Number of athletes	2083
Women (n,%)	(757,36.3)
Age (y)	18.2 ± 5.1
Height (cm)	173.1 ± 9.8
Weight (Kg)	65.5 ± 13.2
Body Surface Area (m2)	1.76 ± 0.2
Weekly training hours (h)	12.5 ± 5.4
Competition level:	
- Regional (n, %)	(1208, 58)
- National (n, %)	(708, 34)
- International (n, %)	(167, 8)
Sports:	
- Soccer (n, %)	(293, 14.5)
- Basketball (n, %)	(238, 11.8)
- Volleyball (n, %)	(213, 10.5)
- Athletics (n, %)	(165, 8.2)
- Handball (n, %)	(163, 8.1)
- Hockey (n, %)	(151, 7.4)
- Rugby (n, %)	(123, 6.1)
- Swimming (n, %)	(74, 3.7)
- Foottsal (n, %)	(67, 3.3)
- Other sports (n, %)	(593,26.4)

Table1. **Baseline characteristics of the population.**

	MALE (n= 1326)	FEMALE (n= 757)	P Value
LV EDD (mm)	51.7 ± 4.7	46.9 ± 4.1	0.0001
LV ESD (mm)	32.3 ± 4.2	28.0 ± 3.4	0.0001
IVS (mm)	9.9 ± 2.6	8.5 ± 1.7	0.0001
LV PW (mm)	9.6 ± 1.4	8.3 ± 1.4	0.0001
LA (mm)	34.6 ± 4.7	30.9 ± 4.1	0.0001
AO (mm)	29.6 ± 3.4	26.1 ± 2.6	0.0001
LV EDD/BSA (mm)	27.8 ± 2.7	28.9 ± 2.7	0.0001
LV ESD/BSA (mm)	16.8 ± 3.8	17.8 ± 2.2	0.0001
LV IVS/BSA (mm)	5.2 ± 1.5	5.2 ± 1.0	0.0001
LV PW/BSA (mm)	5.1 ± 0.7	5.1 ± 0.8	0.0001
LA/BSA (mm)	18.6 ± 2.5	19.0 ± 2.6	0.0076
AO/BSA (mm)	15.9 ± 1.8	16.1 ± 1.7	0.75
AO/Height (mm)	16.6 ± 1.7	15.7 ± 1.5	0.0001
AO ^{0,578} (mm)	20.6±2.0	19.7±1.8	0.0001
AO $^{1'025}$ (mm)	16.4±1.7	15.4±1.5	0.0001

Table2: **Echocardiography characteristics of athletes**. Data are presented as mean ± standard deviation. LV EDD indicates left ventricular end diastolic diameter, LVESD indicates left ventricular end systolic diameter, IVS indicates interventricular septum, LVPW indicates left ventricular posterior wall, LA indicates left atria, AO, indicates aortic root, BSA indicates body surface area. AO ^{0,578} indicates allometric aortic root by BSA and the number is the B exponent. AO $^{1'025}$ indicates allometric aortic root by Height and the number is the B exponent.
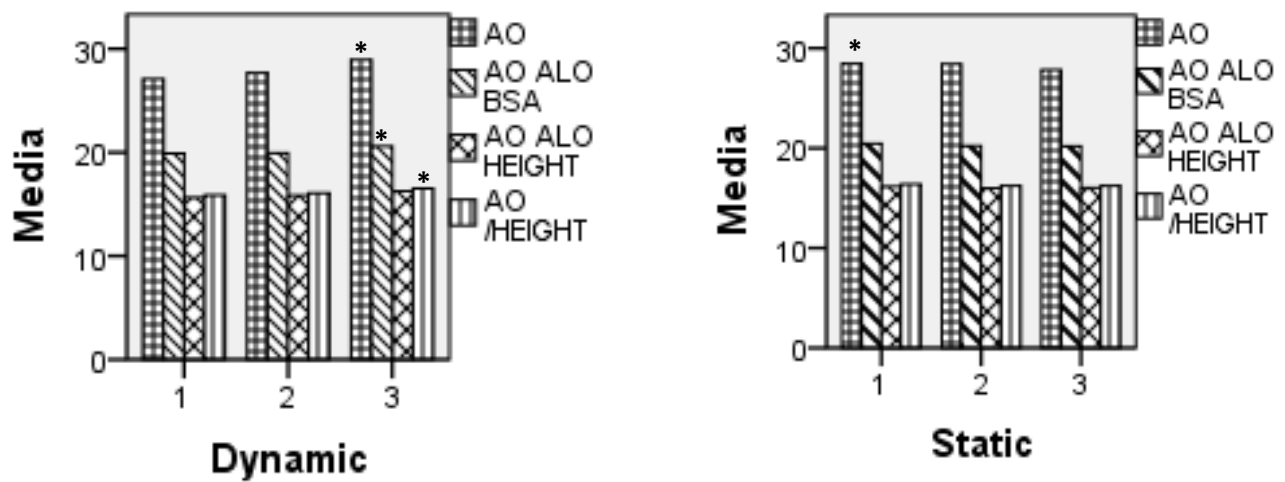
Figure 1. **Values of aortic root in dynamic and static group.** Bar graphs showing the absolute values of aorta (blue box), the values corrected by BSA (green box), the values corrected allometrically for BSA (Body Surface Area) (brown box) and for height (purple box), for the dynamic component (left) and the static component (right). 1 means low component, 2 means moderate component and 3 means high component. * symbol shows the statistic differences between low, moderate and high component groups (P< 0.05).

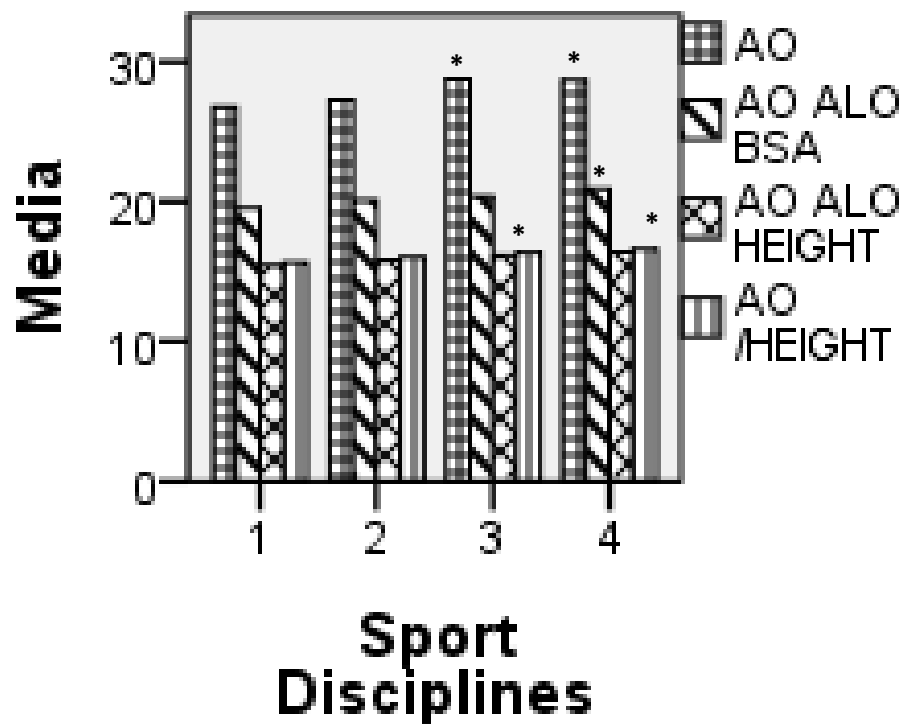*Figure 2*. **Values of aortic root according to sport disciplines.** Bar graphs showing the absolute values of aorta (blue box), the values corrected by BSA (Body Surface Area) (green box), the values corrected allometrically for BSA (brown box) and for height (purple box), according to different groups where 1 is Skill, 2 is Power, 3 is Mixed and 4 is Endurance. *Bonferroni post-hoc analysis (P< 0.05).
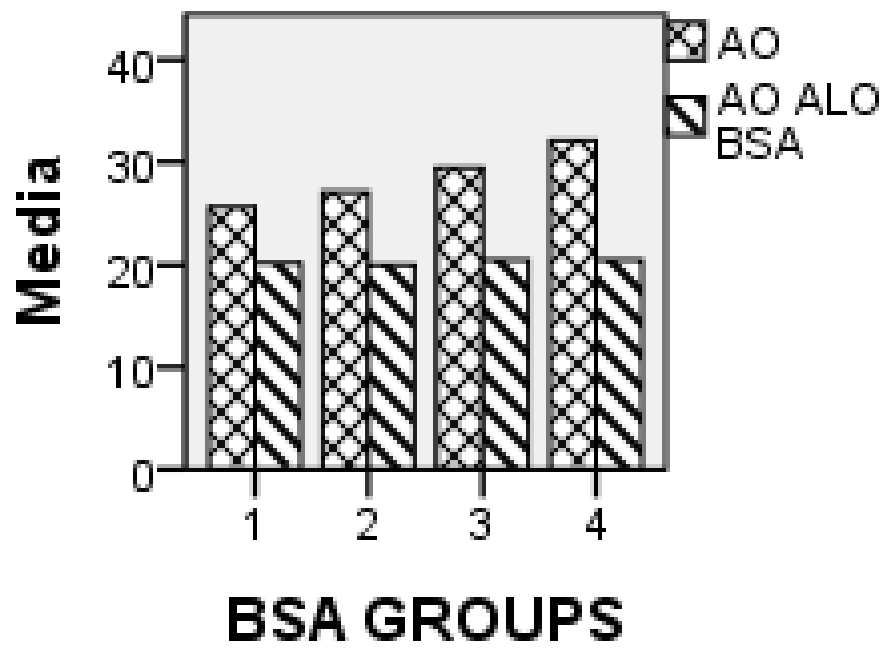
Figure 3. **Values of aortic root according to different groups of BSA (Body Surface Area).** Bar graphs showing the values of aortic root in absolute values (Blue box) and in allometric values for BSA (Green box). 1 is BSA <1,63, 2 is BSA <1,76, 3 is BSA < 2 and 4 is BSA≥2.
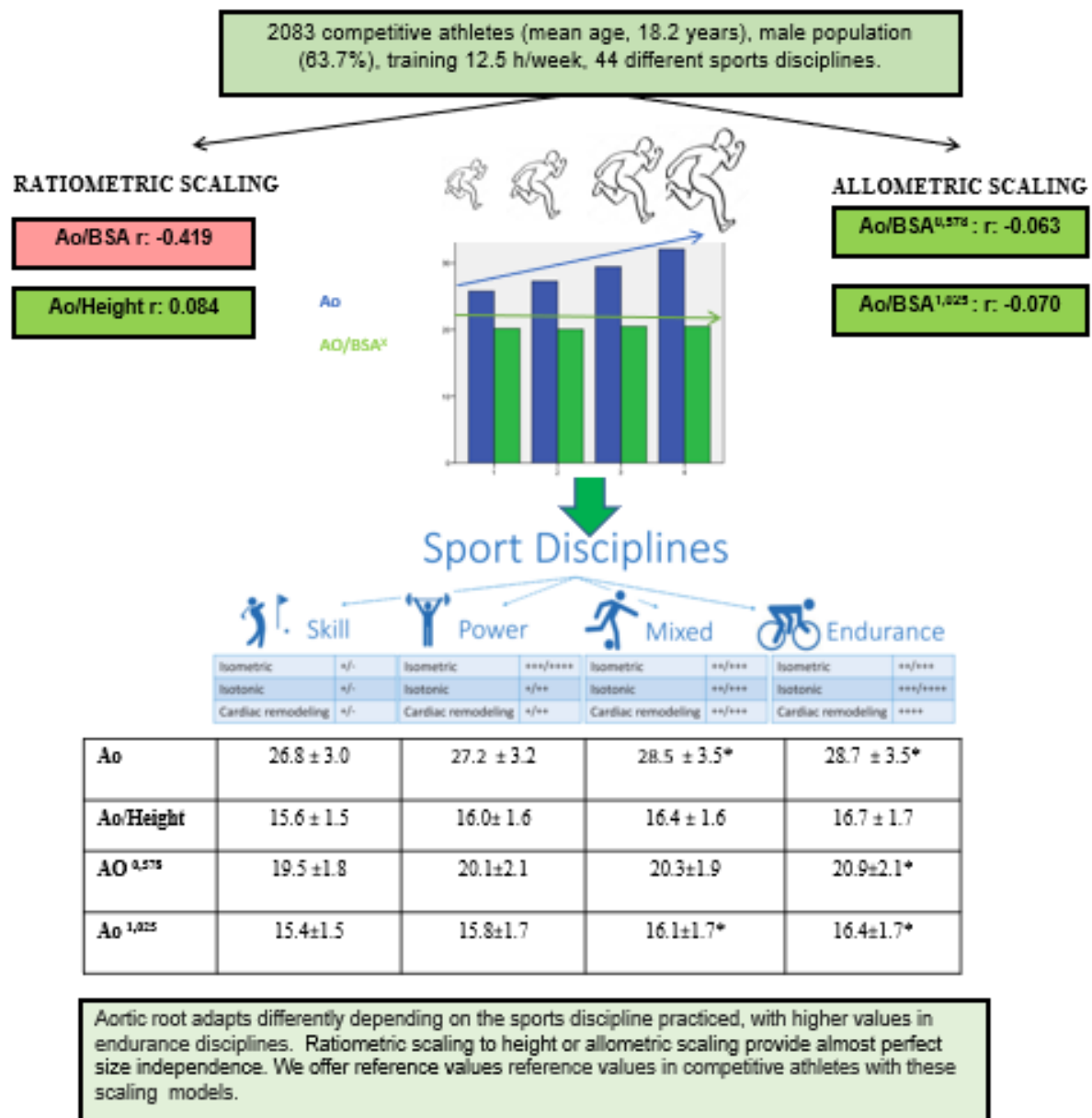
2083 competitive athletes (mean age, 18.2 years), male population (63.7%), training 12.5 h/week, 44 different sports disciplines.

RATIOMETRIC SCALING

Ao/BSA r: -0.419

Ao/Height r: 0.084

ALLOMETRIC SCALING

Ao/BSA$^{0.578}$: r: -0.063

Ao/BSA$^{1.025}$: r: -0.070

Ao

AO/BSA^x

Sport Disciplines

Skill   Power   Mixed   Endurance

Isometric	+/-	Isometric	+++/++++	Isometric	++/+++	Isometric	++/+++
Isotonic	+/-	Isotonic	+/++	Isotonic	++/+++	Isotonic	+++/++++
Cardiac remodeling	+/-	Cardiac remodeling	+/++	Cardiac remodeling	++/+++	Cardiac remodeling	++++

Ao	26.8 ± 3.0	27.2 ± 3.2	28.5 ± 3.5*	28.7 ± 3.5*
Ao/Height	15.6 ± 1.5	16.0± 1.6	16.4 ± 1.6	16.7 ± 1.7
AO $^{0.578}$	19.5 ±1.8	20.1±2.1	20.3±1.9	20.9±2.1*
Ao $^{1.025}$	15.4±1.5	15.8±1.7	16.1±1.7*	16.4±1.7*

Aortic root adapts differently depending on the sports discipline practiced, with higher values in endurance disciplines. Ratiometric scaling to height or allometric scaling provide almost perfect size independence. We offer reference values reference values in competitive athletes with these scaling models.

Figure 4. **Central Illustration.**