

Chapter 17
IFCC Publications 2018-2020

IFCC Scientific Division (SD)

IFCC and IUPAC Joint Committee for Nomenclature, Properties and Unit (C-NPU)

1. Hansen YBL: Recommendations on measurement units – why and how? eJIFCC 2019; 30: 250-275
2. Wikipedia page for the NPU Terminology: https://en.wikipedia.org/wiki/NPU_terminology

IFCC Committee on Molecular Diagnostics (C-MD)

1. Payne DA, Russomando G, Linder MW, Baluchova K, Ashavaid T, Steimer W, Ahmad-Nejad P, and the IFCC Committee for Molecular Diagnostics (C-MD). External quality assessment (EQA) and alternative assessment procedures (AAP) in molecular diagnostics: Findings of an International Survey. Clin Chem Lab Med 2021; 59:301–306. <https://doi.org/10.1515/cclm-2020-0101> PMID: 32383687
2. Payne DA, Baluchova K, Russomando G, Ahmad Nejad P, Mamotte C, Rousseau F, van Schaik RHN, Marriott K, Maekawa M, Chan KC. Toward harmonization of clinical molecular diagnostic reports: findings of an international survey. Clin Chem Lab Med. 2018; 57:78-88. <https://doi.org/10.1515/cclm-2017-1080> PMID: 29729139

IFCC Committee on Traceability in Laboratory Medicine (C-TLM)

1. The results of RELA2020 are published on the website <http://www.dgkl-rfb.de:81>
2. The results of RELA2019 have been evaluated and published: <http://www.dgkl-rfb.de:81>
3. The results of RELA2018 have been evaluated and published: <http://www.dgklrfb.de:81>

IFCC Committee on Reference Intervals and Decision Limits (C-RIDL)

1. Martinez-Sanchez L, Marques-Garcia F, Ozarda Y et.al. Big data and reference intervals: rationale, current practices, harmonization and standardization prerequisites and future perspectives of indirect determination of reference intervals using routine data. Adv Lab Med 2020. <https://doi.org/10.1515/almed-2020-034>
2. Ozarda Y, Sikaris K, Streichert T, Macri J et al., on behalf of IFCC Committee on Reference intervals and Decision Limits (C-RIDL). Distinguishing reference intervals and clinical decision limits - A review by the IFCC Committee on Reference Intervals and Decision Limits. Crit Rev Clin Lab Sci. 2018; 55: 420-431. <https://doi:10.1080/10408363.2018.1482256> PMID: 30047297
3. Jones GRD, Haeckel R, Loh TP, Sikaris K, Streichert T, Katayev A, Barth JH, Ozarda Y; IFCC Committee on Reference Intervals and Decision Limits. Indirect methods for reference interval determination - review and recommendations. Clin Chem Lab Med. 2018; 57: 20-29. <https://doi.org/10.1515/cclm-2018-0073> PMID: 29672266
Other article directly related to the C-RIDL projects:
4. Ozarda Y, Higgins V, Adeli K. Verification of reference intervals in routine clinical laboratories: practical challenges and recommendations. Opinion Paper, Clin Chem Lab Med 2018; 57: 30-37. <https://doi.org/10.1515/cclm-2018-0059>

IFCC Committee on Standardisation of Thyroid Function Tests (C-STFT)

1. Yoshihara A, Noh JY, Watanabe N, Iwaku K, Kunii Y, Ohye H, Suzuki M, Matsumoto M, Suzuki N, Sugino K, Thienpont LM, Hishinuma A, Ito K. Seasonal changes

in serum thyrotropin concentrations observed from big data obtained during six consecutive years from 2010 to 2015 at a single hospital in Japan. *Thyroid*. 2018; 28:429-436. <https://doi.org/10.1089/thy.2017.0600>

IFCC Committee on Harmonization of Autoimmune Tests (C-HAT)

1. Monogioudi E; Zegers I; Hutu DP; Sheldon J; Schimmel H; Meroni PL. Certified Reference Material against PR3 ANCA IgG autoantibodies. From development to certification. *Clin Chem Lab Med*. 2019; 57:1197-1206. <https://doi.org/10.1515/cclm-2018-1095> PMID: 30789822
2. Monogioudi E, Martos, G, Sheldon J, Meroni PL, Trapmann S, Zegers I. Development of a candidate certified reference material for anti-beta 2 glycoprotein I IgG – commutability studies, *Clin Chem Lab Med* 2021; 59:325–332. <https://doi.org/10.1515/cclm-2020-0995>
3. Evanthia Monogioudi; Ingrid Zegers Dana P Hutu; Gustavo Martos; Joanna Sheldon; Heinz Schimmel; Pier Luigi Meroni; “Standardisation of autoimmune testing – is it feasible?” *Clin Chem Lab Med* 2018; 56:1734–1742. <https://doi.org/10.1515/cclm-2017-1077>

IFCC Committee on Bone Metabolism (C-BM)

1. Bhattoa HP, Cavalier E, Eastell R, Heijboer AC, Jørgensen NR, Makris K, Ulmer CZ, Kanis JA, Cooper C, Silverman SL, Vasikaran SD; IFCC-IOF Committee for Bone Metabolism. Analytical considerations and plans to standardize or harmonize assays for the reference bone turnover markers PINP and β -CTX in blood. *Clin Chim Acta* 2021; 515:16-20. <https://doi.org/10.1016/j.cca.2020.12.023>. PMID: 33382995
2. Cavalier E, Eastell R, Jørgensen NR, Makris K, Tournis S, Vasikaran S, Kanis JA, Cooper C, Pottel H, Morris HA. A multicenter study to evaluate harmonization of assays for C-terminal telopeptides of type I collagen (ss-CTX): A report from the IFCC-IOF Committee for Bone Metabolism (C-BM). *Calcif Tissue Int*. 2021. <https://doi.org/10.1007/s00223-021-00816-5> PMID:33661343
3. Cavalier E, Lukas P, Bottani M, Aarsand AK, Ceriotti F, Coşkun A, Díaz-Garzón J, Fernández-Calle P, Guerra E, Locatelli M, Sandberg S, Carobene A; European Biological Variation Study (EuBIVAS): within- and between-subject biological variation estimates of β -CTX, PINP, osteocalcin, intact-FGF 23 and uCuP-MGP - a cooperation between the European Federation of Clinical Chemistry and Laboratory Medicine Working Group on Biological Variation and the International Osteoporosis Foundation-International Federation of Clinical Chemistry Committee on Bone Metabolism. *Osteoporos Int*. 2020; 31:1461-1470. <https://doi.org/10.1007/s00198-020-05362-8> . PMID: 32270253.
4. Vasikaran SD, Bhattoa HP, Eastell R, Heijboer AC, Jørgensen NR, Makris K, Ulmer C, Kanis JA, Cooper C, Silverman S, Cavalier E. Harmonization of commercial assays for PINP; the way forward. *Osteoporos Int*. 2020; 31:409-412. <https://doi.org/10.1007/s00198-020-05310-6>
5. Cavalier E, Vasikaran S, Bhattoa HP, Heijboer AC, Makris K, Ulmer CZ. The path to the standardization of PTH: Is this a realistic possibility? a position paper of the IFCC C-BM. *Clin Chim Acta* 2021; 515: 44-51. <https://doi.org/10.1016/j.cca.2020.12.022>
6. Cavalier E, Eastell R, Rye Jørgensen N, Makris K, Tournis S, Vasikaran S, Kanis JA, Cooper C, Pottel H, Morris HA; IFCC-IOF Joint Committee for Bone Metabolism (C-BM).A multicenter study to evaluate harmonization of assays for N-terminal propeptide of type I procollagen (PINP): a report from the IFCC-IOF Joint

Committee for Bone Metabolism. Clin Chem Lab Med. 2019; 57:1546-1555. <https://doi.org/10.1515/cclm-2019-0174> PMID: 31085740

IFCC Working Group on Standardisation of Hemoglobin A₂ IFCC Working Group on Standardisation of Hemoglobin A₂ - Joint Working Group with ICSH (International Council for Standardization in Haematology) since 2020 (WG-HbA₂)

1. Mosca A, Paleari R, Hartevelde CL; IFCC ICSH Joint Working Group for standardization of HbA₂. A roadmap for the standardization of hemoglobin A₂. Clin Chim Acta. 2021; 512:185-190. <https://doi.org/10.1016/j.cca.2020.11.008> PMID:33181152
2. Paleari R, Ceriotti F, Hartevelde CL, Strollo M, Bakker-Verweij G, ter Huurne J, Bisoen S, Mosca A. Calibration by commutable control materials is able to reduce inter-method differences of current high-performance methods for HbA₂. Clin Chim Acta. 2018; 477: 60-65. <https://doi.org/10.1016/j.cca.2017.12.001> .
3. Arsene CG, Kaiser P, Paleari R, Henrion A, Spannagl M, Mosca A, on behalf of the IFCC Working Group on Standardisation of Hemoglobin A₂ (WG-HbA₂). Determination of HbA₂ by quantitative bottom-up proteomics and isotope dilution mass spectrometry. Clin Chim Acta. 2018; 487:318-324. <https://doi.org/10.1016/j.cca.2018.10.024> PMID: 30342003

IFCC Working Group on Standardization of Albumin Assay in Urine – in collaboration with NKDEP (WG-SAU)

1. Miller WG, Bachmann LM, Fleming JK, Delanghe JR, Parsa A, Narva AS.; Laboratory Working Group of the National Kidney Disease Education Program and the IFCC Working Group for Standardization of Albumin in Urine. Recommendations for reporting low and high values for urine albumin and total protein. [Letter to the Editor]. Clin Chem. 2019; 65:349-350. <https://doi.org/10.1373/clinchem.2018.297861> PMID: 30459169

IFCC Working Group on Standardization of TnI (WG-TnI)

The following recommendation was made in the clinical practice guidelines promulgated by the AACC academy and IFCC TF-CACB in 2018.

1. Recommendation 8: Commutable materials should be developed for use in harmonizing and standardizing cTn.
This recommendation resulted was discussed in a section of the Clinical Practice Guidelines titled 'Harmonizing and Standardizing' and serves to highlight the importance of our work in developing RM 2922.
2. Wu AHB, Christenson RH, Greene DN, Jaffe AS, Kavsak PA, Ordóñez-Llanos J, Apple FS. Clinical laboratory practice recommendations for the use of cardiac troponin in acute coronary syndrome: expert opinion from the academy of the American Association for Clinical Chemistry and the Task Force on Clinical Applications of Cardiac Bio-Markers of the International Federation of Clinical Chemistry and Laboratory Medicine. Clin Chem 2018; 64:645-655. <https://doi.org/10.1373/clinchem.2017.277186>

IFCC Working Group on Commutability (WG-C)

IFCC Working Group on Commutability in Metrological Traceability since 2020 (WG-CMT)

1. Miller GW, Schimmel H, Rej R, Greenberg N, Ceriotti F, Burns C, Budd JR, Weykamp C, Delatour V, Nilsson G, MacKenzie F, Panteghini M, Keller T, Camara JE, Zegers I, Vesper HW, for the IFCC Working Group on Commutability (WG-C). IFCC working group recommendations for assessing commutability part 1: general experimental design. *Clin Chem* 2018;64: 447-54. <https://doi.org/10.1373/clinchem.2017.277525>
2. Nilsson G, Budd JR, Greenberg N, Delatour V, Rej R, Panteghini M, Ceriotti F, Schimmel H, Weykamp C, Keller T, Camara JE, Burns C, Vesper HW, MacKenzie F, Miller GW, for the IFCC Working Group on Commutability (WG-C). IFCC working group recommendations for assessing commutability part 2: using the difference in bias between a reference material and clinical samples. *Clin Chem* 2018; 64: 455-64. This paper includes a worked example as supplemental information. <https://doi.org/10.1373/clinchem.2017.277541>
3. Budd JR, Weykamp C, Rej R, MacKenzie F, Ceriotti F, Greenberg N, Camara JE, Schimmel H, Vesper HW, Keller T, Delatour V, Panteghini M, Burns C, Miller GW, for the IFCC Working Group on Commutability (WG-C). IFCC working group recommendations for assessing commutability part 3: based on the calibration effectiveness of a reference material. *Clin Chem* 2018; 64: 465-74. This paper includes additional example data and statistical tools as supplemental information. <https://doi.org/10.1373/clinchem.2017277558>
4. Miller WG, Budd J, Greenberg N, Weykamp C, Althaus H, Schimmel H, Panteghini M, Delatour V, Ceriotti F, Keller T, Hawkins D, Burns C, Rej R, Camara JE, MacKenzie F, van der Hagen E, Vesper H, for the IFCC Working Group on Commutability. IFCC Working Group recommendations for correction of bias caused by non-commutability of a certified reference material used in the calibration hierarchy of an end-user measurement procedure. *Clin Chem* 2020; 66:769-78. <https://doi.org/10.1093/clinchem/hvaa048>
5. Miller WG, Greenberg N, Budd J, Delatour V; IFCC Working Group on Commutability in Metrological Traceability. The evolving role of commutability in metrological traceability. *Clin Chim Acta*. 2021; 514: 84-89. <https://doi.org/10.1016/j.cca.2020.12.021> PMID: 33359496

IFCC Working Group on Immunosuppressive Drugs (WG-ID)

1. Participation of several WG members (Seger, Langman, Kunicki, Pawinski, Wieland, Shipkova) in the preparation of the guidance publication: Bergan S. et al. Mycophenolate personalized therapy: Consensus report by the International Association of Therapeutic Drug Monitoring and Clinical Toxicology. *Therapeutic Drug Monitoring*, 2021; 43: 150-200. <https://doi.org/10.1097/FTD0000000000000871>

IFCC Working Group on Apolipoproteins by Mass Spectrometry (WG-APO MS)

1. Cobbaert CM, Althaus H, Begcevic Brkovic I, Ceglarek U, Coassin S, Delatour V, Deprez L, Dikaïos I, Dittrich J, Hoofnagle AN, Kostner GM, Kronenberg F, Kuklennyik Z, Prinzing U, Vesper HW, Zegers I, Ruhaak LR; IFCC Working Group for Standardization of Apolipoproteins by Mass Spectrometry. Towards an SI-traceable reference measurement system for seven serum apolipoproteins using bottom-up quantitative proteomics: Conceptual approach enabled by cross-disciplinary/

cross-sector collaboration. *Clin Chem*. 2021; 67:478-489. <https://doi.org/10.1093/clinchem/hvaa239>. PMID:33331636

2. Ruhaak LR, Cobbaert CM., Quantifying apolipoprotein(a) in the era of proteoforms and precision medicine, *Clin Chim Acta*. 2020; 511:260-268. <https://doi.org/10.1016/j.cca.2020.10.010> .

Members of the group have participated in several related publications:

1. Orsi FA, Lijfering WM, Van der Laarse A, Ruhaak LR, Rosendaal FR, Cannegieter SC, Cobbaert C. Association of apolipoproteins C-I, C-II, C-III and E with coagulation markers and venous thromboembolism risk. *Clin Epidemiol*. 2019; 11: 625-633 <https://doi.org/10.2147/CLEP.S196266>
2. Ruhaak LR, Van der Laarse A, Cobbaert CM. Apolipoprotein profiling as a personalized approach to the diagnosis and treatment of dyslipidaemia. *Annals of Clinical Biochemistry*. 2019; 56: 338-356. <https://doi.org/10.1177/0004563219827620>
3. Dittrich J, Beutner F, Teren A, Thiery J, Burkhardt R, Scholz M, Ceglarek U. Plasma levels of apolipoproteins C-III, A-IV, and E are independently associated with stable atherosclerotic cardiovascular disease. *Atherosclerosis*. 2019; 1:17-24. <https://doi.org/10.1016/j.atherosclerosis.2018.11.006>
4. Bodde MC, Hermans MPJ, Jukema JW, et al. Apolipoproteins A1, B, and apoB/apoA1 ratio are associated with first ST-segment elevation myocardial infarction but not with recurrent events during long-term follow-up. *Clin Res Cardiol* 2019; 108: 520-538 <https://doi.org/10.1007/s00392-018-1381-5> .
5. Delatour V, Clouet-Foraison N, Gaie-Levrel F, et al. Comparability of lipoprotein particle number concentrations across ES-DMA, NMR, LC-MS/MS, immunonephelometry, and VAP: In search of a candidate reference measurement procedure for apoB and nonHDL-P standardization. *Clin Chem* 2018; 64: 1485-1495. <https://doi.org/10.1373/clinchem.2018.288746> .
6. Ruhaak LR, Smit NPM, Suchiman HED, et al. MS-based proteomics: a metrological sound and robust alternative for apolipoprotein E phenotyping in a multiplexed test. *Clin Chem Lab Med* 2019; 57: e102-e104. <https://doi.org/10.1515/cclm-2018-0782>.
7. Ruhaak LR, Smit NPM, Romijn F, et al. Robust and accurate 2-year performance of a quantitative mass spectrometry-based apolipoprotein test in a clinical chemistry laboratory. *Clin Chem* 2018; 64: 747-749. <https://doi.org/10.1373/clinchem.2017.285098> .
8. Dittrich J, Adam M, Maas H, et al. Targeted on-line SPE-LC-MS/MS assay for the quantitation of 12 apolipoproteins from human blood. *Proteomics* 2018; 18 2017/12/28. <https://doi.org/10.1002/pmic.201700279> .

IFCC Working Group on IFCC Working Group on Pancreatic Enzymes (WG-PE)

1. Deprez L, Toussaint B, Zegers I, Schimmel H, Grote-Koska D, Klauke R, Gella FJ, Orth M, Lessinger JM, Trenti T, Nilsson G, Ceriotti F. Commutability assessment of candidate reference materials for pancreatic α -amylase. *Clin Chem* 64;1193-1202. <https://doi.org/10.1373/clinchem.2018.289744>

IFCC Working Group on Faecal Immunochemical Testing (WG-FIT)

1. Benton SC, Symonds E, Djedovic N, Jones S, Deprez L, Kocna P, Maria Auge J; International Federation of Clinical Chemistry Faecal Immunochemical Test Working Group (IFCC FIT-WG). Faecal immunochemical tests for haemoglobin: Analytical challenges and potential solutions. *Clin Chim Acta*. 2021; 517:60-65. <https://doi.org/10.1016/j.cca.2021.01.024>

IFCC Working Group on Standardization of Procalcitonin assays (WG-PCT)

1. Huynh HH, Bœuf A, Vinh J, Delatour V; IFCC Working Group on Standardization of Procalcitonin assays (WG-PCT). Evaluation of the necessity and the feasibility of the standardization of procalcitonin measurements: Activities of **IFCC** WG-PCT with involvement of all stakeholders. *Clin Chim Acta*. 2021; 515:111-121. <https://doi.org/10.1016/j.cca.2021.01.004> PMID: 33450213

IFCC Working Group on Continuous Glucose Monitoring (WG-CGM)

1. Freckmann G, Nichols JH, Hinzmann R et.al. Standardization process of continuous glucose monitoring: traceability and performance. *Clin Chim Acta*. 2021; 515: 5-12. <https://doi.org/10.1016/j.cca.2020.12.025> .

IFCC Working Group on Clinical Quantitative Mass Spectrometry Proteomics (WG-cMSP).

1. Hirtz C, Bros P, Brede C, Lescuyer P, Maceski AM, Vialaret J, Delatour V, Lehmann S; Regulatory context and validation of assays for clinical mass spectrometry proteomics (cMSP) methods. *Crit Rev Clin Lab Sci*. 2018; 55: 346-358. <https://doi.org/10.1080/10408363.2018.1470159> . PMID: 29792094

IFCC Education and Management Division (EMD)

IFCC Committee on Clinical Applications of Cardiac Bio-Markers (C-CB)

1. Apple FS, Fantz CR, Collinson PO; IFCC Committee on Clinical Application of Cardiac Bio-Markers. Implementation of high-sensitivity and point-of-care cardiac troponin assays into practice: Some different thoughts. *Clin Chem* 2021; 67:70-78. <https://doi.org/10.1093/clinchem/hvaa264>. PMID: 33279984
2. Apple FS, Collinson PO, Kavsak PA, Body R, Ordóñez-Llanos J, Saenger AK, Omland T, Hammarsten O, Jaffe AS; IFCC Committee Clinical Application of Cardiac Biomarkers. The IFCC clinical application of cardiac biomarkers committee's appraisal of the 2020 ESC guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: Getting cardiac troponin right. *Clin Chem* 2021; 67:hvaa337. <https://doi.org/10.1093/clinchem/hvaa337> . PMID: 33377906
3. Collinson PO, Saenger AK, Apple FS; IFCC C-CB. High sensitivity, contemporary and point-of-care cardiac troponin assays: educational aids developed by the IFCC Committee on Clinical Application of Cardiac Bio-Markers. *Clin Chem Lab Med* 57 :623-632. <https://doi.org/10.1515/cclm-2018-1211> . PMID: 30530880

IFCC Committee on Laboratory Errors and Patient Safety (WG-LEPS)

1. Sciacovelli L, Lippi G, Sumarac Z, Del Pino Castro IG, Ivanov A, De Guire V, Coskun C, Aita A, Padoan A, Plebani M; Pre-analytical quality indicators in laboratory medicine: Performance of laboratories participating in the IFCC Working Group "Laboratory Errors and Patient Safety" project. *Clin Chim Acta*. 2019; 497:35-40. <https://doi.org/10.1016/j.cca.2019.07.007> . PMID:31295446

IFCC Emerging Technologies Division (ETD)

Executive Committee

1. Gruson D, Bernardini S, Dabla PK, Gouget B, Stankovic S. Collaborative AI and laboratory medicine integration in precision cardiovascular medicine *Clin Chim Acta* 2020; 509: 67-71. <https://doi.org/10.1016/j.cca.2020.06.001>
2. Gruson D, Ko G, Luu D. COVID-19: Armageddon before light? *eJIFCC* 2020; 31: 103-105 PMID 32549877
3. Greaves RF, Bernardini S, Ferrari M, Fortina P, Gouget B, Gruson D, Lang T, Loh TP, Morris HA, Park JY, Roessler M, Yin P, Kricka LJ. Key questions about the future of laboratory medicine in the next decade of the 21st century: A report from the IFCC-Emerging Technologies Division *Clin Chim Acta*; 495: 570-589. <http://doi.org/10.1016/j.cca.2019.05.021>
4. Molero A, Calabro M, Vignes M, Gouget B, Grusaon D. Sustainability in healthcare: perspectives and reflections around laboratory. *Ann Lab Med*. 2021; 41: 139-144. <https://doi.org/10.3343/alm.2021.41.2.139>
5. Gouget B, Gruson D., Bernardini S. Promoting BCLF identity in Belgrade with the e-nergized SMBS. *J Med Biochem* 37: 1–5, 2019.

IFCC Working Group on Artificial Intelligence and Genomic Diagnostics (WG-AIGD)

1. Kricka LJ, Polevikov S, Park JY, Fortina P, Bernardini S, Satchkov D, Kolesov V, Grishkov M. Artificial Intelligence – powered search tools and resources in the fight against COVID-19 *eJIFCC* 2020; 31: 106-116

IFCC Task Forces

IFCC Taskforce on COVID-19 (TF-COVID-19)

1. Thompson S, Bohn MK, Mancini N, Loh TP, Wang CB, Grimmier M, Yuen KY, Mueller R, Koch D, Sethi S, Rawlinson WD, Clementi M, Erasmus R, Leportier M, Kwon GC, Menezes ME, Patru MM, Gramegna M, Singh K, Najjar O, Ferrari M, Lippi G, Adeli K, Horvath AR; IFCC Taskforce on COVID-19 IFCC Interim guidelines on biochemical/hematological monitoring of COVID-19 patients. *Clin Chem Lab Med*. 2020; 58: 2009-2016. <https://doi.org/10.1515/cclm-2020-1414> .PMID:33027044
2. Bohn MK, Loh TP, Wang CB, Mueller R, Koch D, Sethi S, Rawlinson WD, Clementi M, Erasmus R, Leportier M, Grimmier M, Yuen KY, Mancini N, Kwon GC, Menezes ME, Patru MM, Gramegna M, Singh K, Najjar O, Ferrari M, Horvath AR, Lippi G, Adeli K; and the IFCC Taskforce on COVID-19. IFCC Interim Guidelines on Serological Testing of Antibodies against SARS-CoV-2. *Clin Chem Lab Med*. 2020;58 :2001-2008. <https://doi.org/10.1515/cclm-2020-1413>. PMID: 33027043
3. Lim CY, Bohn MK, Lippi G, Ferrari M, Loh TP, Yuen KY, Adeli K, Horvath AR; IFCC Task Force on COVID-19. Staff rostering, split team arrangement, social distancing (physical distancing) and use of personal protective equipment to minimize risk of workplace transmission during the COVID-19 pandemic: A simulation study. *Clin Biochem*. 2020; 86:15-22. <https://doi.org/10.1016/j.clinbiochem.2020.09.003> . PMID: 32926883

