

# Errata

Boden G: Role of fatty acids in the pathogenesis of insulin resistance and NIDDM. *Diabetes* 46:3-10, 1997

The volume number and year shown in the abstract of the above article were incorrect. The abstract with the correct reference appears below.

Evidence is reviewed that free fatty acids (FFAs) are one important link between obesity and insulin resistance and NIDDM. First, plasma FFA levels are elevated in most obese subjects. Second, physiological elevations in plasma FFA concentrations inhibit insulin stimulated peripheral glucose uptake in a dose-dependent manner in normal controls and in patients with NIDDM. Two possible mechanisms are identified: 1) a fat-related inhibition of glucose transport or phosphorylation, which appears after 3-4 h of fat infusion, and 2) a decrease in muscle glycogen synthase activity, which appears after 4-6 h of fat infusion. Third, FFAs stimulate insulin secretion in nondiabetic individuals. Some of this insulin is transmitted in the peripheral circulation and is able to compensate for FFA-mediated peripheral insulin resistance. FFA-mediated portal hyperinsulinemia counteracts the stimulation of FFAs on hepatic glucose production (HGP) and thus prevents hepatic glucose overproduction. We speculate that, in obese individuals who are genetically predisposed to develop NIDDM, FFAs will eventually fail to promote insulin secretion. The stimulatory effect of FFAs on HGP would then become unchecked, resulting in hyperglycemia. Hence, continuously elevated levels of plasma FFAs may play a key role in the pathogenesis of NIDDM in predisposed individuals by impairing peripheral glucose utilization and by promoting hepatic glucose overproduction. *Diabetes* 46:3-10, 1997

Massillon D, Barzilai N, Hawkins M, Prus-Wertheimer D, Rossetti L: Induction of hepatic glucose-6-phosphatase gene expression by lipid infusion. *Diabetes* 46:153-157, 1997

A production error caused Fig. 1 on page 154 of the above article to be cropped incorrectly. The correct figure appears below.

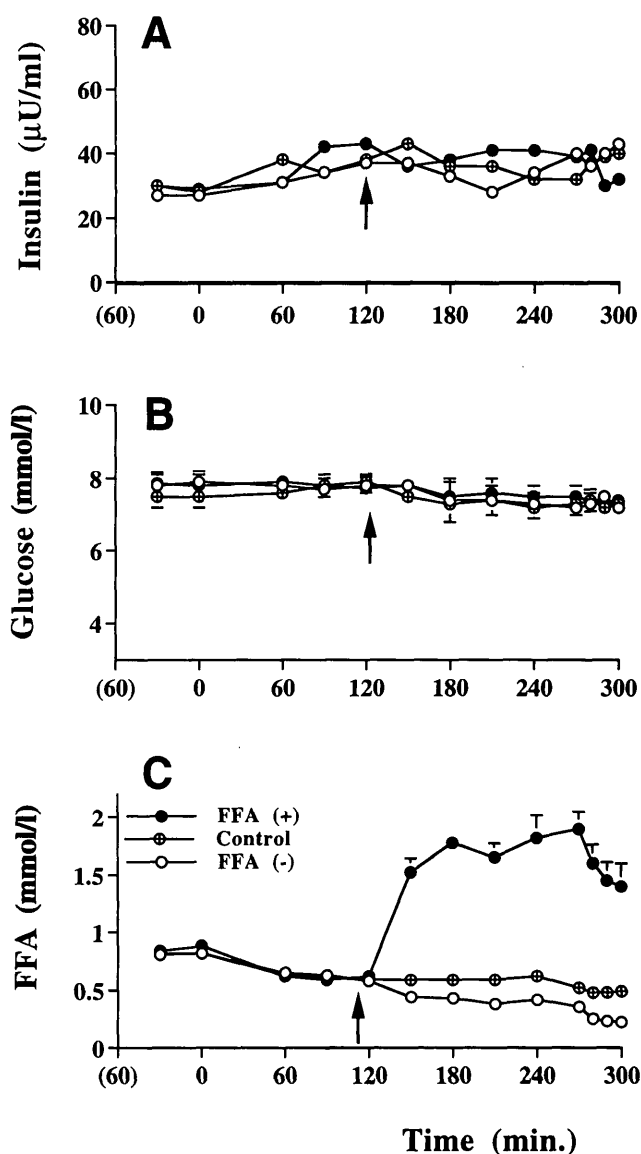


FIG. 1. Time course of the plasma insulin (A), glucose (B), and FFA (C) concentrations during the pancreatic clamp studies. To control the pancreatic hormone concentrations during the in vivo studies, somatostatin and insulin were infused during 5 h of saline (control studies) or 2 h of saline, followed by either 3 h of nicotinic acid infusion alone [FFA (-)] or nicotinic acid with lipid/heparin infusion [FFA (+)]. Insulin was infused at the rate of  $1.0 \text{ mU} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$  to generate plasma hormone concentrations mildly increased above basal levels.

TABLE 1—Système International (SI) units for plasma, serum, or blood concentrations

| Measurement                                  | Conventional unit                    | Conversion factor | SI unit                             | Significant digits | Suggested minimum increments             |
|--|--------------------------------------|-------------------|-------------------------------------|--------------------|--|
| Acetoacetate                                 | mg/dl                                | 97.95             | μmol/l                              | XXO                | 10 μmol/l                                |
| Acetone                                      | mg/dl                                | 172.2             | μmol/l                              | XXO                | 10 μmol/l                                |
| Adrenocorticotropin                          | pg/ml                                | 0.2202            | pmol/l                              | XX                 | 1 pmol/l                                 |
| Aldosterone                                  | ng/dl                                | 27.74             | pmol/l                              | XXO                | 10 pmol/l                                |
| Amino acids                                  |                                      |                   |                                     |                    |  |
| Alanine                                      | mg/dl                                | 112.2             | μmol/l                              | XXX                | 5 μmol/l                                 |
| α-Aminobutyric acid                          | mg/dl                                | 96.97             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Arginine                                     | mg/dl                                | 57.40             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Asparagine                                   | mg/dl                                | 75.69             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Aspartic acid                                | mg/dl                                | 75.13             | μmol/l                              |                    | 5 μmol/l                                 |
| Citrulline                                   | mg/dl                                | 57.08             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Cystine                                      | mg/dl                                | 41.61             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Glutamic acid                                | mg/dl                                | 67.97             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Glutamine                                    | mg/dl                                | 68.42             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Glycine                                      | mg/dl                                | 133.2             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Histidine                                    | mg/dl                                | 64.45             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Hydroxyproline                               | mg/dl                                | 76.26             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Isoleucine                                   | mg/dl                                | 76.24             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Leucine                                      | mg/dl                                | 76.24             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Lysine                                       | mg/dl                                | 68.40             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Methionine                                   | mg/dl                                | 67.02             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Ornithine                                    | mg/dl                                | 75.67             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Phenylalanine                                | mg/dl                                | 60.54             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Proline                                      | mg/dl                                | 86.86             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Serine                                       | mg/dl                                | 95.16             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Taurine                                      | mg/dl                                | 79.91             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Threonine                                    | mg/dl                                | 83.95             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Tryptophan                                   | mg/dl                                | 48.97             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Tyrosine                                     | mg/dl                                | 55.19             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Valine                                       | mg/dl                                | 85.36             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Amino acid nitrogen                          | mg/dl                                | 0.7139            | nmol/l                              | X.X                | 0.1 nmol/l                               |
| Amylase                                      | U/l                                  | 1.0               | U/l                                 | XXO                | 10 U/l                                   |
| Androstenedione                              | μg/l                                 | 3.492             | nmol/l                              | XX.X               | 0.5 nmol/l                               |
| Calcitonin                                   | pg/ml                                | 1.0               | ng/l                                | XXO                | 10 ng/l                                  |
| Calcium                                      | mg/dl                                | 0.2495            | mmol/l                              | X.XX               | 0.02 mmol/l                              |
| Calcium ion                                  | meq/l                                | 0.500             | mmol/l                              | X.XX               | 0.01 mmol/l                              |
| Carbon dioxide content                       | meq/l                                | 1.00              | nmol/l                              | XX                 | 1 nmol/l                                 |
| Cholesterol                                  | mg/dl                                | 0.02586           | mmol/l                              | X.XX               | 0.05 mmol/l                              |
| Citrate (as citric acid)                     | mg/dl                                | 52.05             | μmol/l                              | XXX                | 5 μmol/l                                 |
| Cortisol                                     | μg/dl                                | 27.59             | nmol/l                              | XXO                | 10 nmol/l                                |
| C-peptide                                    | ng/ml                                | 0.331             | nmol/l                              | XXX                | 0.01 nmol/l                              |
| Creatinine                                   | mg/dl                                | 88.40             | μmol/l                              | XXO                | 10 μmol/l                                |
| Creatinine clearance                         | ml/min                               | 0.01667           | ml/s                                | X.XX               | 0.02 ml/s                                |
| cyclic AMP                                   | μg/l                                 | 3.038             | nmol/l                              | XXX                | 1 nmol/l                                 |
| cyclic GMP                                   | μg/l                                 | 2.897             | nmol/l                              | XX.X               | 0.1 nmol/l                               |
| Dehydroepiandrosterone                       | μg/l                                 | 3.467             | nmol/l                              | XX.X               | 0.2 nmol/l                               |
| Dehydroepiandrosterone sulfate               | ng/ml                                | 0.002714          | μmol/l                              | XX.X               | 0.1 μmol/l                               |
| 11-Deoxycortisol                             | μg/dl                                | 28.86             | nmol/l                              | XXO                | 10 nmol/l                                |
| Epinephrine                                  | pg/ml                                | 5.458             | pmol/l                              | XXO                | 10 pmol/l                                |
| Estradiol                                    | pg/ml                                | 3.671             | pmol/l                              | XXX                | 1 pmol/l                                 |
| Estrone                                      | pg/ml                                | 3.699             | pmol/l                              | XXX                | 5 pmol/l                                 |
| Fatty acids, nonesterified                   | mg/dl                                | 0.01              | g/l                                 | X.XX               | 0.01 g/l                                 |
| Follicle-stimulating hormone                 | mIU/ml                               | 1.00              | IU/l                                | XX                 | 1 IU/l                                   |
| Fructose                                     | mg/dl                                | 0.05551           | mmol/l                              | X.XX               | 0.1 mmol/l                               |
| Galactose                                    | mg/dl                                | 0.05551           | mmol/l                              | X.XX               | 0.1 mmol/l                               |
| Gases  |                                      |                   |                                     |                    |  |
| Po <sub>2</sub>                              | mmHg                                 | 0.1333            | kPa                                 | XX.X               | 0.1 kPa                                  |
| Pco <sub>2</sub>                             | mmHg                                 | 0.1333            | kPa                                 | X.X                | 0.1 kPa                                  |
| Gastrin                                      | pg/ml                                | 1.0               | ng/l                                | XXO                | 10 ng/l                                  |
| Gastroinhibitory polypeptide                 | pg/ml                                | 0.201             | pmol/l                              | XXO                | 10 pmol/l                                |
| Glucagon                                     | pg/ml                                | 1.0               | ng/l                                | XXO                | 10 ng/l                                  |
| Glucose                                      | mg/dl                                | 0.05551           | mmol/l                              | XX.X               | 0.1 mmol/l                               |
| Glycerol, free                               | mg/dl                                | 0.1086            | mmol/l                              | X.XX               | 0.01 mmol/l                              |
| Growth hormone                               | ng/ml                                | 1.0               | μg/l                                | XX.X               | 0.5 μg/l                                 |
| β-Hydroxybutyrate (as β-hydroxybutyric acid) | mg/dl                                | 96.05             | μmol/l                              | XXO                | 10 μmol/l                                |
| 17α-Hydroxyprogesterone                      | μg/l                                 | 3.026             | nmol/l                              | XX.X               | 0.5 nmol/l                               |
| Insulin                                      | μU/ml                                | 6.0               | pmol/l                              | XXX                | 5 pmol/l                                 |
| Lactate (as lactic acid)                     | mEq/l                                | 1.0               | mmol/l                              | X.X                | 0.1 mmol/l                               |
| Lipase                                       | U/l                                  | 1.0               | U/l                                 | XXX                | 1 U/l                                    |
| Lipoproteins                                 |                                      |                   |                                     |                    |  |
| LDL (as cholesterol)                         | mg/dl                                | 0.02586           | mmol/l                              | X.XX               | 0.05 mmol/l                              |
| HDL (as cholesterol)                         | mg/dl                                | 0.02586           | mmol/l                              | XXX                | 0.05 mmol/l                              |
| Luteinizing hormone                          | mIU/ml                               | 1.0               | IU/l                                | X.XX               | 1 IU/l                                   |
| Norepinephrine                               | pg/ml                                | 0.005911          | nmol/l                              | XXX                | 0.01 nmol/l                              |
| Osmolality                                   | mOsm/kg                              | 1.0               | mmol/kg                             | XX                 | 1 mmol/kg                                |
| Pancreatic polypeptide                       | pg/ml                                | 0.239             | pmol/l                              | X.XX               | 1 pmol/l                                 |
| Phosphate (as inorganic phosphorus)          | mg/dl                                | 0.3229            | mmol/l                              | X.XX               | 0.05 mmol/l                              |
| Phospholipid phosphorus                      | mg/dl                                | 0.3229            | mmol/l                              | XX                 | 0.05 mmol/l                              |
| Progesterone                                 | ng/ml                                | 3.180             | nmol/l                              | XX                 | 2 nmol/l                                 |
| Prolactin                                    | ng/ml                                | 1.0               | μg/l                                | XX                 | 1 μg/l                                   |
| Protein, total                               | g/dl                                 | 10.0              | g/l                                 | XX                 | 1 g/l                                    |
| Pyruvate (as pyruvic acid)                   | mg/dl                                | 113.6             | μmol/l                              | XXX                | 1 μmol/l                                 |
| Renin  | ng·ml <sup>-1</sup> ·h <sup>-1</sup> | 0.2778            | ng·L <sup>-1</sup> ·s <sup>-1</sup> | X.XX               | 0.02 ng·L <sup>-1</sup> ·s <sup>-1</sup> |
| Serotonin                                    | μg/dl                                | 0.05675           | μmol/l                              | X.XX               | 0.05 μmol/l                              |
| Somatostatin                                 | pg/ml                                | 0.611             | pmol/l                              | XX                 | 1 pmol/l                                 |
| Testosterone                                 | ng/ml                                | 3.467             | nmol/l                              | XX.X               | 0.5 nmol/l                               |
| Thyroid-stimulating hormone                  | μU/dl                                | 1.0               | mU/l                                | X.X                | 0.1 mU/l                                 |
| Thyroxine                                    | μg/dl                                | 12.87             | nmol/l                              | XXX                | 1 nmol/l                                 |
| Triiodothyronine                             | ng/dl                                | 0.01536           | nmol/l                              | X.X                | 0.1 nmol/l                               |
| Urea nitrogen                                | mg/dl                                | 0.3570            | mmol/l                              | X.X                | 0.5 mmol/l                               |
| Vasoactive intestinal polypeptide            | pg/ml                                | 0.331             | pmol/l                              | X.X                | 1 pmol/l                                 |

Largely from Young DS: *Ann Intern Med* 106:114–129, 1987. For insulin see Vølund A, Brange J, Drejer K, Jensen I, Markussen J, Ribøl V, Sørensen AR, Schlichtkrull J: In vitro and in vivo potency of insulin analogues designed for clinical use. *Diabet Med* 8:839–847, 1991.