have same values of exponents with DuBois formula. Gehan and George [13] formula was

not used because it has same body weight and body height exponent with Haycock et al. [12] formula. The derived body weight and height exponent was 0.528 and the constant (K) for dog derived from constant of DuBois, Haycock et al., Boyd and Fujimoto, formulas was 1.4×10^{-1}. Therefore, the derived new BSA formula for dog is BSA=$BW^{0.528} \times H^{0.528} \times K$ were K is 1.4×10^{-1}.

Application of dog new BSA formula

BSA formula (BSA=$(BW^{2/3}) \times 10.1 \times 10^{-4}$) developed by Cowgill and Drabkin [8] and the derived BSA formula (BSA=$BW^{0.528} \times H^{0.528} \times K$) were used for calculation of body surface area for greyhounds (12 breeds), toys (26 breeds), companions (25 breeds), hunting (141 breeds), terriers (28 breeds) and working dogs (92 breeds). Doses of doxorubicine, melphalan, vincristine, chlorambucil, cyclophosphamide and carboplatine were calculated for greyhounds. However, bleomycin, busulfan, cisplatin, cytarabine, dacarbazine, dronabinol and

lumustine were calculated for toys. Calculated for companions are 6-mercaptopurine, carmustine, fluorouracil, mitoxantrone, thioguanine, streptozotocin and Thio-Tepa. Whereas prednisolone, asparaginase and ifosfamide were calculated for terriers. The doses of methotrexate, dactinomycin, mechlorethamine, Thio-TEPA and mercaptopurine were calculated for hunting dogs. But dacarbazine, asparaginase, streptozotocin, dactinomycin, epirubicine and prednisolone [18-22] were calculated for working dogs. Body mass index (BMI) was calculated for all the breeds using human BMI formula ($BMI = \dfrac{Weight}{Height^2}$). A total of 334 adult breeds of dogs (7-10 years) comprising 259 males and 75 females were used for the study [18].

Statistical Analysis

All the data on Table 1 of BSA formulas were presented as mean ± standard error of mean (SEM). Analysis of Variance (ANOVA) was

S/No.	Author	Year of Publication	No. of Patients	Formula
1	Mosteller [11]	1987	Modified Gehan and George	$\left[\dfrac{[HxW]}{3600}\right]^{\frac{1}{2}}$
2	DuBois [5]	1916	9	$2.0247 \times 10^{-1} \times H^{0.725} \times W^{0.425}$
3	Haycock et al [12]	1978	81	$2.4265 \times 10^{-2} \times H^{0.4246} \times W^{0.51456}$
4	Gehan and George [13]	1970	401	$2.35 \times 10^{-2} \times H^{0.4246} \times W^{0.51456}$
5	Boyed [14]	1935	411	$3.207 \times 10^{-4} \times H^{0.3} \times W^{0.7285}$
6	Wang et al [6]	1992	Modified DuBois	$7.184 \times 10^{-3} \times H^{0.725} \times W^{0.425}$
7	Takashira [15]	1925	Unknown	$7.241 \times 10^{-3} \times H^{0.725} \times W^{0.425}$
8	Fujimoto [16]	1968	201	$8.883 \times 10^{-3} \times H^{0.663} \times W^{0.444}$
9	Saganuwan and Ndakotsu [10]	2015	II-modified DuBois	$2.008 \times 10^{-1} \times H^{0.725} \times W^{0.425}$
10	Cowgill and Drabkin [8]	1927	I – Dog BSA formula	$W \times 10.1 \times 10^{-4}$
11	Saganuwan (unpublished)	This paper	Modified DuBois, Haycock et al. Boyd and Fujimoto	$W^{0.528} \times 10^{0.528} \times 1.4 \times 10^{-1}$

Table 1: Body Surface area formulas.

Breed of dog	Body weight (kg)	Height x2 (m²)	Body index (kg/m²)	Cowgill and Drabkin[c] (dog)	DuBois	Monsteller	Haycock et al.	Gehan and George	Boyd	Wang et al.	Takashira	Fujimoto	Saganuwan and Ndakotsu	This paper
Great Pyrene	54	1.52	23.37	1.49	1.49	1.37	1.58 [a]	1.53[a]	1.02	1.49	1.51 [a]	1.46	1.48	1.43
New Foundland	68	1.42	33.72	1.74	1.53	1.61	1.72	1.67	1.18	1.57	1.58	1.55	1.56	1.56
Lemberger	54	1.42	26.78	1.49	1.42	1.28	1.53[a]	1.53[a]	1.00	1.42	1.43	1.40	1.41	1.38
Black Russian	50	1.32	28.70	1.42	1.31	1.10	1.43	1.38	0.92	1.31	1.32	1.28	1.29	1.27
Saint Bernard	59	1.30	34.91	1.59	1.39	1.28	1.55	1.50	1.04	1.39	1.40	1.37	1.37	1.15
Neapolitan Mastiff	50	1.22	33.59	1.42	1.23	1.02	1.38	1.34	0.90	1.023	1.24	1.22	1.22	1.23
Great Danes	59	1.72	19.94	1.59	1.69	1.69	1.74	1.69	1.13	1.70	1.71	1.65	1.57	1.61
Scottish Deerhound	54	1.42	26.78	1.50	1.42	1.28	1.53	1.49	1.00	1.42	1.43	1.40	1.41	1.38
Bullmastiff (m)	110	1.52	47.61	2.41	2.02	2.79	2.28	2.20	1.70	2.02	2.04	2.00	2.00	2.09
Bullmastiff (f)	91	1.38	47.78	2.12	1.73	2.09	1.98	1.92	1.45	1.74	1.75	1.73	1.72	1.80
Wolfhound (m)	55	1.62	20.96	1.51	1.57	1.49	1.64	1.58	1.05	1.58	1.59	1.54	1.56	1.50
Wolfhound (f)	47	1.52	20.34	1.36	1.40	1.19	1.47	1.42	0.92	1.41	1.42	1.37	1.40	1.38
Mean ± SEM	62.16±5.5	1.4 ± 0.04	30.4 ± 2.8	1.63 ± 0.09[c]	1.51 ± 0.06[b]	1.51 ± 0.14[b]	1.65 ± 0.07[a]	1.60 ± 0.06[b]	1.10 ± 0.06[b]	1.52 ± 0.06[b]	1.53 ± 0.06[b]	1.49 ± 0.06[b]	1.49 ± 0.06 [b]	1.48 ± 0.08

a: Significantly Higher (P<0.05); b: Significantly Lower (P<0.05); c: Control Group; m: Male; f: Female

Table 2: The scoring of body surface area (BSA) formulas (m²) for calculation of anticancer agents in dogs.

Breed	Body weight (kg)	Height x2 (m²)	Body index	Cowgill and Drabkin's BSA formula	New BSA formula	Doxorubicin (30 mg/m²)		Melphalan (1.5 mg/m²)		Vincristine (2 mg/m²)		Chlorambucil (3 mg/m²)		Cyclophosphamide (50 mg/m²)		Carboplatin (300 mg/m²)	
						CDF	NF	CDF	NF	CDF	NF	CDF	NF	CDF	NF	CDF	NF
Arab Greyhound (m)	32	1.56	13.15	1.02	1.10	30.6	33	1.53	1.65	2.04	2.20	3.06	3.30	51.0	55.0	303	330
Arab Greyhound (f)	27	1.42	13.39	0.91	0.96	27.3	28.8	1.37	1.44	1.81	1.82	2.73	2.88	45.5	48.0	273	288
Italian Greyhound	5	0.76	8.66	0.30	0.28	9.0	8.4	0.45	0.42	0.60	0.56	0.90	0.94	15.0	14.0	90.0	84.0
Whippet (m)	12	0.94	13.58	0.53	0.50	15.9	15.0	0.80	0.75	1.06	1.00	1.54	1.50	26.5	25.0	265	150
Whippet (f)	9	0.88	11.62	0.44	0.42	13.2	12.6	0.6	0.63	0.88	0.84	1.32	1.26	22.0	21.0	132	126
Deerhound (m)	48	1.52	20.76	1.33	1.35	39.9	40.5	2.00	2.03	2.66	2.70	3.99	4.05	66.5	67.5	399	405
Deerhound (f)	36	1.42	17.85	1.10	1.12	33.0	33.6	1.65	1.68	2.20	2.24	3.30	3.36	60.5	56.0	330	336
Irish Wolf hound (m)	54	1.58	21.63	1.44	1.46	43.2	43.8	2.16	2.10	2.88	2.92	4.32	4.38	72.0	73.0	432	438
Irish Wolf hound (f)**	40	1.42	26.78	1.18	1.18	35.0	35.0	1.77	1.77	17.70	17.70	3.54	3.54	59.0	59.0	354	354
Spanish Greyhound (m)	30	1.40	15.31	0.98	1.00	29.4	30.0	1.47	1.50	1.96	2.00	2.94	3.00	44.0	55.0	294	300
Pharaoh hound (m)	30	1.40	15.31	0.98	1.01	29.4	30.3	1.4	1.52	1.96	2.02	2.94	3.03	49.0	50.5	294	303
Pharaoh hound (f)	28	1.32	16.07	0.93	0.94	27.9	28.2	1.44	1.41	1.86	1.88	2.79	2.82	46.5	47.0	279	282
Afghan hound	34	1.47	15.73	1.06	1.10	31.8	33.0	1.59	1.65	2.12	2.20	3.18	3.30	53.0	55.0	318	330
Saluki	30	1.42	14.88	0.98	1.01	29.4	30.3	1.47	1.52	1.96	2.02	2.94	3.03	49.0	50.5	294	303
Borzoi (m)	48	1.51	21.05	1.33	1.34	39.9	40.2	2.00	2.01	2.66	2.68	3.99	4.02	66.5	67.0	399	402
Magyar Agar (m)	31	1.41	15.59	1.00	1.03	30.0	30.9	1.50	1.55	2.00	2.06	3.00	3.09	50	51.5	300	309
Magyar Agar (f)	26	1.31	15.18	0.89	0.90	26.7	27.0	1.34	1.35	1.78	1.80	2.67	2.70	44.5	45.0	267	270
Sloughi	32	1.50	14.22	1.02	1.08	30.6	32.4	1.53	1.62	2.04	2.16	3.06	3.24	51.0	54.0	306	324
CDF: Cowgill and Drabkin's formula; NF: New Formula; m: Male; f: Female; **: Prone to overweight, BMI>25 kg/m²																	

Table 3: Body weight, height, body mass index, body surface areas and therapeutic doses of anticancer drugs for greyhounds.

used to analyse the data and least significant difference (LSD) was used to detect difference between the calculated BSA values at 5% level of significance [23].

Results

Table 2 shows the body surface areas of various breeds of dogs calculated using human BSA formulas. The average weight, height and body mass index of the dogs were 62.16 ± 5.5 kg, 1.4 ± 0.04 m and 30.4 ± 2.8 kg/m², respectively. Average BSAs of 1.10±0.06 to 1.60±0.06 were calculated using the formulas except, Haycock and Cowgill and Drabkin's formulas (Table 2).

Male Irish Wolf hound recorded highest body weight (54 kg), height (0.79 m) and body surface area (1.44-1.46 m²) as Italian Greyhound recorded smallest body weight (5 kg), height (0.38 m) and body surface area (0.28-0.30 m²). Fourteen out of 18 breeds of dogs yielded higher BSAs. Wolf hound (female) yielded BSA of same value using the formulas (Table 3). The results in Table 4 show that toys generally have low body weight, except female Continental Spaniel and Pekingese breeds that recorded higher body surface areas (BSAs). Body weight, height and body mass index of all the toys are generally low. Companion dogs have low to moderate body weight ranging between 3.0-27.0 kg. Pinscher, Belgian large Griffon and Tibetan Spaniel recorded higher BSAs. Great Spitz, Poodle (miniature) and Chinese Temple dog (miniature) recorded BMI>25 kg/m², whereas poodle (standard) and French Bulldog recorded BMI >30 kg/m² (Table 5). The terrier dogs recorded low to moderate BSAs and body weights within the range of

4.5-28.0 kg. However, the formulas yielded same value of BSA and doses of anticancer drugs for Airedale terrier (Table 6). Out of 141 breeds of dogs whose body weight, height and body mass index were calculated, 39 and 23 dogs recorded height (<1.0 m) and BMI (>30 kg/m²), respectively. But the formulas yielded same BSA value for Kardian Bear dog, male Billy, Smooth-Haired Istrian Hound, Rodhesian Ridgeback (male), Rhodesian Ridgeback (female), Bluetick Coon Hound (male), Redtick Coon Hound (male), Drathaar (male), Weimaraner (male), Braque Ariegeois, Braque Daurvergne (female), French Spaniel (female), Briquette and Irish Setter (female). However, Short Haired Dachshound, longhaired Dachshound, Wirehaired Dachshound, Cirneco Dell Etna, female Basenji and Cocker Spaniel yielded weight ranging 8.3-10.9 kg. Majority of hunting dogs recorded BSA of lower values (Table 7). Twenty-two (22) out of 92 working breeds of dogs recorded height less than 1.00 m, whereas 25 dogs recorded BMI>30 kg/m². But 5 dogs recorded BSA of same value using the formulas. The dogs are Kuvasz, Maremma Sheepdog, Austrian Shepherd, Doberman Pincher (male and female) and Akita Inu (female). However, Border Collie, Shetland Sheepdog, Iceland dog (female) and Australian Kelpie (female) recorded weight (7-11 kg). Majority of hunting dogs recorded lower BSA values (Table 8).

Discussion

Allometric scaling popularly applied in prediction of human clearance, based on animal data has errors which could cause either drug toxicity or therapeutic failure. Hence modifications have been

Breed	Body weight (kg)	Height x2 (m)	Body index	Cowgill and Drabkin's BSA formula	New BSA formula	Bleomycin (10 iu/m²)		Busulfan (4 mg/m²)		Cisplatin (70 mg/m²)		Cytarabine (100 mg/m²)		Dacarbazine (200 mg/m²)		Dronabinol (5 mg/m²)		Lomustine (60 mg/m²)	
						CDF	NF	CDF	NF	CDF	NF	CDF	NF	CDF	NF	CDF	NF	CDF	NF
Pomeranian	5.0	0.60	13.89	0.30	0.25[b]	3.0	2.5	1.2	1.0	21	17.5	30.0	25.0	60.0	50.0	1.5	1.25	18.0	15.0
Australian Silky Terrier	5.0	0.50	20.0	0.30	0.23[b]	3.0	2.3	1.2	0.92	21	16.1	30.0	23	60.0	46.0	1.5	1.15	18.0	13.8
Affenpinscher	3.6	0.76	6.23	0.24	0.24	2.4	2.4	0.96	0.96	16.8	16.8	24.0	24.0	48.0	48.0	1.2	1.2	14.4	14.4
English Toy Spaniel	5.4	0.50	21.6	0.31	0.24[b]	3.1	2.4	1.24	0.96	21.7	16.8	31.0	24.0	62.0	48.0	1.55	1.20	18.6	14.4
Toy Terrier	2.5	0.50	10.0	0.19	0.16[b]	1.9	1.6	0.76	0.64	13.3	11.2	19.0	16.0	36.0	32.0	0.95	0.80	11.4	9.6
Toy Fox Terrier	3.0	0.50	12.0	0.21	0.17[b]	2.1	1.7	0.84	0.68	14.7	11.9	21.0	17.0	42.0	34.0	1.05	0.85	12.6	10.2
Silky Terrier	5.0	0.45	24.69	0.30	0.21[b]	3.0	2.1	1.20	0.84	21	14.7	30.0	21.0	60.0	42.0	1.5	1.05	18.0	12.6
Brussels Griffon	4.5	0.45	22.22	0.28	0.20[b]	2.8	2.0	1.12	0.80	19.6	19.6	28.0	20.0	56.0	40.0	1.4	1.0	16.8	12.0
Maltese (m)	5.0	0.50	20.0	0.30	0.23[b]	3.0	2.3	1.20	0.92	21.0	16.1	30.0	23.0	60.0	46.0	1.5	1.15	18.0	13.8
Maltese (f)	4.0	0.46	18.90	0.25	0.19[b]	2.5	1.9	1.00	0.76	17.5	13.3	25.0	19.0	50.0	38.0	1.25	0.95	15.0	11.4
Little Lion Dog	4.0	0.70	8.16	0.25	0.24[b]	2.5	2.4	1.00	0.96	17.5	16.8	25.0	24.0	50.0	48.0	1.25	1.20	15.0	14.4
Bichonfrise	5.0	0.60	13.89	0.30	0.25[b]	3.0	2.5	1.20	1.00	21	17.5	30.0	25.0	60.0	50.0	1.50	1.25	18.0	15.0
Small Continental Spaniel (m)	4.5	0.56	14.35	0.28	0.23[b]	2.8	2.3	0.96	0.92	19.6	16.1	28.0	23.0	56.0	46.0	1.40	0.92	16.8	13.8
Small Continental Spaniel (f)	1.5	0.50	6.0	0.13	0.21[a]	1.3	2.1	0.52	0.84	9.1	14.7	13.0	21.0	26.0	42.0	0.65	1.05	7.8	12.6
Papillon	4.5	0.56	14.35	0.28	0.23[b]	2.8	2.3	0.96	0.92	19.6	16.1	28.0	23.0	56.0	46.0	1.40	1.15	16.8	13.8
Coton De Tutear (m)	4.0	0.62	10.41	0.25	0.23[b]	2.5	2.3	1.00	0.92	17.5	16.1	25.0	23.0	50.0	46.0	1.25	1.15	15.0	13.8
Coton De Tutear (f)	3.5	0.56	11.16	0.23	0.20[b]	2.3	2.0	0.96	0.80	16.1	14.0	23.0	20.0	46.0	40.0	1.15	1.00	13.8	12.0
Mexican Hairless Dog	13.6	1.00	13.60	0.58	0.56[b]	5.8	5.6	2.32	2.24	40.6	39.2	58.0	56.0	116	114	2.9	2.8	34.8	33.6
Chihuahua	2.6	0.44	13.43	0.19	0.15[b]	1.9	1.5	0.76	0.60	13.3	10.5	19.0	15.0	38.0	30.0	0.95	0.75	11.4	9.0
Chinese Crested Dog	4.5	0.60	12.5	0.28	0.24[b]	2.8	2.4	1.12	0.96	19.6	16.8	28.0	24.0	56.0	48	1.40	1.20	16.8	14.4
Chinese Imperial Ch' In (Giant)	7.0	0.50	28.0	0.37	0.27[b]	3.7	2.7	1.48	1.08	25.9	18.9	37.0	27.0	74.0	54.0	1.85	1.35	22.2	16.2
Chinese Temple Dog (Giant)	9.0	0.72	17.36	0.44	0.38[b]	4.4	3.8	1.76	1.52	30.8	26.6	44.0	38.0	88.0	76.0	2.20	1.90	26.4	22.8
Chinese Imperial Ch' In (Classic)	2.5	0.30	27.78	0.19	0.12	1.9	1.2	0.76	0.48	13.3	8.4	19.0	12.0	38.0	24.0	0.95	0.6	11.4	7.2
Chinese Imperial Ch' In (Miniature)	1.8	0.20	45.00	0.15	0.08	1.5	0.8	0.60	0.32	10.5	5.6	15.0	8.0	30.0	16.0	0.75	0.4	9.0	4.8
Chinese Imperial Ch' In (Sleeve)	0.7	0.16	27.3	0.08	0.04	0.8	0.4	0.32	0.16	5.6	2.8	8.0	4.0	16.0	8.0	0.40	0.20	4.8	2.4

Breed	Body weight (kg)	Height x2 (m)	Body index	Cowgill and Drabkin's BSA formula	New BSA formula	Carmustine CDF	Carmustine NF	6-Mercaptopurine CDF	6-Mercaptopurine NF	Fluorouracil CDF	Fluorouracil NF	Mitoxantrone CDF	Mitoxantrone NF	Thioguanine CDF	Thioguanine NF	Streptozotocin CDF	Streptozotocin NF	Thiotepa CDF	Thiotepa NF
Chinese Temple Dog (Classic)	6.8	0.60	0.89	0.36	0.29	3.6	2.9	1.44	1.16	25.2	20.3	36.0	29.0	72.0	58.0	1.80	1.45	21.6	17.4
Chinese Temple Dog (Miniature)	1.8	0.26	26.63	0.15	0.09	1.5	0.9	0.6	0.36	10.5	6.3	16.0	9.0	30.0	18.0	0.75	0.45	9.0	5.4
Chinese Temple Dog (Sleeve)	0.9	0.15	4.00	0.09	0.05	0.9	0.5	0.36	0.20	6.3	3.5	9.0	5.0	18.0	10.0	0.45	0.25	5.4	3.0
Pekingese	4.5	0.90	5.56	0.28	0.29[a]	2.8	2.9	1.12	1.16	19.6	20.3	28.0	29.0	56.0	58.0	1.40	1.45	16.8	17.4
Shih-Tzu	6.4	0.54	21.95	0.35	0.27[b]	3.5	2.7	1.40	1.08	24.5	18.9	35.0	27.0	70.0	54.0	1.75	1.35	21.0	16.2
Lhasa Apso	6.8	0.56	21.68	0.36	0.28[b]	3.6	2.8	1.44	1.12	25.2	19.6	36.0	28.0	72.0	56.0	1.80	1.40	21.6	16.8
Japanese Spaniel Chin	3.2	0.60	8.89	0.22	0.20[b]	2.2	2.0	0.88	0.80	15.4	14	22.0	20.0	44.0	40.0	1.10	1.00	13.2	12.0
Yorkshire Terrier	3.5	0.46	16.54	0.23	0.18[b]	2.3	1.8	0.92	0.72	16.1	12.6	23.0	18.0	46.0	36.0	1.15	0.90	13.8	10.8
Small English Terrier	3.6	0.60	10.00	0.24	0.21[b]	2.4	2.1	0.96	0.84	16.8	14.7	24.0	21.0	48.0	42.0	1.20	1.05	14.4	12.6
Australian Terrier	5.0	0.50	20.00	0.30	0.23[b]	3.0	2.3	1.20	0.92	21	16.1	30.0	23.0	60.0	46.0	1.50	1.15	18.0	13.8

CDF: Cowgill and Drabkin's Formula; NF: New Formula; m: Male; f: Female; **: Prone to Overweight; BMI>25 kg/m²; ***: Prone to obesity, BMI>30 kg/m²

Table 4: Body weight, height, body mass index and therapeutic doses of anticancer drugs for toys.

Breed	Body weight (kg)	Height x2 (m)	Body index	Cowgill and Drabkin's BSA formula	New BSA formula	Carmustine (90 mg/m²) CDF	NF	6-Mercaptopurine (50 mg/m²) CDF	NF	Fluorouracil (150 mg/m²) CDF	NF	Mitoxantrone (6 mg/m²) CDF	NF	Thioguanine (25 mg/m²) CDF	NF	Streptozotocin (500 mg/m²) CDF	NF	Thiotepa (0.5 mg/m²) CDF	NF
Poodle (Standard)	22.0	0.76	38.09	0.79	0.62	71.1	55.8	39.5	16.0	118.5	93.0	4.94	3.72	19.75	15.5	395	310	0.40	0.31
Great Spitz	18.0	0.80	28.13	0.69	0.57	62.1	51.3	34.5	51.3	103.5	85.5	4.14	3.42	17.25	14.25	345	285	0.35	0.29
Small Spitz	3.75	0.56	11.96	0.24	0.21	21.6	18.9	21.6	18.9	36.0	31.5	1.44	1.26	6.0	3.25	120	105	0.12	0.11
Volpino Italiano (m)	4.5	0.60	12.5	0.28	0.24	25.2	21.6	14.0	12.0	42.0	36.0	1.68	1.44	7.0	6.0	140	120	0.14	0.12
Volpino Italiano (f)	4.0	0.56	12.76	0.25	0.21	22.5	18.9	12.5	10.5	37.5	31.5	1.5	1.26	6.25	5.25	125	105	0.13	0.11
Japanese Spitz (m)	11.0	0.80	17.19	0.50	0.44	45.0	39.6	25.0	22.0	75.0	66.0	3.00	2.64	12.5	11.0	250	220	0.25	0.22
Japanese Spitz (f)	10.0	0.70	20.41	0.47	0.39	42.3	35.1	23.5	19.5	70.5	58.5	2.82	2.34	11.75	9.75	235	195	0.24	0.20
Harlekinpinscher	12.0	0.70	24.49	0.53	0.43	47.7	38.7	26.5	21.5	79.5	64.5	3.18	2.58	13.25	10.75	265	215	0.27	0.22
Dalmatian (m)	27.0	1.20	18.75	0.91	0.88	81.9	79.2	45.5	44.0	136.5	132.0	5.46	5.28	22.75	22.0	455	440	0.46	0.44
Dalmatian (f)	25.0	1.10	20.66	0.86	0.80	77.4	72.0	77.4	40	129.0	120	5.16	4.80	21.5	20.0	430	400	0.43	0.40
Kromfohrlander	12.0	0.92	14.18	0.53	0.50	47.7	45.0	26.5	25	79.5	25.0	3.18	3.0	13.25	12.5	265	250	0.27	0.25
Pinscher	8.0	0.96	8.68	0.40	0.41	36.0	36.9	20	20.5	20.0	20.5	2.4	2.41	10.0	10.25	200	205	0.20	0.21
Zweraschnauzer	7.3	0.70	14.90	0.38	0.33	34.2	29.7	19.0	16.5	19.0	16.5	2.28	1.98	9.5	8.25	190	165	0.19	0.17
Schipperkee (large)	9.0	0.66	20.66	0.44	0.36	39.6	32.4	22.0	18.0	22.0	18.0	2.64	2.16	11.0	9.0	220	180	0.22	0.18
Belgian Griffon (small)	3.0	0.81	4.57	0.21	0.22	18.9	19.8	10.5	11.0	10.5	33.0	1.26	1.32	5.25	5.5	105	110	0.11	0.11
Piccolo Brabantino	4.5	0.60	12.5	0.28	0.24[b]	25.2	21.6	14.0	12.0	42.0	36.0	1.68	1.44	7.0	6.0	140	120	0.14	0.12
English Bulldog (m)	25.0	1.00	25.0	0.86	0.77[b]	77.4	69.3	43.0	38.5	129	115.5	5.16	4.62	21.5	19.25	430	385	0.43	0.39
English Bulldog (f)	23.0	0.75	4.89	0.82	0.63	73.8	56.7	41	31.5	41.0	31.5	4.92	3.78	20.5	15.75	410	315	0.41	0.32
French Bulldog	12.0	0.60	33.33	0.53	0.40	47.7	36.0	26.5	20.0	26.5	20.0	3.18	2.4	13.25	10.0	265	200	0.27	0.20
Bolognese (m)	4.5	0.60	12.5	0.28	0.24[b]	25.2	21.6	14.0	12.0	42.0	36.0	1.68	1.44	7.0	6.0	140	120	0.14	0.12
Bolognese (f)	4.0	0.56	12.76	0.25	0.21	22.5	18.9	12.5	10.5	12.5	10.5	1.5	1.26	6.25	5.25	125	105	0.13	0.11
Bichon Avanese	6.0	0.50	24.0	0.33	0.25	29.7	22.5	16.5	12.5	16.5	12.5	1.98	1.5	8.25	6.25	165	125	0.17	0.13
Cane Nudo	8.0	0.80	12.5	0.40	0.37	26.0	33.3	20	18.5	20.0	18.5	2.4	2.22	10.0	9.25	200	185	0.20	0.19
Schipperkee (medium)	5.0	0.56	15.94	0.30	0.24	27.0	21.6	15.0	12.0	45.0	36.0	1.80	1.44	7.5	6.0	150	120	1.15	0.12

Breed																			
Schipperkee (miniature)	3.0	0.50	12.00	0.21	0.17	18.9	15.3	10.5	8.5	31.5	25.5	1.26	1.02	5.25	4.25	105	85	0.11	0.09
Belgian Griffon (large)	11.0	0.81	16.76	0.46	0.44	41.4	39.6	23.0	22.0	69.0	66.0	2.76	2.64	11.5	11.0	230	220	0.23	0.22
Poodle (miniature)	7.0	0.51	26.91	0.37	0.27	33.3	24.3	18.5	13.5	55.5	40.5	2.22	1.62	9.25	6.75	185	135	0.19	0.14
Chow Chow	27.0	1.01	26.47	0.91	0.80^b	81.9	72.0	45.5	40.0	136.5	120.0	5.46	4.80	22.75	20.0	455	400	0.46	0.40
Pug	8.0	0.56	25.51	0.40	0.31	36.0	27.9	20	15.5	20.0	15.5	2.4	1.86	10.0	7.75	200	155	0.2	0.16
Shar - Pei (m)	25.0	1.02	24.03	0.86	0.71	77.4	69.3	43.0	38.5	43.0	38.5	5.16	4.62	21.5	19.25	430	305	0.43	0.39
Shar - Pei (f)	20.0	0.92	23.63	0.74	0.65	66.6	58.5	37.0	32.5	37.0	32.5	4.44	3.90	18.5	16.25	370	325	0.37	0.33
Tibetan Spaniel	6.8	1.02	6.54	0.36	0.39	32.4	35.1	18.0	19.5	18.0	19.5	2.16	2.34	9.00	9.75	180	195	0.18	0.20
King Charles Spaniel	8.8	0.64	21.51	0.43	0.35	38.7	31.5	21.5	17.5	21.5	17.5	2.58	2.10	10.75	8.75	215	175	0.22	0.18
Telomian	14.0	0.96	15.19	0.59	0.55	53.1	49.5	29.5	27.5	29.5	27.5	3.54	3.30	14.75	13.75	295	275	0.30	0.28
Shiba Inu	20.0	0.82	29.74	0.74	0.61	66.6	54.9	37.0	30.5	37.0	30.5	4.44	3.66	18.5	15.25	370	305	0.37	0.31

CDF: Cowgill and Drabkin's formula; NF: New Formula; m: Male; f: Female; **: Prone to overweight, BMI>25 kg/m²; ***: Prone to obesity, BMI>30 kg/m²

Table 5: Body weight, height, body mass index, body surface areas and therapeutic doses of anticancer drugs for companions.

Breed	Body weight (kg)	Height x2 (m)	Body index	Cowgill and Drabkin's BSA formula	New BSA formula	Vinblastine (0.7 mg/m²)		Predinisolone (40 mg/m²)		L-Asparaginase (10,000 iu/m²)		Ifosfamide (50 mg/m²)	
						CDF	NF	CDF	NF	CDF	NF	CDF	NF
Smooth Fox Terrier	8.0	0.80	12.50	0.40	0.37^b	0.28	0.26	16.0	14.8	4000	3700	20.0	18.5
Wire Haired Fox Terrier	8.0	0.79	12.82	0.40	0.37^b	0.28	0.26	16.0	14.8	4000	3700	20.0	18.5
Airedale Terrier	20.0	1.18	14.36	0.74	0.74^b	0.52	0.52	29.6	29.6	7400	7400	37.0	37.0
Bedlington Terrier	10.5	0.84	14.88	0.48	0.44^b	0.34	31	19.2	17.6	4800	4400	24.0	22.0
Border Terrier**	7.0	0.50	28.00	0.37	0.27^b	0.26	0.19	14.8	10.8	3700	2700	18.5	13.5
Bull Terrier	28.0	1.12	22.38	0.93	0.86^b	0.44	0.60	37.2	34.4	9300	8600	46.5	43.0
Cairn Terrier	6.3	0.60	17.50	0.34	0.28^b	0.24	0.20	13.6	11.2	3400	2800	17.0	14.0
Dandie Diomont Terrier***	8.0	0.50	32.0	0.40	0.29^b	0.28	0.20	11.6	11.2	4000	2900	20.0	14.5
Irish Terrier	12.3	0.92	14.53	0.54	0.50^b	0.38	0.35	21.6	20.0	5400	5000	27.0	25.0
Jack Russell Terrier***	9.0	0.44	46.49	0.44	0.29^b	0.31	0.20	17.6	11.60	4400	2900	22.0	14.5
Kerry Blue Terrier	17.0	0.96	18.45	0.67	0.61^b	0.45	0.43	26.8	24.4	6700	6100	33.5	30.5
Lakeland Terrier (m)	7.7	0.74	14.06	0.39	0.35^b	0.27	0.25	15.6	14.0	3900	3500	19.5	14.5
Lakeland Terrier (f)	6.8	0.71	13.49	0.36	0.32^b	0.25	0.22	14.4	12.8	3600	3200	18.0	16.0
Manchester Terrier**	7.7	0.50	27.2	0.39	0.29^b	0.27	0.20	15.6	11.6	3900	2900	19.5	14.5
Norfolk Terrier	5.4	0.50	21.60	0.31	0.24^b	0.22	0.17	12.4	9.6	3100	2400	15.5	12.0
Norwich Terrier	4.5	0.50	18.00	0.28	0.21^b	0.20	0.15	11.2	8.4	2800	2100	14.0	10.5
Scottish Terrier***	10.5	0.56	33.48	0.48	0.36^b	0.34	0.25	19.2	14.4	4800	3600	24.0	18.0
Sealyham Terrier (m)	9.0	0.60	25.00	0.44	0.34^b	0.31	0.24	17.6	13.6	4400	3400	22.0	17.0
Sealyham Terrier (f)	8.1	0.58	24.08	0.41	0.32^b	0.29	0.22	16.4	12.8	4100	3200	20.5	16.0
Sky Terrier ***	11.5	0.51	44.21	0.51	0.36^b	0.36	0.75	20.4	14.4	5100	3600	20.5	16.0
Soft-Coated Wheaten Terrier	15.8	0.90	19.51	0.64	0.57^b	0.45	0.40	25.6	22.8	6400	5700	32.0	28.5
Staffordshire Bull Terrier (m)**	17.0	0.80	26.56	0.67	0.56^b	0.47	0.39	26.8	22.4	6700	5600	33.5	28.0
Staffordshire Bull Terrier (f)**	15.0	0.73	25.97	0.61	0.51^b	0.43	0.36	24.4	20.4	6100	5100	30.5	25.5
Welsh Terrier	9.5	0.78	15.61	0.45	0.40^b	0.32	0.28	18.0	16.0	4500	4000	22.5	20.0
West Highland White Terrier***	10.0	0.56	31.89	0.47	0.35^b	0.33	0.25	18.6	14.0	4700	3500	23.5	17.5
Glen of Imaal Terrier (m)***	16.0	0.72	30.86	0.64	0.51^b	0.45	0.36	25.6	20.4	6400	5100	32.0	25.5
Glen of Imaal Terrier (f)***	14.0	0.66	32.14	0.59	0.45^b	0.41	0.29	23.6	18.0	5900	4500	29.5	22.5
German hunting Terrier (m)	10.0	0.80	15.63	0.47	0.42^b	0.33	0.29	18.8	16.8	4700	4200	23.5	21.0
German hunting Terrier (f)	8.5	0.78	13.97	0.42	0.38^b	0.29	0.27	16.8	15.2	4200	3800	21.0	19.0
Bohemian Terrier	9.0	0.70	18.37	0.44	0.37^b	0.31	0.26	17.6	14.8	4400	3700	22.0	18.5
American Pit Bull Terrier (m)	20.0	0.92	23.63	0.74	0.65^b	0.52	0.46	29.6	26.0	7400	6500	37.0	32.5
American Pit Bull Terrier (f)**	18.0	0.83	26.13	0.69	0.58^b	0.48	0.41	27.6	23.2	6900	5800	34.5	29.0
Boston Terrier	11.3	0.86	15.28	0.51	0.47^b	0.36	0.34	20.4	18.8	5100	4700	25.5	23.5
Tibetan Terrier	13.6	0.80	21.25	0.58	0.49^b	0.41	0.34	23.2	19.6	5800	4900	29.0	24.5

CDF: Cowgill and Drabkin's formula; NF: New Formula; m: Male; f: Female; **: Prone to overweight, BMI>25 kg/m² ***: Prone to obesity; BMI>30 kg/m²

Table 6: Body weight, height, body mass index, body surface areas and therapeutic doses of some anticancer drugs for terriers.

Breed	Body weight (kg)	Height x2(m)	Body index	Cowgill and Drabkin's BSA formula	New BSA formula	Methotrexate (5mg/m²)		Dactinomycin (1mg/m²)		Mechlorethamine (5mg/m²)		Thio-TEPA (9mg/m²)		6-Mercaptopurine (50mg/m²)	
						CDF	NF	CDF	NF	CDF	NF	CDF	NF	CDF	NF
Shorthaired Dachshund (Normal)	9.0	0.44	46.49	0.44	0.29	2.20	1.45	0.44	0.29	2.20	1.45	3.96	2.61	22.0	14.5
Longhaired Dachshund**	10.6	0.42	52.35	0.49	0.31	2.45	1.55	0.49	0.31	2.45	1.55	4.41	2.79	24.5	15.5
Wirehaired Dachshund**	8.3	0.40	51.9	0.41	0.26	2.05	1.30	0.41	0.26	2.05	1.30	3.69	2.34	20.5	13.0
Hanover Hound (m)**	45.0	1.14	34.68	1.28	1.12	6.40	5.60	1.28	1.12	6.40	5.60	11.52	10.08	64.0	56.0
Hanover Hound (f)**	43.0	1.04	39.79	1.23	1.04	6.15	5.20	1.23	1.04	6.15	5.20	11.07	9.36	61.5	52.0
Bloodhound (m) ***	48.0	1.34	26.73	1.33	1.26	6.65	6.30	1.33	1.26	6.65	6.30	11.97	11.34	66.5	63.0
Bloodhound (f) ***	40.0	1.20	27.78	1.18	1.08	5.90	5.40	1.18	1.08	5.90	5.40	10.62	9.72	59.0	54.0
Kardian Bear Dog*	22.0	1.20	15.28	0.79	0.79	3.95	3.95	0.79	0.79	3.95	3.95	7.11	7.11	39.5	39.5
Grand Bleu DeGaslogne	35.0	1.40	17.86	1.08	1.09	5.40	5.45	1.08	1.09	5.40	5.45	9.72	9.81	54.0	54.5
Grand Gascon Saintongeris (m)	32.0	1.41	16.10	1.02	1.05	5.10	5.25	1.02	1.05	5.10	5.25	9.18	9.45	51.0	52.5
Grand Gascon Saintongeris (f)	30.0	1.30	17.75	0.98	0.83	4.90	4.85	0.98	0.97	4.90	4.85	8.82	8.73	49.0	48.5
Poitevin	30.0	1.40	15.31	0.98	1.01	4.90	5.05	0.98	1.01	4.90	5.05	8.82	9.09	49.0	50.5
Billy (m)	30.0	1.32	17.22	0.98	0.98	4.90	4.90	0.98	0.98	4.90	4.90	8.82	8.82	49.0	49.0
Billy (f)	25.0	1.16	18.58	0.86	0.83	4.30	4.15	0.86	0.83	4.30	4.15	7.74	7.47	43.0	41.5
Chen Francais	30.0	1.44	14.47	0.98	1.02	4.90	5.10	0.98	1.02	4.90	5.10	8.82	9.18	49.0	51.0
Swedish Elkhound	30.0	1.26	18.90	0.98	0.95	4.90	4.75	0.98	0.95	4.90	4.75	8.82	8.55	49.0	47.5
English Fox hound (m) **	63.0	1.26	39.68	1.60	1.41	8.0	7.05	1.60	1.41	8.0	7.05	14.4	12.69	80.0	70.5
English Fox hound (f) **	60.0	1.22	40.42	1.55	1.35	7.75	6.75	1.55	1.35	7.75	6.75	13.95	12.15	77.5	67.5
American Fox hound (m) **	63.0	1.26	39.68	1.60	1.41	8.0	7.05	1.60	1.41	8.0	7.05	14.4	12.69	80.0	70.5
American Fox hound (f) **	56.0	1.22	37.72	1.48	1.30	7.40	6.50	1.48	1.30	7.4	6.50	13.32	11.7	74.0	65.0
Trigg Hound (m)	25.0	1.22	16.84	0.86	0.85	4.30	4.25	0.86	0.85	4.30	4.25	7.74	7.65	43.0	42.5
Trigg Hound (f)	20.0	1.12	15.94	0.74	0.72	3.70	3.60	0.74	0.72	3.70	3.60	6.66	6.48	37.0	36.0
Plott Hound (m)	29.0	1.28	17.70	0.95	0.94	4.75	4.70	0.95	0.94	4.75	4.70	8.55	8.46	47.5	47.0
Shorthaired Dachshound (Minature)**	4.0	0.24	69.44	0.25	0.14	1.25	0.70	0.25	0.14	1.25	0.70	2.25	1.26	12.5	7.0
Shorthaired Dachshound (Toy)**	3.5	0.22	72.31	0.23	0.12	1.15	0.60	0.23	0.12	1.15	0.60	1.15	0.60	11.5	6.0
Petit Bleu	20.0	1.00	20.00	0.74	0.68	3.70	3.0	0.74	0.68	3.70	3.0	3.70	3.40	37.0	30.0
Plott Hound (f)	25.0	1.22	16.84	0.86	0.85	4.30	4.25	0.86	0.85	4.30	4.25	7.74	7.65	43.0	42.5
Dachsbracke (West Phalian Basset) **	18.0	0.70	36.73	0.69	0.53	3.45	2.65	0.69	0.53	3.45	2.65	6.21	4.77	34.5	26.5
German Spaniel	20.0	1.00	20.0	0.74	0.68	3.70	3.40	0.74	0.68	3.70	3.40	6.66	6.12	37.0	34.0
Tiroler Bracke	22.0	0.96	23.87	0.79	0.70	3.95	3.50	0.79	0.70	3.95	3.50	7.11	6.30	39.5	35.0
Mountain Hound	18.0	1.00	18.00	0.69	0.64	3.45	3.20	0.69	0.64	3.45	3.20	6.21	5.76	34.5	32.0
Finnish Spitz	27.0	1.00	22.00	0.91	0.80	4.55	4.00	0.91	0.80	4.55	4.00	8.19	7.20	45.5	40.0
Finnish Hound (m)	25.0	1.22	16.84	0.86	0.85	4.30	4.25	0.86	0.85	4.30	4.25	7.74	7.65	43.0	42.5
Finnish Hound (f)	23.0	1.16	17.09	0.82	0.79	4.10	3.95	0.82	0.79	4.10	3.95	7.38	7.11	41.0	39.5
Steinbrack***	22.0	0.90	27.16	0.79	0.68	3.95	3.40	0.79	0.68	3.95	3.40	7.11	6.12	39.5	34.0
Ogar Polski (m)	32.0	1.30	18.93	1.02	1.00	5.10	5.00	1.02	1.00	5.10	5.00	9.18	9.00	51.0	50.0
Ogar Polski (f)	26.0	1.20	18.06	0.89	0.86	4.45	4.30	0.89	0.86	4.45	4.30	8.01	7.74	44.5	43.0
Austrian Hound	22.0	1.02	21.15	0.79	0.72	3.95	3.40	0.79	0.72	3.95	3.60	7.11	6.48	39.5	36.0
Bavarian Mountain Hound**	35.0	1.00	33.00	1.08	0.91	5.40	4.55	1.08	0.91	5.40	4.55	9.72	8.19	54.0	45.5
Petit Bleu De Gascogne	20.0	1.40	10.20	0.74	0.81	3.70	4.05	0.74	0.81	3.70	4.05	6.66	7.29	37.0	40.5
Ariegeuis	30.0	1.20	20.83	0.98	0.93	4.90	4.65	0.98	0.93	4.90	4.65	8.82	8.31	49.0	46.5
Basset Artesien Normand**	15.0	0.72	28.94	0.61	0.49	3.05	2.45	0.61	0.49	3.05	2.45	5.49	4.41	30.5	24.5
Basset Bleu De Gascogne**	18.0	0.76	31.16	0.69	0.56	3.45	2.80	0.69	0.56	3.45	2.80	6.21	5.04	34.5	28.0
Basset Griffon Vendeen***	20.0	0.82	29.74	0.74	0.61	3.70	3.05	0.74	0.61	3.70	3.05	6.66	5.49	37.0	30.5
Basset Fauve De Bretagne**	18.0	0.72	34.72	0.69	0.56	3.45	2.80	0.69	0.56	3.45	2.80	6.21	5.04	34.5	28.0
Griffon Nivernais	25.0	1.20	17.36	0.86	0.84	4.30	4.20	0.86	0.84	4.30	4.20	7.74	7.56	43.0	42.0
Harrier**	46.0	1.00	46.00	1.30	1.06	6.50	5.30	1.30	1.06	6.50	5.30	9.27	9.54	65.0	53.0
Beagle	13.6	0.80	21.25	0.58	0.49	2.90	2.45	0.58	0.49	2.90	2.45	5.22	4.41	29.0	24.5
Beagle Harrier	20.0	0.96	21.70	0.74	0.67	3.70	3.35	0.74	0.67	3.70	3.35	6.66	6.03	37.0	33.5
Otter hound	35.0	1.30	20.71	1.08	1.05	5.40	5.25	1.08	1.05	5.40	5.25	9.72	9.45	54.0	52.5
Basset Hound**	23.0	0.71	45.63	0.82	0.61	4.10	3.05	0.82	0.61	4.10	3.05	7.38	5.49	41.0	30.5
Italian Hound (m)	28.0	1.16	20.81	0.93	0.88	4.65	4.40	0.93	0.88	4.65	4.40	8.37	7.92	46.5	44.0

Breed														
Italian Hound (f)	18.0	0.96	19.53	0.69	0.63	3.45	3.15	0.69	0.63	3.45	3.15	6.21	5.67	34.5	31.5
Cirneco Dell Etna (m)	12.0	1.12	9.57	0.53	0.55	2.65	3.30	0.53	0.55	2.65	3.30	4.77	4.95	26.5	33.0
Dachsbrcke (Montano – Alpino)	10.0	0.84	14.17	0.47	0.43	2.35	2.15	0.47	0.43	2.35	2.15	4.25	3.87	23.5	21.5
Elizabeth Beagle***	10.0	0.60	27.78	0.47	0.36	2.35	1.80	0.47	0.36	2.35	1.80	4.23	3.24	23.5	18.0
Cirneco Dell Etna (f)	10.0	0.96	10.85	0.47	0.46	2.35	2.30	0.47	0.46	2.35	2.30	4.23	4.14	23.5	23.0
Podengo Portuguese Grade	30.0	1.40	15.31	0.98	1.01	4.90	5.05	0.98	1.01	4.90	5.05	8.82	9.09	49.0	50.5
Podengo Portuguese Medio	20.0	1.10	16.53	0.74	0.72	3.70	3.60	0.74	0.72	3.70	3.60	6.66	6.48	37.0	36.0
Podengo Portuguese Pequeno	5.0	0.60	13.89	0.30	0.25	1.50	1.25	0.30	0.25	1.50	1.25	2.70	2.25	15.0	12.5
Hamitton Hound	25.0	1.20	17.36	0.86	0.84	4.30	4.20	0.86	0.84	4.30	4.20	7.74	7.56	43.0	42.0
Drever (m) ***	15.0	0.74	27.39	0.61	0.50	3.05	2.50	0.61	0.50	30.5	2.50	5.49	4.50	30.5	25.0
Drever (f)**	14.0	0.64	34.18	0.59	0.45	2.95	2.25	0.59	0.45	2.95	2.25	5.31	4.05	29.5	22.5
Swiss Hound	20.0	1.10	16.53	0.74	0.72	3.70	3.60	0.74	0.72	3.70	3.60	6.66	4.05	37.0	36.0
Jura Hound **	20.0	0.80	31.25	0.74	0.61	3.70	3.05	0.74	0.61	3.70	3.05	6.66	5.49	37.0	30.5
Burnese Hound***	18.0	0.80	28.13	0.69	0.57	3.45	2.85	0.69	0.57	3.45	2.85	6.21	5.13	34.5	28.5
Curernese Hound**	28.0	0.80	43.75	0.93	0.72	4.65	3.60	0.93	0.72	4.65	3.60	8.37	6.48	46.5	36.0
Small Swiss Hound***	15.0	0.76	26.0	0.61	0.51	3.05	2.55	0.61	0.51	3.05	2.55	5.49	4.59	30.5	25.5
Smooth-Haired Istrian Hound**	20.0	1.16	14.86	0.74	0.74	3.70	3.70	0.74	0.74	3.70	3.70	6.66	6.66	37.0	37.0
Posavac	18.0	1.16	13.38	0.69	0.70	3.45	3.50	0.69	0.70	3.45	3.50	6.21	6.30	34.5	35.0
Rhodesia Ridgeback (m)	33.9	1.32	19.46	1.06	1.04	5.30	5.20	1.06	1.04	5.30	5.20	9.54	9.36	53.0	52.0
Rhodesia Ridgeback (f)	29.4	1.30	17.40	0.96	0.96	4.80	4.80	0.96	0.96	4.80	4.80	8.64	8.64	4.80	4.80
Basenji (m)	10.8	0.85	14.95	0.49	0.45	2.45	2.25	0.49	0.45	2.45	2.25	4.41	4.05	24.5	22.5
Basenji (f)	9.9	0.80	15.47	0.47	0.42	2.35	2.10	0.47	0.42	2.35	2.10	4.23	3.78	23.5	21.0
Black and Tan Coon Hound**	64.0	1.36	34.60	1.62	1.48	8.10	7.40	1.62	1.48	8.10	7.40	14.58	13.32	81.0	74.0
Bluetick Coon hound (m)*	36.0	1.38	18.90	1.10	1.10	5.50	5.50	1.10	1.10	5.50	5.50	9.90	9.90	55.0	55.0
Bluetick Coon hound (f)	29.0	1.28	17.70	0.95	0.94	4.75	4.70	0.95	0.94	4.75	4.70	8.55	8.46	47.5	47.0
Redbone Coon hound (m)	32.0	1.32	18.37	1.02	1.01	5.10	5.05	1.02	1.01	5.10	5.05	9.18	9.09	51.0	50.5
Redbone Coon hound (f)	29.0	1.28	17.70	0.95	0.94	4.75	4.70	0.95	0.94	4.75	4.70	8.55	8.46	47.5	47.0
Redtick Coon hound (m)*	36.0	1.38	18.90	1.10	1.10	5.50	5.50	1.10	1.10	5.50	5.50	9.9	9.9	55.0	55.0
Redtick Coon hound (f)	29.0	1.28	17.70	0.95	0.94	4.75	4.70	0.95	0.94	4.75	4.70	8.55	8.46	47.5	47.0
Treeing Walker Coon hound (m)**	65.0	1.38	34.13	1.63	1.50	8.15	7.50	1.63	1.50	8.15	7.50	14.67	13.50	81.5	75.0
Treeing Walker Coon hound (f)	34.0	1.28	20.75	1.06	1.03	5.30	5.15	1.06	1.03	5.30	5.15	19.54	9.27	53.0	51.5
Tennessee Treeing Brindle (m)	23.0	1.22	15.45	0.82	0.81	4.10	4.05	0.82	0.81	4.10	4.05	7.38	7.29	41.0	40.5
Tennessee Treeing Brindle (f)	18.0	1.12	14.35	0.69	0.68	3.45	3.40	0.69	0.68	3.45	3.40	6.21	6.12	34.5	34.0
Westphalian Basset**	18.0	0.70	36.73	0.69	0.53	3.45	2.65	0.69	0.53	3.45	2.65	6.21	4.77	34.5	26.5
Bosnian Hound	24.0	1.12	19.13	0.84	0.80	4.20	4.0	0.84	0.80	4.20	4.0	7.56	7.20	42.0	40.0
Yugoslavian Mountain hound	25.0	1.10	20.66	0.86	0.81	4.20	4.05	0.86	0.81	4.30	4.05	7.74	7.29	43.0	40.5
Yugoslavian Tricolor hound	25.0	1.10	20.66	0.86	0.81	4.30	4.05	0.86	0.81	4.30	4.05	7.74	7.29	43.0	40.5
Black Forest hound	22.0	1.10	18.18	0.79	0.75	3.95	3.75	0.79	0.75	3.95	3.75	7.11	6.75	39.5	39.5
Grand Anglo-Francais	32.0	1.36	17.30	1.02	1.03	1.10	1.15	1.02	1.03	1.10	1.15	9.18	9.27	37.5	37.5
Porcelaine (m)	28.0	1.16	20.81	0.93	0.88	4.65	4.40	0.93	0.88	4.65	4.40	8.37	7.92	11.0	11.5
Porcelaine (f)	25.0	1.12	19.93	0.86	0.81	4.30	4.05	0.86	0.81	4.30	4.05	7.74	7.29	46.5	44.0
Anglo-Francais Tricolor	25.0	1.00	25.0	0.86	0.77	4.30	3.85	0.86	0.77	4.30	3.85	7.74	6.93	43.0	40.5
Petit Anglo-Francais	20.0	0.90	24.69	0.74	0.64	3.70	3.20	0.74	0.64	3.70	3.20	6.66	5.76	43.0	38.5
Transylvanian Hound	35.0	1.30	20.71	1.08	1.05	5.40	1.25	1.08	1.05	5.40	1.25	9.72	9.45	37.0	32.0
Small Gray Elk Dog***	30.0	1.04	27.74	0.98	0.86	4.90	4.30	0.98	0.86	4.90	4.30	8.82	7.74	54.0	12.5
Balkan Hound (m)	20.0	1.03	18.85	0.74	0.69	3.70	3.45	0.74	0.69	3.70	3.45	6.66	6.21	49.0	43.0
Balkan Hound (f)	20.0	1.04	18.49	0.74	0.70	3.70	3.50	0.74	0.70	3.70	3.50	6.66	6.30	37.0	34.5
Lunde hound (m)	6.0	0.72	11.57	0.33	0.30	1.65	1.50	0.33	0.30	1.65	1.50	2.97	2.70	37.0	35.0
Lunde hound (f)	6.0	0.68	12.98	0.33	0.29	1.65	1.45	0.33	0.29	1.65	1.45	2.97	2.61	16.5	15.0
Norwegian Elk hound	20.0	1.00	20.0	0.74	0.68	3.70	3.40	0.74	0.68	3.70	3.40	6.66	6.12	16.5	14.5
Schillerstorare (m)	24.0	1.14	18.47	0.84	0.80	4.20	4.00	0.84	0.80	4.20	4.00	7.56	7.20	37.0	34.0
Schillerstovare (f)	18.0	1.06	16.02	0.69	0.66	3.45	3.30	0.69	0.66	3.45	3.30	6.21	5.94	42.0	40.0
Greek Hound (m)	20.0	1.10	16.53	0.74	0.72	3.70	3.60	0.74	0.72	3.70	3.60	6.66	6.48	34.5	33.0
Greek Hound (f)	17.0	1.06	15.13	0.67	0.64	3.45	3.20	0.67	0.64	3.35	3.20	6.03	5.76	37.0	36.0

Breed															
Smalendsstovare	18.0	1.00	18.0	0.69	0.64	3.45	3.20	0.69	0.64	3.45	3.20	6.21	5.76	33.5	32.0
Hygenhund	24.0	1.20	16.67	0.84	0.83	4.20	4.15	0.84	0.83	4.20	4.15	7.56	7.47	34.5	32.0
Haldenstover (m)	25.0	1.10	20.66	0.76	0.81	4.30	4.05	0.86	0.81	4.30	4.05	7.74	7.29	42.0	41.5
Haldenstover (f)	20.0	1.00	20.0	0.74	0.68	3.70	3.40	0.74	0.68	3.70	3.40	6.66	6.12	43.0	40.5
Dunker	22.0	1.10	18.18	1.79	0.75	3.95	3.75	0.79	0.75	3.95	3.75	7.11	6.75	37.0	34.0
Transylvanian (Short legged)**	35.0	1.00	35.00	1.08	0.91	5.4	4.55	1.08	0.91	5.4	4.55	9.72	8.19	39.5	37.5
Norwegian Elkhound (Grey male)	20.0	1.02	19.22	0.74	0.69	3.70	3.45	0.74	0.69	3.70	3.45	6.66	6.21	54.0	45.5
Norwegian Elkhound grey (female)	20.0	0.98	20.52	0.74	0.67	3.70	3.35	0.74	0.67	3.70	3.35	6.66	6.03	37.0	34.5
Somercet Harrier	18.0	1.10	14.88	0.69	0.68	3.45	3.40	0.69	0.68	3.45	3.40	6.21	6.12	37.0	33.5
Sabueso Espanol (m)	25.0	1.12	19.93	0.86	0.81	4.30	4.05	0.86	0.81	4.30	4.05	7.74	7.29	34.5	34.0
Sabueso Espanol (f)	25.0	1.04	23.11	0.86	0.78	4.30	3.90	0.86	0.78	4.30	3.90	7.74	7.02	43.0	40.5
Rastreador Brasileiro	25.0	1.30	14.79	0.86	0.88	4.30	4.40	0.86	0.88	4.30	4.40	7.74	7.92	43.0	39.0
Levesque	30.0	1.44	14.47	0.98	1.02	4.90	5.10	0.98	1.02	4.90	5.10	8.82	9.18	43.0	44.0
Briquette Griffon Vendeen (m)	24.0	1.10	19.83	0.84	0.79	4.20	3.95	0.84	0.79	4.20	3.95	7.56	7.11	49.0	51.0
Briquette Griffon Vendeen (f)	16.0	1.06	14.24	0.64	0.62	3.20	3.10	0.64	0.62	3.20	3.10	5.76	5.58	42.0	39.5
Petit Griffon Bleu De Gascogne	15.0	1.04	13.87	0.61	0.60	3.05	3.00	0.61	0.60	3.05	3.00	5.49	5.40	32.0	31.5
Griffon Fauve De Bretagne (m)	20.0	1.10	16.53	0.74	0.72	3.70	3.60	0.74	0.72	3.70	3.60	6.66	6.48	30.5	30.0
Griffon Fauve De Bretagne (f)	20.0	1.04	18.49	0.74	0.70	3.70	3.50	0.74	0.70	3.70	3.50	6.66	6.30	37.0	36.0
Kurzhaar	32.0	1.28	19.53	1.02	0.99	5.10	4.95	1.02	0.99	5.10	4.95	9.18	8.91	37.0	35.0
Drahthaar (m)*	32.0	1.34	17.82	1.02	1.02	5.10	5.10	1.02	1.02	5.10	5.10	1.18	1.18	51.0	49.5
Drahthaar (f)	27.0	1.24	17.56	0.91	0.89	4.55	4.45	0.91	0.89	4.55	4.45	8.19	8.01	51.0	51.0
Grosser Miinsterlainder	20.0	1.24	13.01	0.74	0.76	3.70	3.80	0.74	0.76	3.70	3.80	6.66	6.84	45.5	44.5
Kleiner Miinsterlainder (m)	15.0	1.12	11.96	0.61	0.62	3.05	3.10	0.61	0.62	3.05	3.10	5.49	5.58	37.0	38.0
Kleiner Miinsterlainder (f)	15.0	1.04	13.87	0.61	0.60	3.05	3.00	0.61	0.60	5.05	3.00	5.49	5.40	30.5	31.0
German long-Haired Porita	30.0	1.40	15.31	0.98	1.01	4.90	5.05	0.98	1.01	4.90	5.05	8.82	9.09	30.5	30.0
Weimaraner (m)*	38.0	1.40	19.39	1.14	1.14	5.70	5.70	1.14	1.14	5.70	5.70	10.26	10.26	49.0	50.5
Weimaraner (f)	35.0	1.30	20.71	1.08	1.05	5.40	5.25	1.08	1.05	5.40	5.25	9.72	9.45	57.0	57.0
Perdiguero De Burgos	30.0	1.50	13.33	0.98	1.04	4.90	5.20	0.98	1.04	4.90	5.20	8.82	9.36	54.0	52.5
Podenco Ibicenco (m)	22.5	1.32	12.91	0.80	0.84	4.00	4.20	0.80	0.84	4.00	4.20	7.20	7.56	49.0	52.0
Podenco Ibicenco (f)	19.0	1.23	12.56	0.72	0.74	3.60	3.70	0.72	0.74	3.60	3.70	6.48	6.66	40.0	42.0
Braque Ariegeois *	30.0	1.34	16.71	0.98	0.98	4.90	4.90	0.98	0.98	4.90	4.90	8.82	8.82	36.0	37.0
Braque D'Aurvergne (m)	28.0	1.26	17.64	0.93	0.92	4.65	4.600	0.93	0.92	4.65	4.60	8.37	8.28	49.0	49.0
Braque D' Aurvergne (f)*	22.0	1.20	15.28	0.79	0.79	3.95	3.95	0.79	0.79	3.95	3.95	7.11	7.11	46.5	46.0
French Pointer	32.0	1.30	18.93	1.02	1.00	5.10	5.00	1.02	1.00	5.10	5.00	1.18	9.00	39.5	39.5
Barbet	15.0	1.20	10.42	0.61	0.64	3.05	3.20	0.61	0.64	3.05	3.20	5.49	5.76	51.0	50.0
Vizsla	28.0	1.24	18.21	0.93	0.91	4.65	4.55	0.93	0.91	4.65	4.55	8.37	8.19	30.5	32.0
Brittany Spaniel (m)	18.0	1.10	14.88	0.69	0.68	3.45	3.40	0.69	0.68	3.45	3.40	6.21	6.12	46.5	45.5
Brittany Spaniel (f)	15.0	0.98	15.62	0.61	0.58	3.05	2.90	0.61	0.58	3.05	2.90	5.49	5.22	34.5	34.0
French Spaniel (m)	25.0	1.20	17.36	0.86	0.84	4.30	4.20	0.86	0.84	4.30	4.20	7.74	7.56	30.5	29.0
French Spaniel (f)	20.0	1.16	14.86	0.74	0.74	3.70	3.70	0.74	0.74	3.70	3.70	6.66	6.66	43.0	42.0
Picardy Spaniel	20.0	1.20	13.89	0.74	0.75	3.70	3.75	0.74	0.75	3.70	3.75	6.66	6.75	37.0	37.0
Pont-Audemere Spaniel	24.0	1.16	17.84	0.84	0.81	4.20	4.05	0.84	0.81	4.20	4.05	7.56	7.29	37.0	37.5
Soft-Coated Griffon (m)	25.0	1.20	17.36	0.86	0.84	4.30	4.20	0.86	0.84	4.30	4.20	7.74	7.56	42.0	40.5
Soft-Coated Griffon (f)	20.0	1.10	16.53	0.74	0.72	3.70	3.60	0.74	0.72	3.70	3.60	6.66	6.48	43.0	42.0
Korthals (m)	27.0	1.20	18.75	0.91	0.88	4.55	4.40	0.91	0.88	4.55	4.40	8.19	7.92	37.0	36.0
Korthals (f)	23.0	1.10	19.01	0.82	0.77	4.10	3.85	0.82	0.77	4.10	3.85	7.38	6.93	45.5	44.0
Grand Griffon Vendien	25.0	1.30	14.79	0.86	0.88	4.30	4.40	0.86	0.88	4.30	4.40	7.74	7.92	41.0	38.5
Briquette	20.0	1.16	14.86	0.74	0.74	3.70	3.70	0.74	0.74	3.70	3.70	6.66	6.66	43.0	44.0
Gammel Dansk Horsehead (m)	24.0	1.16	17.84	0.84	0.81	4.20	4.05	0.84	0.81	4.20	4.05	7.56	7.29	37.0	37.0
Gammel Dansk Horsehead (f)	18.0	1.08	15.43	0.69	0.67	3.45	3.35	0.69	0.67	3.45	3.35	6.21	6.03	42.0	40.5
Wetter houn	20.0	1.10	16.53	0.74	0.77	3.70	3.60	0.74	0.72	3.70	3.60	6.66	6.48	34.5	33.5
Staby-Houn	20.0	1.00	20.00	0.74	0.68	3.70	3.40	0.74	0.68	3.70	3.40	6.66	6.12	37.0	36.0
Spinone Italiano (m)	37.0	1.30	21.89	1.12	1.08	5.60	5.40	1.12	1.08	5.60	5.40	10.08	9.72	37.0	34.0

Breed	Body weight (kg)	Height x2(m)	Body Mass index	CDF BSA	NF BSA	Dacarbazine CDF	Dacarbazine NF	Asparaginase CDF	Asparaginase NF	Dactinomycin CDF	Dactinomycin NF	Epirubicine CDF	Epirubicine NF	Prednisolone CDF	Prednisolone NF
Spinone Italiano (f)	32.0	1.40	16.33	1.02	1.04	5.10	5.20	1.02	1.04	5.10	5.20	9.18	9.36	56.0	54.0
Italian Pointer	40.0	1.34	22.28	1.81	1.15	5.90	5.75	1.18	1.15	5.90	5.95	10.62	10.35	51.0	52.0
Perdiguero Portuguese (m)	27.0	1.12	21.52	0.91	0.85	4.55	4.25	0.91	0.85	4.55	4.25	8.19	7.65	59.0	57.5
Perdiguero Portuguese (f)	24.0	1.04	22.19	0.84	0.77	4.20	3.85	0.84	0.77	4.20	3.85	7.56	6.93	45.5	42.5
Cesky Foursek	34.0	1.32	19.51	1.06	1.04	5.30	5.20	1.06	1.04	5.30	5.20	9.54	9.36	42.0	38.5
Cesky Foursek	28.0	1.24	19.51	0.93	0.91	4.65	4.55	0.93	0.91	4.65	4.55	8.37	8.19	53.0	52.0
Drentse Patrijshond	20.0	1.30	11.83	0.74	0.78	3.70	3.90	0.74	0.78	3.70	3.90	6.66	7.62	46.5	45.5
Pointer (m)	30.0	1.24	19.51	0.98	0.94	4.90	4.70	0.98	0.94	4.90	4.70	8.82	8.46	37.0	39.0
Pointer (f)	20.0	1.20	13.89	0.74	0.75	3.70	3.75	0.74	0.75	3.70	3.75	6.66	6.75	49.0	47.0
English Setter (m)	32.0	1.24	20.81	1.02	0.98	5.10	4.90	1.02	0.98	5.10	4.90	9.18	8.82	37.0	37.5
English Setter (f)	27.0	1.16	20.07	0.91	0.86	4.55	4.30	0.91	0.86	4.55	4.30	8.19	7.74	50.0	49.0
Irish Setter (m)	22.5	1.24	14.63	0.80	0.81	4.00	4.55	0.80	0.81	4.00	4.95	7.20	7.29	45.5	43.0
Irish Setter (f)	22.0	1.20	15.28	0.79	0.79	3.95	3.95	0.79	0.79	3.95	3.95	7.11	7.11	40.0	49.5
Gordon Setter (m)	33.0	1.26	20.79	1.04	1.00	5.20	5.00	1.04	1.00	5.20	5.00	9.36	9.00	39.5	39.5
Gordon Setter (f)	22.0	1.22	14.78	0.79	0.80	3.95	4.00	0.79	0.80	3.95	4.00	7.11	7.20	52.0	50.0
Braque De Boarbonnais	26.0	1.10	21.49	0.89	0.82	4.45	4.10	0.89	0.82	4.45	4.10	8.01	7.38	39.5	40.0
Braque Dupuy (m)	28.0	1.36	15.14	0.93	0.96	4.65	4.80	0.93	0.96	4.65	4.80	8.37	8.64	44.5	41.0
Braque Dupuy (f)	22.0	1.32	12.63	0.79	0.83	3.95	4.15	0.76	0.83	3.95	4.15	7.11	7.47	46.5	48.0
Braque Saint-German	26.0	1.24	16.91	0.89	0.88	4.45	4.40	0.89	0.88	4.45	4.40	8.01	7.92	39.5	41.5
Braque Saint-German	18.0	1.18	12.93	0.69	0.70	3.45	3.50	0.69	0.70	3.45	3.50	6.21	6.30	44.5	44.0
Stichelhaar	20.0	1.32	11.48	0.74	0.79	3.70	3.95	0.74	0.79	3.70	3.95	6.66	7.11	34.5	35.0
Pudel Pointer	25.0	1.30	14.79	0.86	0.88	4.30	4.40	0.86	0.88	4.30	4.40	7.74	7.92	37.0	39.5
Curly-Coated Retriever	36.2	1.32	20.78	1.11	1.08	5.55	5.40	1.11	1.08	5.55	5.40	9.99	9.72	43.0	44.0
Flat-Coated Retriever	32.0	1.16	23.78	1.02	0.94	5.10	4.70	1.02	0.94	5.10	4.70	9.18	8.46	55.5	54.0
Golden Retriever (m)	34.0	1.22	22.84	1.06	1.00	5.30	5.00	1.06	1.00	5.30	5.00	8.54	9.00	51.0	47.0
Golden Retriever (f)	32.0	1.14	24.62	1.02	0.94	5.10	4.70	1.02	0.94	5.10	4.70	9.18	8.46	53.0	50.0
Labrador Retriever (m) ***	36.0	1.14	27.70	1.10	1.00	5.50	5.00	1.10	1.00	5.50	5.00	9.90	9.00	51.0	47.0
Labrador Retriever (f)	24.0	1.12	19.13	0.84	0.80	4.20	4.00	0.84	0.80	4.20	4.00	7.56	7.20	55.0	50.0
Chesapeake Retriever (m)	34.0	1.32	19.51	1.06	1.04	5.30	5.20	1.06	1.04	5.30	5.20	9.54	9.36	42.0	40.0
Chesapeake Retriever (f)	28.0	1.22	18.81	0.93	0.90	4.65	4.50	0.93	0.90	4.65	4.50	8.37	8.1	53.0	52.0
English Cocker Spaniel (m)	14.5	0.82	21.56	0.60	0.52	3.00	2.06	0.60	0.52	3.00	2.60	5.40	4.68	46.5	45.0
English Cocker Spaniel (f)	12.7	0.79	20.35	0.55	0.47	2.75	2.35	0.55	0.47	2.75	2.35	4.95	4.23	30.0	26.0
Cocker Spaniel (m)	12.7	0.76	21.99	0.55	0.46	2.75	2.30	0.55	0.46	2.75	2.30	4.95	4.14	27.5	23.5
Cocker Spaniel (f)	10.9	0.74	19.91	0.50	0.42	2.50	2.10	0.50	0.42	2.50	2.10	4.50	3.78	27.5	23.0
Clumber Spaniel**	31.5	0.92	37.22	1.01	0.83	5.05	4.15	1.01	0.83	5.05	4.15	9.09	7.47	25.0	21.0
English Springer Spaniel	24.0	1.00	24.00	0.84	0.75	4.20	3.75	0.84	0.75	4.20	3.75	7.56	6.75	50.5	41.5
Welsh Springer Spaniel***	20.25	0.86	27.38	0.75	0.63	3.75	3.15	0.75	0.63	3.75	3.15	6.75	5.67	42.0	37.5
Irish Water Spaniel (m)	27.22	1.16	20.23	0.91	0.87	4.55	4.35	0.91	0.87	4.55	4.35	8.19	7.83	37.5	31.5
Irish Water Spaniel (f)	25.0	1.12	19.93	0.86	0.81	4.30	4.05	0.86	0.81	4.30	4.05	7.74	7.29	45.5	31.5
Sussex Spaniel **	20.0	0.80	31.25	0.74	0.61	3.70	3.05	0.74	0.61	3.70	3.05	6.66	5.49	43.0	40.5
Field Spaniel ***	22.5	0.92	26.58	0.80	0.69	4.00	3.45	0.80	0.69	4.00	3.45	7.20	6.21	37.0	30.5
American Water Spaniel	20.0	0.90	24.69	0.74	0.64	3.70	3.20	0.74	0.64	3.70	3.20	6.66	5.76	40.0	34.5
Boykin Spaniel	17.0	0.86	22.99	0.67	0.58	3.35	2.90	0.67	0.58	3.35	2.90	6.03	5.22	37.0	32.0

CDF: Cowgill and Drabkin's formula; NF: New Formula; m: male; f : female; *: same BSA value using the two formulas; **: BMI $\geq$ 30 kg/m²; ***: BMI>25 kg/m²

Table 7: Body weight, height, body mass index, body surface areas and therapeutic doses of anticancer drugs in hunting dogs.

Breed	Body weight (kg)	Height x2(m)	Body Mass index	Cowgill and Drabkin's BSA formula	New BSA formula	Dacarbazine (200mg/m²)		Asparaginase (30,000 iu/m²)		Dactinomycin (1.5 mg/m²)		Epirubicine (30 mg/m²)		Prednisolone (10 mg/m²)	
German Shepherd (m)	40.0	1.30	23.67	1.18	1.13	236.0	226.0	35400	33900	1.77	1.70	35.40	33.90	11.8	11.3
German Shepherd (f)	35.0	1.20	24.30	1.08	1.01	216.0	202.0	32400	30300	1.62	1.52	32.4	30.30	10.8	10.1
Belgian Sheepdog (m)	28.0	1.26	17.64	0.93	0.92	186.0	184.0	27900	27600	1.40	1.38	27.9	27.6	9.3	9.2
Belgian Sheepdog (f)	28.0	1.16	20.81	0.93	0.88	186.0	176.0	27900	26400	1.40	1.32	27.9	26.4	9.3	8.8
Belgian Tervuren	28.0	1.26	17.64	0.93	0.92	186.0	184.0	27900	27600	1.40	1.38	27.9	27.6	9.3	9.2
Belgian Malinors	27.0	1.20	18.75	0.91	0.88	182.0	176.0	27300	26400	1.37	1.32	27.3	26.4	9.1	8.8
Beauceron	35.0	1.40	17.86	1.08	1.09	216.0	218.0	32400	32700	1.62	1.64	32.4	32.7	10.8	10.9
Briard (m)***	35.0	1.38	29.30	1.08	1.08	216.0	216.0	32400	32400	1.62	1.62	32.4	32.4	10.8	35400
Briard (f)	35.0	1.28	21.36	1.08	1.04	216.0	208.0	32400	31200	1.62	1.56	32.4	31.2	10.8	10.4
Smooth-Muzzled Pyrenees Sheepdog	19	0.90	23.46	0.72	0.63	144.0	126.0	21600	18900	1.08	0.95	32.4	28.5	7.2	6.3

Pyrenees Sheepdog	20.0	1.00	20.00	0.74	0.68	148.0	136.0	22200	20400	1.11	1.02	33.3	30.6	7.4	6.8
Picardy Sheepdog	32.0	1.30	18.93	1.02	1.00	204.0	200.0	30600	30000	1.53	1.50	45.9	45.0	10.2	10.0
Catalan Sheepdog (m)	18.0	1.00	18.00	0.69	0.64	138.0	128.0	20700	19200	1.04	0.96	31.2	28.8	6.9	6.4
Catalan Sheepdog (f)	16.0	0.96	17.36	0.64	0.59	128.0	118.0	19200	17700	0.96	0.89	28.8	26.7	6.4	5.9
Dutch Sheepdog (m)	30.0	1.26	18.90	0.98	0.95	196.0	190.0	29400	28500	1.47	1.43	44.10	42.9	9.8	9.5
Dutch Sheepdog (f)	30.0	1.20	20.83	0.98	0.93	196.0	186.0	29400	27900	1.47	1.40	44.10	42.0	9.8	9.3
Komondor (m) **	59.0	1.30	34.91	1.53	1.38	306.0	276.0	45900	41400	2.30	2.07	69.0	62.1	15.3	13.8
Komondor (f) **	50.0	1.28	30.52	1.37	1.26	274.0	252.0	41100	37800	2.06	1.89	61.8	56.7	13.7	12.6
Kuvasz	50.0	1.50	22.22	1.37	1.37	274.0	274.0	41100	41100	2.06	2.06	61.8	61.8	13.7	13.7
Mudi	13.0	0.94	14.71	0.56	0.52	112.0	104.0	16800	15600	0.84	0.78	25.2	23.4	5.6	5.2
Puli	15.0	0.88	19.37	0.61	0.55	122.0	110.0	18300	16500	0.92	0.83	27.6	24.9	6.1	5.5
Pumi	13.0	0.88	16.79	0.56	0.51	112.0	102.0	16800	15300	0.84	0.77	25.2	23.1	5.6	5.1
Anatolian Sheepdog (m)**	68.0	1.04	62.87	1.68	1.33	336.0	266.0	50400	39900	2.25	2.00	50.4	39.9	25.2	20.0
Anatolian Sheepdog (f) ***	59.0	1.42	29.26	1.53	1.45	306.0	290.0	45900	43500	2.30	2.18	45.9	43.5	23.0	21.8
Bergamasco (m) ***	38.0	1.20	26.39	1.14	1.05	228.0	210.0	34200	31500	1.71	1.58	34.2	31.5	17.1	15.8
Bergamasco (f)	30.0	1.16	22.29	0.98	0.91	196.0	182.0	29400	27300	1.47	1.37	29.4	27.3	14.7	13.7
Maremma Sheepdog (m)*	45.0	1.46	21.11	1.28	1.28	256.0	256.0	38400	38400	1.92	1.92	38.4	38.4	19.2	19.2
Maremma Sheepdog (f)	40.0	1.36	21.63	1.18	1.15	236.0	230.0	35400	34500	1.77	1.73	35.4	34.5	17.7	17.3
Vala Sheepdog (m) ***	30.0	1.04	27.74	0.98	0.86	196.0	172.0	29400	25800	1.47	1.29	29.4	25.8	14.7	12.9
Vala Sheepdog (f)**	30.0	0.92	35.44	0.98	0.81	196.0	162.0	29400	24300	1.47	1.23	29.4	24.3	14.7	12.3
Tatra Sheepdog (m)	35.0	1.30	20.71	1.08	1.05	216.0	210.0	32400	31500	1.62	1.58	32.4	31.5	10.8	10.5
Tatra Sheepdog (f)	30.0	1.20	20.83	0.98	0.93	196.0	186.0	29400	27900	1.47	1.40	29.4	27.9	9.8	9.3
Norsk Buhund**	25.0	0.90	30.86	0.86	0.72	172.0	144.0	25800	21600	1.29	1.08	25.8	21.6	8.6	7.2
Swedish Shepherd	14.0	0.80	21.88	0.59	0.50	118.0	100.0	17700	15000	0.89	0.75	17.7	15.0	5.9	5.0
Illyrian Sheepdog (m)	35.0	1.20	24.31	1.08	1.01	216.0	202.0	32400	30300	1.62	1.52	32.4	30.3	10.8	10.1
Illyrian Sheepdog (f)	25.0	1.10	20.66	0.86	0.81	172.0	162.0	25800	24300	1.29	1.22	25.8	24.3	8.6	8.1
Karst Sheepdog (m)***	40.0	1.20	27.78	1.18	1.08	236.0	216.0	35400	32400	1.77	1.62	35.4	32.4	11.8	10.8
Karst Sheepdog (f) **	30.0	1.00	30.00	0.98	0.84	196.0	168.0	29400	25200	1.47	1.26	29.4	25.2	9.8	8.4
Bearded Collie	30.0	1.12	23.92	0.98	0.90	196.0	180.0	29400	25200	1.47	1.35	29.4	27.0	9.8	8.4
Smooth Collie	34.0	1.32	19.51	1.06	1.04	212.0	208.0	31800	31200	1.59	1.56	31.8	31.2	10.6	10.4
Rough Collie (m)	34.0	1.32	19.51	1.06	1.04	212.0	208.0	31800	31200	1.59	1.56	31.8	31.2	10.6	10.4
Rough Collie (f)	29.0	1.22	19.48	0.95	0.92	190.0	184.0	28500	27600	1.43	1.38	28.5	27.6	9.5	9.2
Border Collie (m)	23.0	1.12	18.34	0.82	0.78	164.0	156.0	24600	23400	1.23	1.17	24.6	23.4	8.2	7.8
Border Collie (f)	8.0	1.06	7.12	0.40	0.43	80.0	86.0	12000	12900	0.60	0.65	12.0	12.9	4.0	4.3
Bobtail	30.0	1.12	23.92	0.98	0.90	196.0	180.0	29400	27000	1.47	1.35	29.4	27.0	9.8	9.0
Shetland Sheepdog	7.0	0.82	10.41	0.37	0.35	74.0	70.0	11100	10500	0.56	0.53	11.1	10.5	3.7	3.5
Welsh Corgi**	12.6	0.60	35.00	0.55	0.41	110.0	82.0	16500	12300	0.83	0.62	16.5	12.3	5.5	4.1
Rafeiro Do Alentejo	50.0	1.50	22.22	1.37	1.37	274.0	274.0	41100	41100	2.06	2.06	41.1	41.1	13.7	13.7
Lapponian Herder (m)	30.0	1.10	24.79	0.98	0.89	196.0	178.0	29400	26700	1.47	1.34	29.4	26.7	9.8	8.9
Lapponian Herder (f)**	30.0	0.98	31.24	0.90	0.83	180.0	166.0	27000	24900	1.35	1.25	27.0	24.9	9.0	8.3
Lapphund	20.0	1.00	20.00	0.74	0.68	148.0	136.0	22200	20400	1.11	1.02	22.2	20.4	7.4	6.8
Slovak Tchouvatch (m)	45.0	1.40	22.96	1.12	1.25	224.0	250.0	33600	37500	1.68	1.88	33.6	37.5	11.2	12.5
Slovak Tchouvatch (f)	40.0	1.30	23.67	1.18	1.13	236.0	226.0	35400	33900	1.77	1.70	35.4	33.9	11.8	11.3
Croatian Sheepdog	20.0	1.00	20.00	0.74	0.68	148.0	136.0	22200	204.00	1.11	1.02	22.2	20.4	7.4	6.8
Iceland Dog (m)	14.0	0.82	20.82	0.59	0.51	118.0	102.0	17700	15300	0.89	0.77	17.7	15.3	5.9	5.1
Iceland Dog (f)	11.0	0.76	19.04	0.50	0.43	100.0	86.0	15000	12900	0.75	0.65	15.0	12.9	5.0	4.3
Australian Kelpie (m)	14.0	1.07	12.23	0.59	0.58	118.0	116.0	17700	17400	0.89	0.87	17.7	17.4	5.9	5.8
Australian Kelpie (f)	11.0	0.96	11.94	0.50	0.49	100.0	98.0	15000	14700	0.75	0.74	15.0	14.7	5.0	4.9
Austrian Shepherd	20.0	1.16	14.86	0.74	0.74	148.0	148.0	22200	22200	1.11	1.11	22.2	22.2	7.4	7.4
Austrian Shepherd	18.0	1.06	16.02	0.69	0.66	138.0	132.0	20700	19800	1.04	0.99	20.7	19.8	6.9	6.6
Bourier Des Ardennes	25.0	1.20	17.36	0.86	0.84	172.0	168.0	25800	25200	1.29	1.26	25.8	25.2	8.6	8.4
Cao DaSerra De Aires	18.0	0.96	19.53	0.69	0.63	138.0	126.0	20700	18900	1.04	0.95	20.7	18.9	6.9	6.3
Bouvier Des Flanders	40.0	1.36	21.63	1.18	1.15	236.0	230.0	35400	34500	1.77	1.73	35.4	34.5	11.8	11.5
Appenzel Mountain Dog	25.0	1.16	18.58	0.86	0.83	172.0	166.0	25800	24900	1.29	1.25	25.8	24.9	8.6	8.3
Bernese Mountain Dog	40.0	1.40	20.41	1.18	1.17	236.0	234.0	35400	35100	1.77	1.76	35.4	35.1	11.8	11.7
Great Swiss Mountain Dog**	59.0	1.40	30.10	1.53	1.44	306.0	216.0	45900	43200	2.30	2.16	45.9	43.2	15.3	14.4
Entlebucher Sennehund**	30.0	1.01	29.41	0.98	0.85	196.0	170.0	29400	25500	1.47	1.28	29.4	25.5	9.8	8.5
Austrian Cattle Dog **	23.0	0.96	35.81	1.04	0.87	208.0	174.0	31200	26100	1.56	1.31	31.2	26.1	10.4	8.7
Austrian Cattle Dog	20.0	0.92	23.63	0.74	0.65	148.0	130.0	22200	19500	1.11	0.98	22.2	19.5	7.4	6.5
Catahoula leopard Dog (m)	36.0	1.28	21.97	1.10	1.06	220.0	212.0	33000	31800	1.65	1.59	33.0	31.8	11.0	10.6
Catahoula leopard Dog (f)	32.0	1.18	22.98	1.02	0.95	204.0	190.0	30600	28500	1.53	1.43	30.6	28.5	10.2	9.5

Standard Schnauzer	15.0	1.00	15.00	0.61	0.58	122.0	116.0	18300	17400	0.92	0.87	18.3	17.4	6.1	5.8
Great Dane (m) ***	60.0	1.52	25.97	1.55	1.52	310.0	304.0	46500	45600	2.33	2.28	46.5	45.6	15.5	15.2
Great Dane (f) ***	60.0	1.44	28.94	1.55	1.47	310.0	294.0	46500	44100	2.33	2.21	46.5	44.1	15.5	14.7
Tawny Great Dane**	54	1.22	36.28	1.44	1.28	288.0	256.0	43200	38400	2.16	1.92	43.2	38.4	14.4	12.8
Brindle Great Dane**	58	1.30	34.32	1.51	1.32	302.0	284.0	45300	39600	2.27	1.98	45.3	39.6	15.1	13.2
Harlequin Great Dane**	56	1.35	30.73	1.48	1.37	2960	274.0	44400	41100	2.22	2.06	44.4	41.1	14.8	13.7
Hovawart (m)	40.0	1.40	20.41	1.18	1.17	236.0	234.0	35400	35100	1.77	1.76	35.4	35.1	11.8	11.7
Hovawart (f)	35.0	1.30	20.71	1.08	1.05	216.0	210.0	32400	31500	1.62	1.58	32.4	31.5	10.8	10.5
Napoleon Mastiff (m) **	70.0	1.50	31.11	1.72	1.63	344.0	326.0	51600	48900	2.58	2.45	51.6	48.9	17.2	16.3
Napoleon Mastiff (f) **	70.0	1.40	35.71	1.72	1.58	344.0	316.0	51600	47400	2.58	2.37	51.6	47.4	17.2	15.8
French Mastiff (m)	50.0	1.60	19.53	1.37	1.42	274.0	284.0	41100	42600	2.06	2.13	41.1	42.6	13.7	14.2
French Mastiff (f)	50.0	1.44	24.11	1.37	1.34	274.0	268.0	41100	40200	2.06	2.01	41.1	40.2	13.7	13.4
Old English Mastiff (m) **	86.0	1.50	38.22	1.97	1.82	394.0	364.0	59100	54600	2.96	2.73	59.1	54.6	19.7	18.2
Old English Mastiff (f) **	79.0	1.40	40.31	1.86	1.68	372.0	336.0	55800	50400	2.79	2.52	55.8	50.4	18.6	16.8
Bullmastiff (m) **	58.0	1.37	30.90	1.51	1.41	302.0	282.0	45300	42300	2.27	2.12	45.3	42.3	15.1	14.1
Bullmastiff (f) **	54.0	1.32	30.99	1.44	1.33	288.0	266.0	43200	39910	2.16	2.00	4.32	39.9	14.4	13.3
Rottweiler ***	50.0	1.36	27.03	1.37	1.30	274.0	195.0	30600	29700	2.06	1.95	41.1	39.0	13.7	13.0
Boxer (m)	32.0	1.26	20.16	1.02	0.99	204.0	198.0	25800	24900	1.53	1.49	30.6	29.7	10.2	9.9
Boxer (f)	25.0	1.17	18.26	0.86	0.83	172.0	166.0	32400	30900	1.29	1.25	25.8	24.9	8.6	8.3
Brindle Boxer	35.0	1.26	22.05	1.08	1.03	216.0	206.0	29400	27000	1.62	1.55	32.4	30.9	10.8	10.3
Tawny Boxer	30.0	1.26	23.92	0.98	0.90	196.0	180.0	29400	27000	1.47	1.35	29.4	27.0	9.8	9.0
Doberman Pinscher (m)	40.0	1.42	19.84	1.18	1.18	236.0	236.0	35400	35400	1.77	1.77	35.4	35.4	11.8	11.8
Doberman Pinscher (f)	30.0	1.32	17.22	0.98	0.98	196.0	196.0	29400	29400	1.47	1.47	29.4	29.4	9.8	9.8
Giant Schnauzer	35.0	1.40	17.86	1.08	1.09	216.0	218.0	32400	32700	1.62	1.64	32.4	32.7	10.8	10.9
Leonberger	40.0	1.60	15.63	1.18	1.26	236.0	252.0	35400	37800	1.77	1.89	35.4	37.8	11.8	12.6
Long-Haired St. Bernard (m) ***	55.0	1.40	28.06	1.46	1.39	292.0	278.0	43800	41700	2.19	2.09	43.8	41.7	14.6	13.9
Long-Haired St. Bernard (f) ***	50.0	1.30	29.59	1.37	1.27	274.0	254.0	41100	38100	2.06	1.91	41.1	38.1	13.7	12.7
Great Pyrenees (m)	57.0	1.62	21.72	1.50	1.53	300.0	306.0	45000	45900	2.25	2.30	45.0	45.9	15.0	12.7
Great Pyrenees (f)	41.0	1.44	19.77	1.20	1.21	240.0	242.0	36000	36300	1.80	1.82	36.0	36.3	12.0	12.1
New found land (m) **	68.0	1.40	34.69	1.68	1.55	336.0	310.0	50400	46500	2.52	2.33	50.4	46.5	16.8	15.5
New found land (f) **	54.0	1.30	31.95	1.44	1.32	288.0	264.0	43200	39600	2.16	1.98	43.2	39.6	14.4	13.2
Land Seer***	70.0	1.60	27.34	1.72	1.69	344.0	338.0	51600	50700	2.58	2.54	51.6	50.7	17.2	16.9
Alaskan Malmute (m)	38.0	1.28	23.19	1.14	1.09	228.0	218.0	34200	32700	1.71	1.64	34.2	32.7	11.4	10.9
Alaskan Malmute (f) ***	34.0	1.16	25.27	1.06	0.97	212.0	194.0	31800	29100	1.59	1.46	31.8	29.1	10.6	9.7
Eskimo Dog (m) **	50.0	0.90	61.72	1.37	1.04	274.0	208.0	41100	31200	2.06	1.56	41.1	31.2	13.7	10.4
Eskimo Dog (f)**	48.0	0.80	75.00	1.33	0.96	266.0	192.0	39900	28800	2.00	1.44	39.9	28.8	13.3	9.6
Greenland	30.0	1.10	24.79	0.98	0.89	196.0	178.0	29400	26700	1.47	1.34	29.4	26.7	9.8	8.9
Samoyed (m)	30.0	1.20	20.83	0.98	0.93	196.0	186.0	29400	27900	1.47	1.40	29.4	27.9	9.8	9.3
Samoyed (f)	23.0	1.06	20.47	0.82	0.76	164.0	152.0	24600	22800	1.23	1.14	24.6	22.8	8.2	7.6
Siberian Husky (m)	27.0	1.20	18.75	0.91	0.88	182.0	176.0	27300	26400	1.37	1.32	27.3	26.4	9.1	8.8
Siberian Husky (f)	22.5	1.12	17.94	0.80	0.77	160.0	154.0	2400	23100	1.20	1.16	24.0	23.1	8.0	7.7
Canaan Dog	25.0	1.20	17.36	0.86	0.84	172.0	168.0	25800	25200	1.29	1.26	25.8	25.2	8.6	8.4
Portuguese Water Dog (m)	25.0	1.14	19.24	0.86	0.82	172.0	164.0	25800	24600	1.29	1.23	25.8	24.6	8.6	8.2
Portuguese Water Dog (f)	22.0	1.04	20.34	0.79	0.73	158.0	146.0	23700	21900	1.19	1.14	23.7	21.9	7.9	7.3
Fila Brasileiro***	50.0	1.30	29.59	1.37	1.27	274.0	254.0	41100	38100	2.06	1.91	41.1	38.1	13.7	12.7
Pyrenees Mastiff***	70.0	1.60	27.34	1.72	1.69	344.0	338.0	51600	50700	2.58	2.54	51.6	50.7	17.2	16.9
Spanish Mastiff**	60.0	1.40	30.61	1.55	1.45	310.0	290.0	46500	43500	2.33	2.18	46.5	43.5	15.5	14.5
Austrian Short-Haired Pinscher	18.0	1.00	18.00	0.69	0.64	138.0	128.0	20700	19200	1.04	0.96	20.7	19.2	6.9	6.4
Kyiishii (m) ***	30.0	1.08	25.72	0.98	0.88	196.0	176.0	29400	26400	1.47	1.32	29.4	26.4	9.8	8.8
Kyiishii (f) **	30.0	0.96	32.55	0.98	0.83	196.0	166.0	29400	24900	1.47	1.25	29.4	24.9	9.8	8.3
Norbottens pets	15.0	0.80	23.43	0.61	0.52	122.0	104.0	18300	15600	0.92	0.78	18.3	15.6	6.1	5.2
Hokkaidoken	25.0	1.00	25.00	0.86	0.77	172.0	154.0	25800	23100	1.29	1.16	25.8	23.1	8.6	7.7
Tosa***	37.5	1.20	26.04	1.13	1.04	226.0	208.0	3310	31200	1.70	1.56	33.9	31.2	11.3	10.4
Akita Inu (m)	40.0	1.42	19.84	1.18	1.18	236	236	35400	35400	1.77	1.77	35.4	35.4	11.8	11.8
Akita Inu (f)	35.0	1.32	20.09	1.08	1.06	216.0	212.0	32400	31800	1.62	1.59	32.4	31.8	10.8	10.6
Sanshu (m)	25.0	1.10	20.66	0.86	0.81	172.0	162.0	25800	24300	1.29	1.23	25.8	24.3	8.6	8.1
Sanshu (f)	20.0	1.00	20.00	0.74	0.68	148.0	136.0	22200	20400	1.11	1.02	22.2	20.4	7.4	6.8
Aidi (m)	30.0	1.24	19.51	0.98	0.94	196.0	188.0	29400	28200	1.47	1.41	29.4	28.2	9.8	9.4
Aidi (f)	30.0	1.10	24.79	0.98	0.89	196.0	178.0	29400	26700	1.47	1.34	29.4	26.7	9.8	8.9

Cao Serra Da Estrela***	50.0	1.44	24.11	1.32	1.34	274.0	268.0	41100	40200	2.06	2.01	41.1	40.2	13.7	13.4
Cao De Castro Laboreiro (m) ***	40.0	1.20	27.78	1.18	1.08	236.0	216.0	35400	32400	1.77	1.62	35.4	32.4	11.8	10.8
Cao De Castro Laboreiro (f)	30.0	1.14	23.08	0.98	0.90	196.0	180.0	29400	27000	1.47	1.35	29.4	27.0	9.8	9.0
Tibetan Mastiff**	100.0	1.60	39.06	2.18	2.04	436.0	408.0	65400	61200	3.27	3.06	65.4	61.2	21.8	20.4
Keeshond (m) **	30.0	0.96	32.55	0.98	0.83	196.0	166.0	29400	24900	1.47	1.25	29.4	24.9	9.8	8.3
Keeshond (f) **	25.0	0.90	30.86	0.86	0.72	172.0	144.0	25800	21600	1.29	1.08	25.8	21.6	8.6	7.2
CDF: Cowgill and Drabkin's formula; NF: New Formula; m: Male; f: Female; *: Same BSA Value using the Two Formulas; **: BMI>30 kg/m²; **: BMI>25kg/m²															

Table 8: Body weight, height, body mass index, body surface areas and therapeutic doses of anticancer drugs in working dogs.

proposed to the various scalings [24]. The fact that all the human BSA formulas applied in this study yield BSA of larger dogs less than that of Cowgill and Drabkin's formula, indicates that human BSA formulas may be used in cancer chemotherapy of dogs. Since human BSA formulas have body height and after having multiplied body height of the dogs by 2, the formulas yielded BSAs of dogs less than that of Cowgill and Drabkin's formula [8], suggesting that the current formula used to estimate BSA of dogs may be inaccurate, because the body height is lacking. Although body surface area and weight were found to be significantly correlated with severity of toxicity [2], relative to large dogs, the prevalence of melphalan, cisplatin and carboplatin toxicosis is greater in small dogs which are at greater risk of developing bone marrow toxicity from melphalan than large dogs, if Cowgill and Drabkin's formula is used [25]. The derived formula (BSA=BW$^{0.528}$ × H$^{0.528}$ × K) where k is 0.14 yielded BSAs and doses of anticancer agents less than that of all human formulas except Boyd formula. The body weight and height exponents of 0.25-0.30 and 0.425-0.514 of human BSAs used in this study agrees with the report, indicating that indices of body measures are numerous for both humans and animals [26]. Dosing per unit of weight alone is responsible for a large dose of anticancer drug that can cause toxicity. Therefore, the principles of BW$^{1/2}$ to BW$^{3/4}$ across species may be adopted. But BW$^{3/4}$ has been adopted for conversion of data between species [27].

The fact that fourteen out of 18 greyhounds recorded higher BSA values using the new formula shows that dogs with high body weight and high body height yield BSA value higher than that yielded by Cowgill and Drabkin's formula. But Wolfhound BSA (1.18 m²) using the new and Cowgill and Drabkin's formula shows that at the weight (40 kg) and height (1.42 m), the exponents of the formulas may be approximately same, and at weight higher or lower than 40 kg, but at height lower or higher than 1.42 m there may be either decrease or increase in BSA value. Since prediction errors are commonly observed in the practical application of allometric scaling, various modifications have been proposed [28]. Therefore, application of Cowgill and Drabkin's formula for calculation of BSA for greyhounds may be preferred to the new formula. But on contrary, toys recorded lower BSA values using the new formula. This may be due to their low body weight relative to low height. Since Affenspincher recorded same value of BSA (0.24 m²) using the new and Cowgill and Drabkin's formula, it implies that at weight less or higher than 3.6 kg and height less or higher than 0.76 m, BSA value may either be increased or decreased in this breed of dog. Therefore, application of the new formula may be preferred for this dog. However, obtaining lower doses of vincristine (0.6 mg/m²) and mechlorethamine (0.56 mg/m²) yielded by Cowgill and Drabkin and the new formula disagree with the reported therapeutic doses of vincristine (0.75/m²) and mechlorethamine (3 mg/m²) [7]. When doxorubicin doses were calculated using BSA rather than body weight, drug concentrations and toxicoses were greater in smaller dogs [1]. The similar BSA (0.24 m²) yielded by the new and Cowgill and Drabkin's formula for Affenpinscher with body weight (3.6 kg) and height 0.38 m as well as BSA (0.74 m²) of Airedale with body weight

(20.0 kg) and height, (1.18 m) show that toys and terriers may share some common pharmacokinetic parameters that are related to their body functions. The reported therapeutic doses of cyclophosphamide (50 mg/m²) in transmissible venereal tumor (TVT) of dogs [29] carboplatin (300 mg/m²) for osteosarcoma [30], dacarbazine and (200 mg/m²) for canine hemangiosarcoma [31] corroborate the present calculated therapeutic values for cyclophosphamide, carboplatin and dacarbazine, respectively. The similarity in the estimated values may be accounted for by similarity in the exponents of their body weight and height. But the exponent (0.67) has a highly significant correlation to body weight [27]. Different values of BSAs and anticancer doses maybe, in the present analysis due to variation in exponents (0.67) and (0.528) reported by Cowgill and Drabkin and this paper, respectively. Therefore, it is reasonable to use a formula in which body weight and height are not ignored, to more accurately normalize chemotherapeutic exposure and reduce or avoid toxicosis in dogs. The relevance of the new formula derived from human BSA formulas which yielded results lower than Cowgill and Drabkin's formula cannot be over emphasized. Although anticancer overdosing may be easily recognized, underdosing may occur in 30% of cancer patients [32]. This is because the predicted values for humans are heavily depended on certain species for example, dog [24], which has similar stomach morphology and emptying characteristics with human [33]. Higher BMI>25 kg/m² recorded for Irish Wolf Hound, Chinese Imperial Ch'ln (giant), Chinese Imperial Ch'ln (classic), Chinese Imperial Ch'ln (miniature), Chinese Imperial Ch'ln (Sleeve), Poodle (standard), Great Spitz, French Bulldog, Poodle (miniature) and Chinese Temple dog (miniature) may portend higher tendency for obesity, hypertension, coronary artery disease, diabetes and cancer in these breeds. Although improved nutrition may cause an increase in body size in carnivores, while increased ambient temperature may result in decreased body size as expected by Bergamann's rule, majority of hunting and working dogs yield lower BSA values using the new formula. This shows that high body weight with corresponding body height yield lower BSA value. Also, majority of hunting and working dogs are tall and weigh relatively heavier than greyhounds hence, 23 and 25 hunting and working dogs, respectively recorded BMI greater than 30 kg/m². Breed differences in susceptibility to diabetes mellitus in dogs is genetic as observed in the UK dog population. The affected breeds are Samoyed, Tibetan Terrier, Cairn Terrier, Miniature Schnauzer, Yorkshire Terrier, Border Terrier, Labrador Retriever, Golden Retriever, German Shepherd dog and Boxer [34], Bichon Fries, Border Collie, Border Terrier, Collie, Dachshound, English Setter, Poodle, Schnauzer, English Springer Spaniard, Staffordshire Bull Terrier, Weimaraner, Welsh Springer Spaniel, Cavalier King Charles Spaniel, Cocker Spaniel, Doberman, Jack Russell Terrier, Rottweiler and West Highland Terrier [28]. Overweight prevalence of 30% or more was found for Beagle, Shetland Sheepdog and Dalmatian. BMI>25 kg/m² suggest overweight and BMI>30 kg/m² is indicative of obesity in humans. However, dog is said to be overweight when body weight is greater than 15% of their optimal body weight and obese when body weight exceeds 30% of optimal [35]. The special attributes of the dog for comparative medicine are large

body size, remarkable genotype homogeneity compared with human ethnic group, controllable breeding and nutrition and applicability of clinical techniques between children and dogs [30]. The similar BSAs for Kardian Bear dog (0.79 m²) and Brigue Ariergeois (0.79 m²) as well as Braque D'Aurvergne female (0.74 m²) and French Spaniel female 0.74 m²) show that doses of anticancer drugs are calculated as a function of several pharmacokinetic parameters, including volume of distribution (Vd) and total body clearance (Cl). However, the variation in body size over an order of magnitude as shown in grey hounds, toys, companions, terriers, hunting and working dogs, may be more accurately described as a non-proportional function of body weight [26]. Since metabolic rate, body surface area (BSA), organ blood flow and glomerular filtration rate (GFR) depend on body weight [27], pharmacokinetic parameters and appropriate drug doses scale allometrically with body weight [36,37]. Allometric equation of the general form is: $y = aW^b$, where y is the scalable variable, a is the mass coefficient, W represents body weight, and b is the mass exponent. The relationship between pharmacokinetic terms and body size is related to a single mass exponent [38]. When a pharmacokinetic parameter is available from one species, the allometric equation: $Y_{human} = Y_{animal} \left(\frac{W_{human}}{Y_{animal}} \right)^b$ can be used to predict the value of the parameter in humans. The value of b can be related to mean residence time (MRT=0.25), Vd=1.0, blood flow, renal and hepatic clearance (0.75). For multiple species log Y=log(a)+b log(W), whereas b derived from compound specific data can be used. The similarities between dog and human cancers are related to cancer-association genes such as MET, IGFIR, mTor, KIT [39] and BCR-Abl translocation in myelogeneous leukemia and RBI in human [40]. Therefore, comparative therapeutics will eliminate highly toxic and non-effective anticancer drugs [41]. Metabolic rate being related with BSA depends on body weight and exponent (1/4) [42] which further predicts pharmacokinetic mass exponents for clearance (3/4), elimination half-life (t1 / 2, 1/4), and volume of distribution. Clearance with BSA also scale with the 2/3 power. Intraspecific studies in mammals have correlated the allometry of physiological parameters with that of drug disposition [43] suggesting that obesity could increase BSA value [44].

Conclusion

Boyd formula can be used for estimating body surface area of dogs, since it provides low doses of anticancer agents, whereas this paper, Saganuwan and Ndakotsu, Fujimoto and Mosteller formulas provide relatively averaged doses for larger breeds of dogs. DuBois, Takashira and Wang formulas can serve as alternatives. The rest of human body surface area formulas provide BSAs lower than the original body surface area formulas of dog. Human BSA formulas provide moderate doses of anticancer agents that may be effective and less toxic. Toys, companions and terriers have lower BSAs in comparison with greyhounds using Saganuwan's formula. Whereas majority of greyhounds recorded higher BSA values using Saganuwans's formula. The difference in BSA values might depend on the weight, height and exponents of the BSA formulas used. Hunting and working dogs have lower BSA values using Saganuwan's formula. Some breeds from the two categories have high risk of becoming obese, hypertensive and diabetic. But Irish Wolf hound, Affenspincher, Airedale terrier, Irish setter, Briquette, French Spaniel, Braque D' Aurvergne (female), Brique Ariegeois, Weimaraner (male), Drahthaar (female), Red-tick Coon Hound, Bluetick Coon Hound (male), Rodhesia Ridgeback (female), Smooth-Haired Istrian Hound, Billy (male), Kuvasz, Maremma Sheep dog, Rafeiro Do Alentejo, Austrian Shepherd, Doberman pinscher (male and female) and Akita Inu (female) recorded same values of

BSAs and doses of anticancer drugs using Cowgill and Drabkin's as well as the new derived formula.

References

1. Arrington KA, Legendre AM, Tabeling GS, Frazier DL (1998) Comparison of body surface area-based and weight-based dosage protocol for doxorubicin administration in dogs. Am J Vet Res 55: 1587-1592.

2. Belo VS, Werneck GL, Da Silva ES, Barbosa DS, Struchiner CJ, et al. (2015) Population estimation methods for free ranging dogs: A systematic review. Plos One 10: e0144830.

3. Miller AA (2002) Body surface area in dosing anticancer agent: Scratch the surface. J Natur Cancer Instit 94: 1822-1823.

4. Saganuwan SA (2012) Principles of pharmacological calculations, (1st edn), Ahmadu Bello University Press, Zaria, Nigeria. p. 529.

5. DuBois D, DuBois EF (1916) A formula to estimate the approximate surface area of height and weight be known. Arch Intern Med 17: 863-871.

6. Wang Y, Moss J, Thisted R (1992) Predicators of body surface area. J Clin Anesthesiol 4: 4-10.

7. Back AR, Schleis SE, Smrkovski OA, Lee I, Smith AN, et al. (2015) Mechlorethamine, vincristine, melphalan and prednisone (MOMP) for the treatment of relapsed lymphoma in dogs. Vet Compar Oncol 13: 398-408.

8. Cowgill GR, Drabkin D (1927) Determination of a formula for the surface area of the dog together with a consideration of formulae available for other species. Am J Physiol 81: 36-61.

9. Gold LS, Slone TH, Manley NB (2002) Misconceptions about the causes of cancer. Risk Controversy Series. The Eraser Institute, Centre for Studies in Risk, Regulation and Environment, Vancouver, British Colombia, Canada 3: 1-141.

10. Saganuwan SA, Ndakotsu AM (2015) Standardization and soring of the body surface area (BSA) formulas for calculation of the doses of anticancer agents for cancer patients from the North-Western Nigeria. J Cancer Sci Ther 7: 02-018.

11. Mosteller RD (1987) Simplified calculation of body surface area. N Eng J Med 317: 1098.

12. Haycok GB, Schwartz GJ, Wisotsky DH (1978) Geometric method for measuring body surface area: A height weight formula validated in infants, children and adults. J Paediatric 93: 62-66.

13. Gehan EA, George SL (1970) Estimation of human body surface area from height and weight. Cancer Chemother Reprod 54: 225-235.

14. Boyd E (1935) The growth of the surface area of the human. University of Minesota, press, USA.

15. Freireich EJ, Gehan EA, Rall DP (1996) Quantitative comparison of toxicity of anticancer agents in mouse, rat, hamster, dog, monkey and man. Cancer Chemother Report 50: 219-223.

16. Fujimoto S, Watanabe T, Sakamato A (1968) Studies on the physical surface area of Japanese. Is. calculation formulae in three stages over all ages. Nippon Eiseigoku Zassho 5: 443-450.

17. Pugnetti G (1980) Simon and Schuster's Guide to Dogs, Simons and Schuster, New York, USA 313-323.

18. Sandhu HS, Rampal S (2006) Essentials of veterinary, pharmacology and therapeutics, Kalyani Publishers, New Delhi, India. p. 1529.

19. Aliu YO (2001) Veterinary pharmacology (1st edn), Tamaza Publishing Company Ltd., Zaria, Nigeria 814.

20. Khan CM (2010) The Merck Veterinary Manual, (10th edn), Merck & Co Inc., USA. 2945.

21. Price GS, Frazier DL (1998) Use of body surface area (BSA) based dosages to calculate chemotherapeutic drug dose in dogs: 1. Potential problems with current BSA formulae. J Vet Intern Med 12: 267-271.

22. Sturgess K (2012) Pocket Handbook of Small Animal Medicine, CRC Press, Tailor and Francis, USA 192.

23. Howell DC (2004) Fundamental Statistics for the Behavioural Science, (5th edn)., Thomson Wadsworth, Belmonth USA 570.

24. Tang H, Mayersohn M (2005) A novel model for prediction of human drug clearance by allometric scaling. Drug Metab Dispos 33: 1297-1303.

25. Page RL, Macy DW, Thrall DE (1988) Unexpected toxicity associated with use of body surface area for dosing Melphalan in dog. Cancer Res 48: 288-290.

26. Mordent J (1985) Forecasting rephalosporin and monobactam antibiotic half-lives in humans from data collected in laboratory animals. Antimicrob Agent Chemother 27: 887-891.

27. Kleiber M (1947) Body size and metabolic rate. Physiol Rev 27: 511-541.

28. Catchpole B, Adams JP, Holder AL (2013) Genetics of cancine diabetes mellitus: Are the diabetes susceptibility genes identified in humans in breed susceptibility to diabetes mellitus in dogs? Vet J 195: 139-147.

29. Al-Vitalaru B, Crangmu D, Polter G (2017) Comparative therapeutic approach of canine transmissible venereal tumor (TVT). Faculty of Veterinary Medicine Bucharest. pp. 1-8.

30. Duffy D, Selmic LE, Kendall, AR, Powers BE (2015) Outcome following treatment of soft tissue and visceral extraskeletal osteosarcoma in 33 dogs: 2008-2013. Vet. Comparat Oncol 15: 46-54.

31. Finotello R, Stefanello D, Zini E, Marconato L (2015) comparison of doxorubicin-cyclophophamide with doxorubicin-dacarbazine for the adjuvant treatment of canine hemangiosarcoma. Vet Comparat Oncol 15: 25-35.

32. Gurney H (2002) how to calculate the dose of chemotherapy. Br J Cancer 86: 1297- 1302.

33. Kararli TT (1995) Comparison of the gastrointestinal anatomy, physiology, and biochemistry of humans and commonly used laboratory animals. Biopharmaceutic Drug Dispos 16: 351-380.

34. Catchpole B, Kennedy LJ, Davison LJ (2007) Canine diabetes mellitus: From phenotype to genotype. J Small Animal Pract 49: 4-10.

35. Burkholder WJ, Toll PW, MS Thatcher, CD, Reimillard RL, Roudebush (2000) Small animal clinical nutrition, (4th edn), Morris Institute: Topeka KS 401-430.

36. Courcier EA, Thomson RM, Mellor DJ, Yam PS (2010) An epidemiological study of environmental factors associated with canine obesity. J Small Animal Pract 51: 362 -367.

37. Mahmood I (1998) Interspecies scaling: Predicting volumes, mean residence time and elimination half-life. Some suggestions. J Pharm Pharmacol 50: 493-499.

38. Mahmood I (2006) Prediction of drug clearance in children from adults: A comparison of several allometric methods. Br J Clin Pharmacol 61: 545-557.

39. Lave T, Coassolo P, Ubeaud G (1996) Interspecies scaling of bosentan, a new endothelin receptor antagonist and integration of *in vitro* data into allometric scaling. Pharmaceutic Res 13: 97-101.

40. Paoloni M, Khanna C (2008) Translation of new cancer treatments from pet dogs to humans. Natur Rev Cancer 8: 147-156.

41. Kouno T, Katsumata N, Mukai H (2003) Standardization of body surface area (bsa) to calculate the dose of anticancer agents in Japan. Japanese J Clin Oncol 33: 309-313.

42. Anderson BJ, Allegaert K, Holford NHG (2006) Population clinical pharmacology of children: Modelling covariate effects. Eur J Pediatric 165: 819-829.

43. Yom-Tov Y (2003) Body sizes of carnivores commensal with humans have increased over the past 50 years. Functional Ecol 17: 323-327.

44. Lund EM, Armstrong PJ, Kurk CA (2006) Prevalence and risk factors for obesity in adult dogs from private US veterinary practice. Int J Appl Res Vet Med 4: 177-186.