Multifractality, sample entropy, and wavelet analyses for age-related changes in the peripheral cardiovascular system: Preliminary results

Titre	Multifractality, sample entropy, and wavelet analyses for age-related changes in the peripheral cardiovascular system: Preliminary results
Type de publication	Article de revue
Auteur	Humeau-Heurtier, Anne [1], Chapeau-Blondeau, François [2], Rousseau, David [3], Rousseau, Pascal [4], Trzepizur, Wojciech [5], Abraham, Pierre [6]
Editeur	American Association of Physicists in Medicine
Type	Article scientifique dans une revue à comité de lecture
Année	2008
Langue	Anglais
Date	2008/01/29
Numéro	2
Pagination	717 - 723
Volume	35
Titre de la revue	Medical Physics
ISSN	0094-2405
Mots-clés	Biological [7], Blood [8], Cardiovascular [9], Doppler [10], entropy [11], Frequency [12], Haemodynamics [13], Skin [14], Time [15], Wavelets [16]
Résumé en anglais	Using signal processing measures we evaluate the effect of aging on the peripheral cardiovascular system. Laser Doppler flowmetry (LDF) signals, reflecting the microvascular perfusion, are recorded on the forearm of 27 healthy subjects between 20–30, 40–50, or 60–70 years old. Wavelet-based representations, Hölder exponents, and sample entropy values are computed for each time series. The results indicate a possible modification of the peripheral cardiovascular system with aging. Thus, the endothelial-related metabolic activity decreases, but not significantly, with aging. Furthermore, LDF signals are more monofractal for elderly subjects than for young people for whom LDF signals are weakly multifractal: the average range of Hölder exponents computed with a parametric generalized quadratic variation based estimation method is 0.13 for subjects between 20 and 30 years old and 0.06 for subjects between 60 and 70 years old. Moreover, the average mean sample entropy value of LDF signals slightly decreases with age: it is 1.34 for subjects between 20 and 30 years old and 1.19 for subjects between 60 and 70 years old. Our results could assist in gaining knowledge on the relationship between microvascular system status and age and could also lead to a more accurate age-related nonlinear modeling.
URL de la notice	http://okina.univ-angers.fr/publications/ua1466 [17]
DOI	10.1118/1.2831909 [18]

Lien vers le document	http://dx.doi.org/10.1118/1.2831909 [18]

Liens
[1] http://okina.univ-angers.fr/a.hum/publications
[2] http://okina.univ-angers.fr/f.chapeau/publications
[3] http://okina.univ-angers.fr/publications?f[author]=1901
[4] http://okina.univ-angers.fr/publications?f[author]=1152
[5] http://okina.univ-angers.fr/w.trzepizur/publications
[6] http://okina.univ-angers.fr/pierre.abraham/publications
[7] http://okina.univ-angers.fr/publications?f[keyword]=212
[8] http://okina.univ-angers.fr/publications?f[keyword]=1795
[9] http://okina.univ-angers.fr/publications?f[keyword]=1839
[10] http://okina.univ-angers.fr/publications?f[keyword]=4458
[11] http://okina.univ-angers.fr/publications?f[keyword]=3289
[12] http://okina.univ-angers.fr/publications?f[keyword]=4485
[13] http://okina.univ-angers.fr/publications?f[keyword]=3264
[14] http://okina.univ-angers.fr/publications?f[keyword]=1231
[15] http://okina.univ-angers.fr/publications?f[keyword]=1748
[16] http://okina.univ-angers.fr/publications?f[keyword]=3568
[17] http://okina.univ-angers.fr/publications/ua1466
[18] http://dx.doi.org/10.1118/1.2831909