Activité sportive et microbiote

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Conflits d'intérêt

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Données expérimentales

Table 1

Characteristic	SPF	GF	BF
Body weight (g)	29.1 ± 0.8	29.7 ± 0.3	29.1 ± 1.1
Liver (g)	1.52 ± 0.06[c]	1.16 ± 0.03[a]	1.35 ± 0.09[b]
Muscle (g)	0.34 ± 0.02[b]	0.25 ± 0.01[a]	0.32 ± 0.02[b]
BAT (g)	0.07 ± 0.01[b]	0.05 ± 0.00[a]	0.05 ± 0.01[a]
EFP (g)	0.35 ± 0.03[c]	0.23 ± 0.03[a]	0.31 ± 0.02[b]
Spleen (g)	0.07 ± 0.003	0.07 ± 0.007	0.07 ± 0.006
Relative liver weight (%)	5.28 ± 0.09[c]	3.93 ± 0.04[a]	4.57 ± 0.35[b]
Relative muscle weight (%)	1.19 ± 0.06[b]	0.85 ± 0.01[a]	1.09 ± 0.05[b]
Relative BAT weight (%)	0.24 ± 0.02[b]	0.18 ± 0.01[a]	0.17 ± 0.02[a]
Relative EFP weight (%)	1.19 ± 0.2[b]	0.74 ± 0.1[a]	1.05 ± 0.1[b]
Relative spleen weight (%)	0.24 ± 0.01	0.24 ± 0.02	0.25 ± 0.02

*Data are mean ± *SEM* for $n = 8$ mice in each group. Data in the same line followed by different letters (a, b, c) differ significantly at $p \leq 0.05$ by 1-way analysis of variance. SPF = specific pathogen free; GF = germ free; BF = *Bacteroides fragilis*; BAT = brown adipose tissue; EFP = epididymal fat pad.

Effect of Intestinal Microbiota on Exercise Performance in Mice.
Hsu, Yi; Chiu, Chien; Li, Yen; Huang, Wen; Huang, Yen; Huang, Chi; Chuang, Hsiao

Journal of Strength & Conditioning Research. 29(2):552-558, February 2015.
DOI : 10.1519/JSC.0000000000000644

Table 1 General characteristics of the experimental groups.

L'absence de bactéries ou d'une flore normale compromettent le développement musculaire et des tissus adipeux

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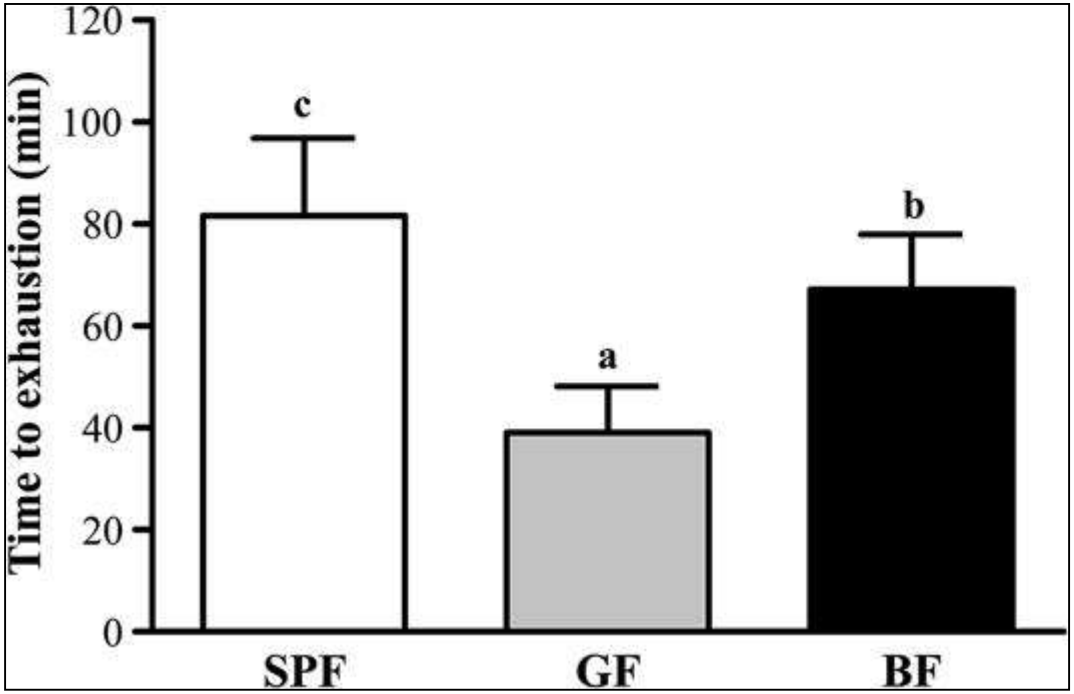
Figure 1



Effect of Intestinal Microbiota on Exercise Performance in Mice.
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Journal of Strength & Conditioning Research. 29(2):552-558, February 2015.
DOI : 10.1519/JSC.0000000000000644

Figure 1 . Effect of microbial status on swim exercise performance in mice. Data are mean +/- SD (n = 8). Values in the same line with different superscript letters are significantly different at p Bacteroides fragilis.

L'absence de bactéries ou d'une flore normale sont associées à des performances musculaires plus faible

Wolters Kluwer Health | OvidSP

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Le microbiote influence l'activité physique.

Normal gut microbiota modulates brain development and behavior

Rochellys Diaz Heijtz[a,b,1], Shugui Wang[c], Farhana Anuar[d], Yu Qian[a,b], Britta Björkholm[d], Annika Samuelsson[d], Martin L. Hibberd[c], Hans Forssberg[b,e], and Sven Pettersson[c,d,1]

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Edited by Arturo Zychlinsky, Max Planck Institute for Infection Biology, Berlin, Germany, and accepted by the Editorial Board January 4, 2011 (received for review August 11, 2010)

Les souris sans germe bouge plus

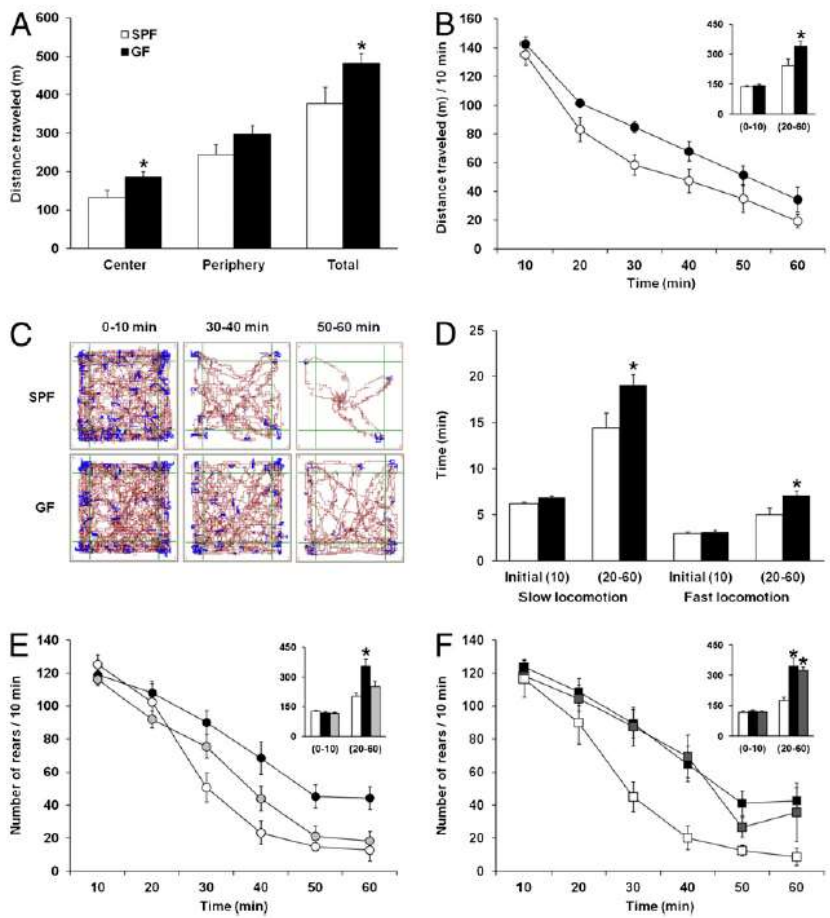

Fig. 1. GF mice display increased spontaneous motor activity. (*A*) Bars show cumulative distance traveled (meters) per zone and in the entire box (total) during the 60-min open field test session by SPF (open bars) and GF (filled bars) mice. (*B*) Average distance traveled (meters) measured in 10-min time bins across a 60-min session in an open field box. (*Inset*) Bars show cumulative distance traveled (meters) during the initial 10 min and the 20- to 60-min time interval of open field testing. (*C*) Representative tracks of movement patterns of SPF and GF mice at the 0–10, 30–40, and 50–60 min time intervals of the 60-min open field test session; distance traveled and rearing activity is shown in dark red and blue colors, respectively. (*D*) The time that SPF and GF mice spent in slow (>5 cm/s) or fast (>20 cm/s) locomotion during the initial 10 min of testing and the 20–60 min time interval. (*E*) Rearing activity of SPF (white), GF (black), and conventionalized (CON; light gray) mice. Circles show the average number of rears measured in 10-min time bins across a 60-min session in an open field box. (*F*) Rearing activity of SPF, GF, and adult CON mice (dark gray); lines connecting cumulative data in *B*, *E*, and *F* were drawn for clarity only. All data (*A*, *B*, and *D*–*F*) are presented as means (± SEM; $n = 7–14$ per group). $^*P < 0.05$ compared with SPF mice.

La perception par le cerveau d’une activité physique modifie différentiellement le microbiote.

J Appl Physiol 118: 1059–1066, 2015.
First published February 12, 2015; doi:10.1152/japplphysiol.01077.2014.

Voluntary and forced exercise differentially alters the gut microbiome in C57BL/6J mice

Jacob M. Allen,[1,2] Margret E. Berg Miller,[4,5] Brandt D. Pence,[1,2] Keith Whitlock,[1] Vandana Nehra,[3] H. Rex Gaskins,[4,5,6] Bryan A. White,[4,5] John D. Fryer,[7] and Jeffrey A. Woods[1,2,6]

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Submitted 5 December 2014; accepted in final form 8 February 2015

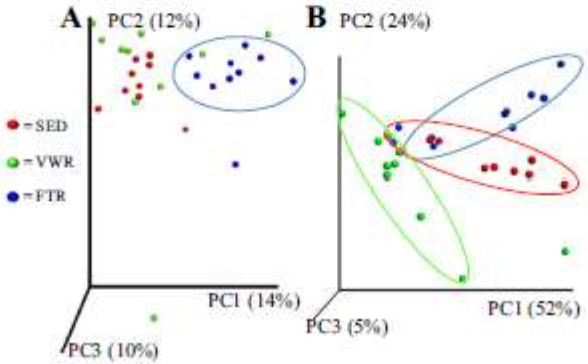


Fig. 3. PCoA based on unweighted UniFrac (*A*) and weighted UniFrac (*B*) distance metrics within the feces of mice. Clustering reveals significant differences between groups (PERMANOVA, $P < 0.05$). Axes represent percentage of data explained by each coordinate dimension. β-Diversity determines the phylogenetic distance shared between samples and effectively measures the number of distinct communities within a given region. The ovals in the figure do not represent any statistical significance but rather serve a visual guide to group differences.

L'activité physique perçu comme « forcée » modifie différemment le microbiote de l'activité physique « consentie »!

Données humaines

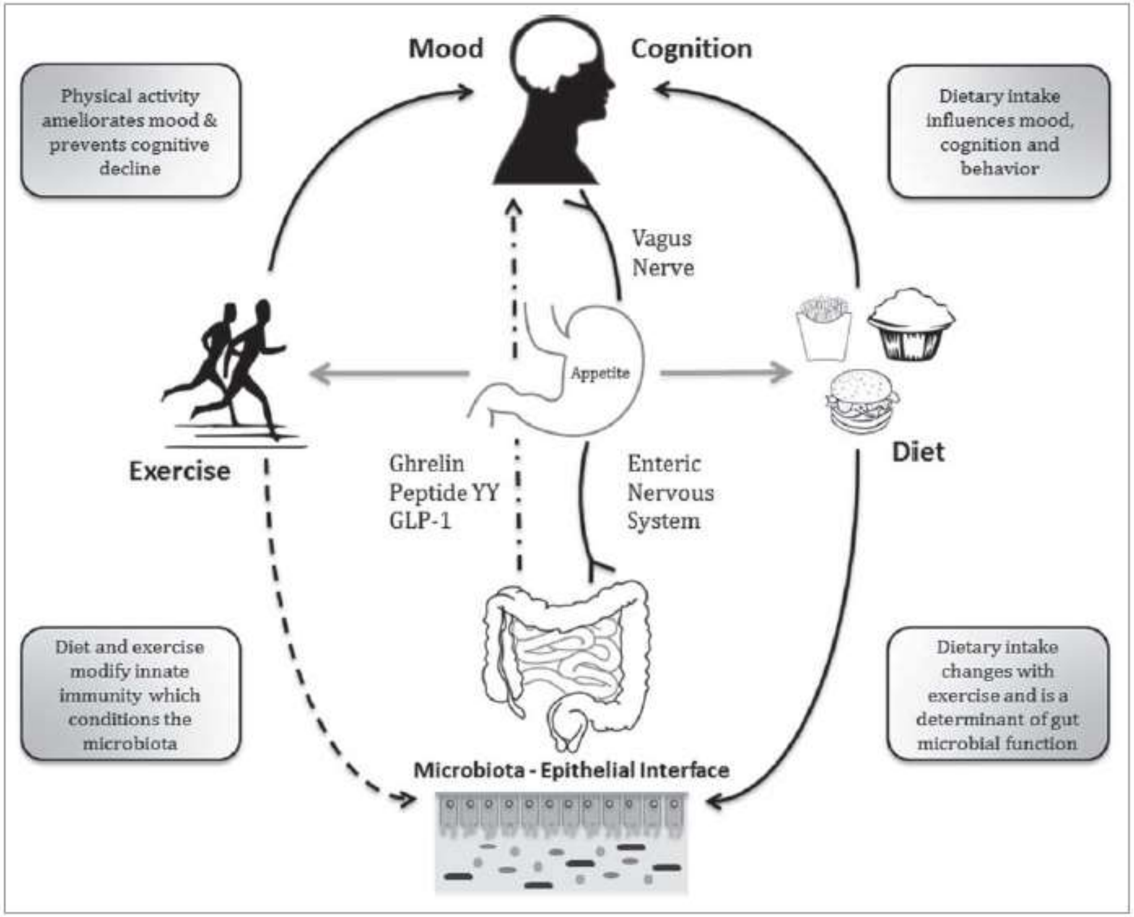


Figure 1. Schematic overview of potential sites of interaction between the biological adaptations to exercise and the microbiota. This is intended to be representative not comprehensive. Exercise is linked with a diversity of biological responses including a modifying influence on the brain-gut-microbe axis, diet-microbe-host metabolic interactions, neuro-endocrine and neuro-immune interactions. For example, exercise is long known to increase vagal tone - the hard wiring of the gut - which is anti-inflammatory and immune-modulatory. The latter might represent an indirect means by which exercise conditions gut microbiota composition.

La mise en jeu de l’axe intestin-cerveau lors de l’exercice physique influence la prise alimentaire, l’immunité intestinale, l’humeur, le microbiote

Le cerveau est un moteur de cet axe

Changes in intestinal microbiota composition and metabolism coincide with increased intestinal permeability in young adults under prolonged physiological stress.

Military training, a unique model for studying temporal dynamics of intestinal barrier and intestinal microbiota responses to stress, resulted in increased intestinal permeability concomitant with changes in intestinal microbiota composition and metabolism.

Karl et al Am J Physiol Gastrointest Liver Physiol. 2017 Jun 1;312(6):G559-G571

nutrients

MDPI

Article

An Exploratory Investigation of Endotoxin Levels in Novice Long Distance Triathletes, and the Effects of a Multi-Strain Probiotic/Prebiotic, Antioxidant Intervention

Justin D. Roberts [1,*], Craig A. Suckling [1], Georgia Y. Peedle [1], Joseph A. Murphy [2], Tony G. Dawkins [3] and Michael G. Roberts [2]

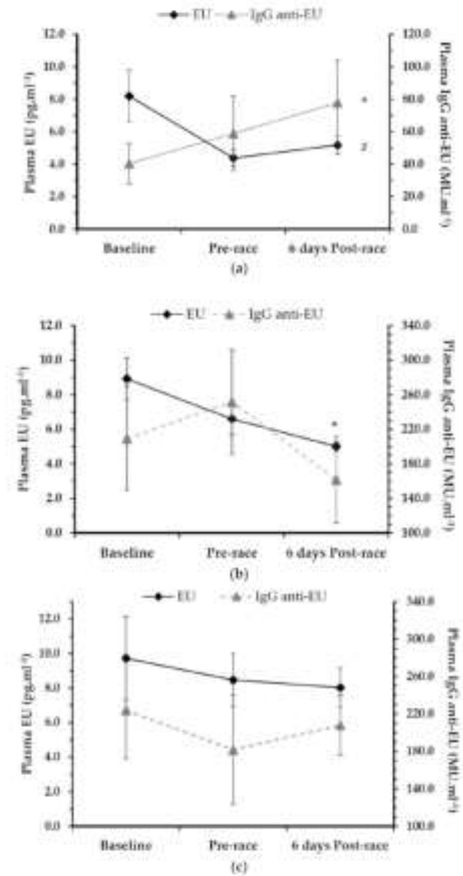
Table 1. Pre-screening (Month 0) and baseline (Month 6) characteristics for intervention groups.

Variable	LAB^4_{ANTI}		LAB^4		PL	
Distribution	(n = 10; 7 male, 3 female)		(n = 10; 9 male, 1 female)		(n = 10; 9 male, 1 female)	
Age (years)	33 ± 2		35 ± 2		35 ± 3	
Height (m)	1.74 ± 0.34		1.79 ± 0.27		1.76 ± 0.16	
	Pre-screening	Baseline	Pre-screening	Baseline	Pre-screening	Baseline
Weight (kg)	75.21 ± 4.12	73.61 ± 3.96 *	83.77 ± 4.71	81.94 ± 4.44 *	77.42 ± 3.03	74.56 ± 2.76
Body fat (%)	22.56 ± 1.67	19.36 ± 2.23 *	21.88 ± 1.68	20.93 ± 1.52	21.28 ± 2.38	18.64 ± 1.93 *
VO_2max ($L \cdot min^{-1}$)	3.26 ± 0.20	3.57 ± 0.19 *	3.78 ± 0.28	3.94 ± 0.27	3.30 ± 0.14	3.70 ± 0.10 *
VO_2max ($mL \cdot kg^{-1} \cdot min^{-1}$)	42.90 ± 1.59	48.60 ± 1.80 *	43.89 ± 1.75	47.56 ± 1.69 *	43.40 ± 2.53	50.50 ± 1.71 *

Data presented as mean ± SE No significant differences reported between groups. * denotes significant difference ($p < 0.05$) to pre-screening only within group.

Nutrients **2016**, *8*, 733; doi:10.3390/nu8110733

Nutrients 2016, 8, 733



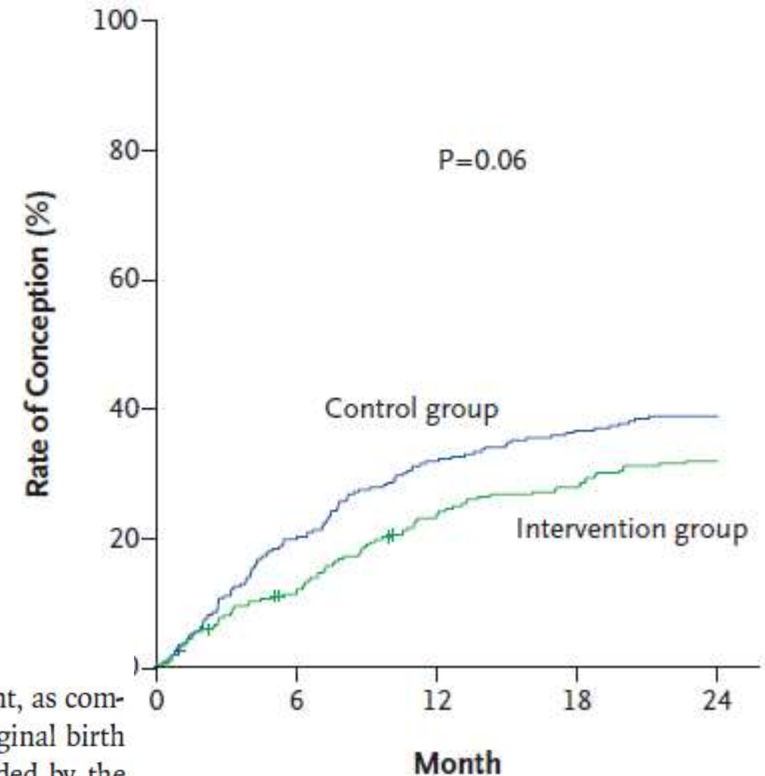
L'effet d'un symbiotique sur le passage du LPS dans le sang après un triathlon

ORIGINAL ARTICLE

Randomized Trial of a Lifestyle Program in Obese Infertile Women

loric intake of 1200 kcal per day. They were also advised to engage in moderate-intensity physical activity, with a target level of 10,000 steps per day (monitored by a step counter), and at least 30 minutes of moderate-intensity exercise two or three times per week.[27] The coaches also pro-

A Vaginal Birth of Healthy Singleton at Term



CONCLUSIONS

In obese infertile women, a lifestyle intervention preceding infertility treatment, as compared with prompt infertility treatment, did not result in higher rates of a vaginal birth of a healthy singleton at term within 24 months after randomization. (Funded by the Netherlands Organization for Health Research and Development; Netherlands Trial Register number, NTR1530.)

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Cardiovascular Effects of Intensive Lifestyle Intervention in Type 2 Diabetes

The Look AHEAD Research Group*

The intensive lifestyle intervention was aimed at achieving and maintaining weight loss of at least 7% by focusing on reduced caloric intake and increased physical activity. The program included both group and individual counseling sessions, occurring weekly during the first 6 months, with decreasing frequency over the course of the trial. Specific intervention strategies included a calorie goal of 1200 to 1800 kcal per day (with <30% of calories from fat and >15% from protein), the use of meal-replacement products, and at least 175 minutes of moderate-intensity physical activity per week. A toolbox of strategies was available for patients having difficulty achieving the weight-loss goals (see the Supplementary Appendix).

Une puissance statistique réelle correspondant à la puissance prévue de 80%

Table 2. Primary and Secondary Outcomes and Other Cardiovascular Outcomes.*

Outcome	Patients with Event	Control Group	Intervention Group	Hazard Ratio (95% CI)	P Value
	no.	*no. of events (rate/100 person-yr)*			
Primary outcome					
Death from cardiovascular causes, nonfatal myocardial infarction, nonfatal stroke, or hospitalization for angina	821	418 (1.92)	403 (1.83)	0.95 (0.83–1.09)	0.51
Secondary outcomes					
Death from cardiovascular causes, nonfatal myocardial infarction, or nonfatal stroke	550	283 (1.25)	267 (1.17)	0.93 (0.79–1.10)	0.42
Death from any cause, nonfatal myocardial infarction, nonfatal stroke, or hospitalization for angina	1025	529 (2.43)	496 (2.25)	0.93 (0.82–1.05)	0.23
Death from any cause, nonfatal myocardial infarction, nonfatal stroke, hospitalization for angina, CABG, PCI, hospitalization for heart failure, carotid endarterectomy, or peripheral vascular disease	1177	600 (2.81)	577 (2.67)	0.94 (0.84–1.05)	0.29
Other cardiovascular outcomes					
Death					
Any cause	376	202 (0.86)	174 (0.73)	0.85 (0.69–1.04)	0.11
Cardiovascular cause	109	57 (0.24)	52 (0.22)	0.88 (0.61–1.29)	0.52
Myocardial infarction					
Fatal or nonfatal†	354	191 (0.84)	163 (0.71)	0.84 (0.68–1.04)	0.11
Fatal	16	11 (0.05)	5 (<0.02)	0.44 (0.15–1.26)	0.13
Nonfatal	342	183 (0.80)	159 (0.69)	0.86 (0.69–1.06)	0.16
Hospitalization for angina	390	196 (0.87)	194 (0.85)	0.97 (0.80–1.19)	0.79
Stroke	165	80 (0.34)	85 (0.36)	1.05 (0.77–1.42)	0.78
Heart failure	218	119 (0.51)	99 (0.42)	0.80 (0.61–1.04)	0.10
CABG	525	269 (1.21)	256 (1.14)	0.93 (0.78–1.10)	0.41
Carotid endarterectomy	54	25 (0.11)	29 (0.12)	1.10 (0.64–1.87)	0.74

L’influence du travail forcé?

The New England
Journal of Medicine

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VOLUME 346 FEBRUARY 7, 2002 NUMBER 6

REDUCTION IN THE INCIDENCE OF TYPE 2 DIABETES WITH LIFESTYLE INTERVENTION OR METFORMIN

DIABETES PREVENTION PROGRAM RESEARCH GROUP*

The goals for the participants assigned to the intensive lifestyle intervention were to achieve and maintain a weight reduction of at least 7 percent of initial body weight through a healthy low-calorie, low-fat diet and to engage in physical activity of moderate intensity, such as brisk walking, for at least 150 minutes per week.

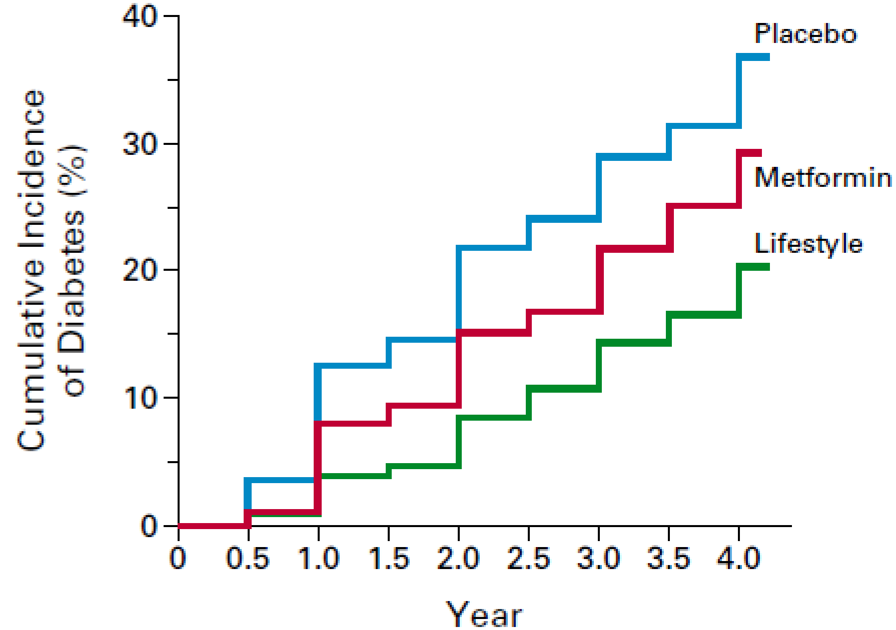

Figure 2. Cumulative Incidence of Diabetes According to Study Group.

The diagnosis of diabetes was based on the criteria of the American Diabetes Association.[11] The incidence of diabetes differed significantly among the three groups ($P<0.001$ for each comparison).

EFFECTS OF REGULAR EXERCISE ON BLOOD PRESSURE AND LEFT VENTRICULAR HYPERTROPHY IN AFRICAN-AMERICAN MEN WITH SEVERE HYPERTENSION

Peter F. Kokkinos, Ph.D., Puneet Narayan, M.D., John A. Colleran, D.O., Andreas Pittaras, M.D., Aldo Notargiacomo, B.S., Domenic Reda, M.S., and Vasilios Papademetriou, M.D.

Patients were advised and frequently reminded not to alter their dietary habits during the study. Patients in the no-exercise group were also advised to maintain the same level of physical activity. Patients were seen at least monthly in our clinic.

Table 4. Resting Blood Pressure and Heart Rate at Base Line and after 16 and 32 Weeks.*

Variable	16-Week Study					32-Week Study				
	Exercise Group (N=23)		No-Exercise Group (N=23)		P Value	Exercise Group (N=14)†		No-Exercise Group (N=18)‡		P Value
	Base line	16 Wk	Base line	16 Wk		Base line	32 Wk	Base line	32 Wk	
Systolic blood pressure (mm Hg)	138±10	131±15	139±13	138±10	0.13	135±8	129±10	139±13	138±15	0.15
Diastolic blood pressure (mm Hg)	88±7	83±8	88±6	90±7	0.002	89±7	85±6	89±6	90±7	0.04
Heart rate (bpm)	73±9	71±9	73±9	75±9	0.11	—	—	—	—	—

*Plus–minus values are means ±SD. P values are for the comparison of changes from base line between groups. Data on heart rates were not obtained at 32 weeks.

†Complete data at both base line and 32 weeks were available for only 14 patients.

‡Complete data at both

Table 5. Echocardiographic Data on 15 Patients in the Exercise Group and 17 Patients in the No-Exercise Group.*

Variable	Exercise Group (N=15)		No-Exercise Group (N=17)		P Value	
	Base line	16 Wk	Base line	16 Wk	Unadjusted	Adjusted
Posterior-wall thickness (mm)	13.3±1.5	12.3±1.3	11.9±2.0	11.9±1.9	0.04	0.20
Interventricular septal thickness (mm)	14.9±2.3	14.0±1.7	13.7±2.0	13.7±2.1	0.008	0.03
Left ventricular systolic dimension (mm)	31±5	30±5	35±7	34±6	0.49	0.92
Left ventricular diastolic dimension (mm)	49±5	48±4	51±6	51±6	0.62	0.29
Left ventricular mass (g)	346±95	304±72	323±69	326±83	0.01	0.02
Left-ventricular-mass index†	163±45	143±34	150±27	149±32	0.02	0.04
Ejection fraction (%)	72±11	74±11	64±11	69±12	0.43	0.81
Fractional shortening (%)	37±8	38±9	32±5	36±8	0.18	0.53

Conclusion

- L'activité physique/ le sport modifient le microbiote intestinal et la translocation bactérienne. Ces modifications dépendent des modalités de mise en jeu de l'axe cerveau- intestin (plaisir – contrainte) et de l'intensité de l'effort.
- Le microbiote influence les capacités physiques de l'individu et l'appétence pour le mouvement.
- L'activité physique sans contrainte diététique réduit l'hypertrophie ventriculaire gauche chez l'hypertendu d'origine africaine.
- L'activité physique et la contrainte diététique
  - réduisent le risque de diabète chez le patient à risque métabolique,
  - ne réduisent pas le risque cardiovasculaire du patient diabétique de type 2,
  - N'améliorent pas l'infertilité chez la femme obèse.