MDSC 501
Principles and Mechanisms of Pharmacology

Instructors:
Dr. Donna Slater  Course Coordinator/Instructor  dmslater@ucalgary.ca
Dr. Stefanie Borgland  slborgla@ucalgary.ca
Dr. Chad Bousman  chad.bousman@ucalgary.ca
Dr. Justin Deniset  jdeniset@ucalgary.ca
Dr. Kyle Flannigan  kyle.flannigan1@ucalgary.ca
Dr. Mark Giembycz  giembycz@ucalgary.ca
Dr. Charlie Kwok  hongting.kwok@ucalgary.ca

Office Hours/Policy on Answering Student Emails
Office hours are available by appointment.

Email communications with the instructor and/or TA are welcome.
Please note that all course communications must occur through your @ucalgary email.
Please email with MDSC 501 in the subject line of the message. All efforts will be made to respond to
emails received via student’s @ucalgary emails within 48 hours (excluding weekends and statutory
holidays).

Teaching Assistant:
Ryan Bianchini  ryan.bianchini@ucalgary.ca

Time and Location:
Fall 2021 September 8th to December 8th
Class will be on Mondays and Wednesdays at 5:00 - 6:20 pm.
Class will be held in Theatre 1

Prerequisite/Co-Requisite:
Admission to the BHSc Honours program; and Biochemistry 341 or 393; and Medical Science 404 or Zoology 463.

Course Description:
Basic principles of pharmacology, with emphasis on mechanisms of drug action and receptor signaling.
The application of pharmacology to the treatment of disease will also be explored.

Overarching Theme
The course is designed to introduce the basic principles of ‘Pharmacodynamics and Pharmacokinetics’
(what the drug does to the body and what the body does to the drug), and the ‘targets and mechanisms
of drug action’. In addition, students will explore the pharmacological manipulation of these in the
context of clinical treatment. The class will be lecture and discussion-based, with select drug examples
to build on basic concepts taught.
Global Objectives

- To introduce basic concepts of pharmacology, including how drugs act along with factors that may affect their absorption, distribution, metabolism, and elimination within the body
- To develop a working knowledge of key pharmacology terms and concepts
- To facilitate the ability to integrate information provided and apply to the principles and mechanisms of pharmacology in the context of select disease and or pathologies
- To be able to critically evaluate evidence and appreciate some reasons why drugs do not always have the desired effect

Course Learning Outcomes

By the end of this course, students will be able to:

1. Define and differentiate the main pharmacodynamics terms (e.g. drug, ligand, receptor, antagonist, agonist, partial agonists, receptor reserve, affinity, efficacy). List the main targets for drug action (e.g. receptors, enzymes, ion channels) and outline the translation into biological responses: i.e. signal transduction mechanisms, gene transcription
2. Explain the principles of pharmacokinetics (ADME) and describe why an understanding of each is important for clinical pharmacology
3. Explain why select patients (e.g. elderly, children, pregnancy, disease state) may respond differently to drugs
4. Describe the basic pathophysiology of select diseases or health problems (e.g. asthma, COPD, hypertension, GI motility, preterm labour, pain, drug abuse), the main classes of drug treatments / mechanism of action, and place these into context of the above principles
5. Investigate a drug in clinical use, describe the main treatment of the drug, adverse outcomes, contraindications, and possible drug interactions, critically assess the literature, and using pharmacological principles above hypothesize why these might be occurring
6. Facilitate classroom learning, by presenting scientific / clinical findings and addressing questions to a broad audience

Learning Resources

There is no assigned textbook for this course
Any readings / links to readings will be posted on D2L
Access to library resources will be required.

Recommended Textbooks/Readings

Supplemental Reading: Rang and Dale’s Pharmacology
- 7th edition. By HP Rang, MM Dale, JM Ritter, RJ Flower & G Henderson
- 8th edition. By HP Rang, JM Ritter, RJ Flower & G Henderson
- 9th edition. By JM Ritter, RJ Flower, G Henderson, Loke YK, MacEwan D & HP Rang,

Any of the above are recommended to supplement lectures. Copies are kept in the library.

Learning Technology Requirements

Brightspace (by D2L) is located on the University of Calgary server and will be used extensively for communication with students. It is the student’s responsibility to ensure that they receive all posted communications and documents and that they receive emails sent by instructors or fellow students through D2L. Only your @ucalgary.ca email address may be linked to D2L. Please ensure that you are regularly checking your @ucalgary.ca account.
**Evaluation**

The University policy on grading and related matters is described in section F of the 2021-2022 Calendar.

In determining the overall grade in the course, the following weights will be used:

<table>
<thead>
<tr>
<th>Description</th>
<th>% grade</th>
<th>Due Date</th>
<th>LOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment #1 (Basic Principles L1-9) Open book worksheet</td>
<td>25%</td>
<td>Friday Oct 15th 11:59pm</td>
<td>1-3</td>
</tr>
<tr>
<td>Assignment #2 (Special topics L10-18) Open book worksheet</td>
<td>25%</td>
<td>Friday Nov 26th 11:59pm</td>
<td>4</td>
</tr>
<tr>
<td>Individual Drug Report</td>
<td>25%</td>
<td>Friday Dec 10th, 11:59pm</td>
<td>1-5</td>
</tr>
<tr>
<td>10 mins Presentation Drug summary (with partner)</td>
<td>15%</td>
<td>Slides to D2L 24 hours before presentation</td>
<td>1-6</td>
</tr>
<tr>
<td>Participation - Student attend and asks Qs on student presentations</td>
<td>10%</td>
<td>Participate in class discussion</td>
<td>6</td>
</tr>
</tbody>
</table>

Guidelines and Rubrics for each component will be provided on D2L.

There is no final exam for this course.

Students who do not complete Assignment #1, Assignment #2, and the Student Presentation prior to the end of term will be considered as not having completed the course; this will be reflected on the student’s official transcript as ‘Incomplete’. In the absence of medical or other documented reasons, the instructor reserves the right to award an ‘Incomplete’.

A student’s final grade for the course is the sum of the separate assignments. It is not necessary to pass each assignment separately in order to pass the course.

**A Note regarding Writing Assignments:**

Writing skills are important to academic study in all disciplines. In keeping with the University of Calgary’s emphasis on the importance of academic writing in student assignments (section E.2 of 2021-22 Calendar), writing is emphasized, and the grading thereof in determining a student’s mark in this course. The Bachelor of Health Sciences values excellence in writing. Competence in writing entails skills in crafting logical, clear, coherent, non-redundant sentences, paragraphs and broader arguments, as well as skills with the mechanics of writing (grammar, spelling, punctuation). Sources used in research papers must be properly documented. The University of Calgary offers instructional services through the Students’ Success Centre’s Writing Support Services (http://www.ucalgary.ca/writingsupport/) for students seeking feedback on assignments or seeking to improve their general writing skills. Students are strongly encouraged to take advantage of these programs.
Grading Scheme:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>Outstanding performance</td>
<td>95-100</td>
</tr>
<tr>
<td>A</td>
<td>Excellent performance</td>
<td>90-94.99</td>
</tr>
<tr>
<td>A-</td>
<td>Approaching excellent performance</td>
<td>85-89</td>
</tr>
<tr>
<td>B+</td>
<td>Exceeding good performance</td>
<td>80-84</td>
</tr>
<tr>
<td>B</td>
<td>Good performance</td>
<td>75-79</td>
</tr>
<tr>
<td>B-</td>
<td>Approaching good performance</td>
<td>70-74</td>
</tr>
<tr>
<td>C+</td>
<td>Exceeding satisfactory performance</td>
<td>65-69</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory performance</td>
<td>60-64</td>
</tr>
<tr>
<td>C-</td>
<td>Approaching satisfactory performance</td>
<td>57-59</td>
</tr>
<tr>
<td>D+</td>
<td>Marginal pass</td>
<td>54-56</td>
</tr>
<tr>
<td>D</td>
<td>Minimal pass</td>
<td>50-53</td>
</tr>
<tr>
<td>F</td>
<td>Did not meet course requirements</td>
<td>0-49</td>
</tr>
</tbody>
</table>

Missed Components of Term Work:

**Students will lose 5% per day late past the deadline for all assignments.** Assignments will **NOT** be accepted more than 72 hours after the posted deadline and students failing to submit any assignment within this time frame will receive a mark of zero.

It is the agreement of all Faculty involved in MDSC501 that extensions will **NOT be granted** on any assignment. The only exceptions to this are those in keeping with the University Calendar (debilitating illness, religious conviction, or severe domestic affliction) that are received in writing and with supporting documentation. Traffic jams and late or full buses are common events in Calgary and are NOT acceptable reasons for late arrivals to class, meetings and examinations. Please note that while absences are permitted for religious reasons, students are responsible for providing advance notice and adhering to other guidelines on this matter, as outlined in the University Calendar (https://www.ucalgary.ca/pubs/calendar/current/e-4.html).

Course Evaluations and Student Feedback

Student feedback will be sought at the end of the course through the Universal Student Rating of Instruction (USRI) and a qualitative student evaluation. Students are welcome to discuss the process and content of the course at any time with the instructor. Students may also address any concerns they may have with Dr. Ebba Kurz, Associate Dean (Undergraduate Health and Science Education) in the Cumming School of Medicine (kurz@ucalgary.ca).

Attendance

Attendance at lectures is strongly encouraged. Posted lecture notes provide the basic information required; however, in class questions and discussion in the lecture will add depth to the knowledge base and facilitate greater success in the course assignments. Attendance is recommended as 10% of the final grade is based upon participation in class discussions of student presentations.

Conduct During Lectures

The classroom should be respected as a safe place to share ideas without judgement - a community in which we can all learn from one another. Students are expected to frame their comments and questions
to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic. Students, employees, and academic staff are also expected to demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

As members of the University community, students, employees and academic staff are expected to demonstrate conduct that is consistent with the University of Calgary Calendar, the Code of Conduct and Non-Academic Misconduct policy and procedures, which can be found at https://www.ucalgary.ca/legal-services/university-policies-procedures.

**Students are expected to take notes during class and should not rely solely on material supplied by the instructors.**

**Use of Internet and Electronic Communication Devices in Class**
The Bachelor of Health Sciences program aims to create a supportive and respectful learning environment for all students. The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. However, research studies have found that inappropriate/off-topic use of electronic devices in the classroom negatively affects the learning of others during class time.

Students are responsible for being aware of the University’s Internet and email use policy, which can be found at [https://www.ucalgary.ca/policies/files/policies/electronic-communications-policy.pdf](https://www.ucalgary.ca/policies/files/policies/electronic-communications-policy.pdf).

**UNIVERSITY OF CALGARY POLICIES AND SUPPORTS**

**Copyright**
All students are required to reach the University of Calgary policy on Acceptable Use of Material Protected by Copyright ([https://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright-policy.pdf](https://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright-policy.pdf)) and requirements of the Copyright Act ([https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html](https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html)) to ensure they are aware of the consequences of unauthorized sharing of course materials (including instructor notes, electronic versions of textbooks, etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy [https://www.ucalgary.ca/pubs/calendar/current/k.html](https://www.ucalgary.ca/pubs/calendar/current/k.html).

**Instructor Intellectual Property**
Course materials created by instructors (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may **NOT** be reproduced, redistributed or copied without the explicit consent of the professor. The **posting of course materials to third-party websites such as note-sharing sites without permission is prohibited**. Sharing of extracts of these course materials with other students enrolled in the course **at the same time** may be allowed under fair dealing.

**Academic Accommodations**
It is the student’s responsibility to request academic accommodations according to the University policies and procedures listed below. The Student Accommodations policy is available at [https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations](https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations). Students needing an accommodation based on disability or medical concerns should contact Student Accessibility Services (SAS) in accordance with the Procedure for Accommodations for Students with Disabilities ([https://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-](https://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-).
disabilities.pdf). SAS will process the request and issue letters of accommodations to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/.

Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to Dr. Ebba Kurz (kurz@ucalgary.ca), Associate Dean (Undergraduate Health and Science Education).

**Academic Misconduct**
The University of Calgary is committed to the highest standards of academic integrity and honesty. The University of Calgary has created rules to govern all its members regarding the creation of knowledge and the demonstration of knowledge having been learned.

Academic Misconduct refers to student behaviour that compromises proper assessment of a student’s academic activities and includes (but is not limited to): cheating, fabrication, falsification, plagiarism, unauthorized assistance, failure to comply with an instructor’s expectations regarding conduct required of students completing academic assessments in their courses, and failure to comply with exam regulations applied by the Registrar. It also includes using of third-party websites/services to access past/current course material, essay/assignment writing services, or real-time assistance in completing assessments, seeking answers to assessment questions and similar, whether paid, bartered or unpaid.

For information of the Student Academic Misconduct Policy and Procedures, please visit: https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf

Additional information is available on the Academic Integrity website at: https://ucalgary.ca/student-services/student-success/learning/academic-integrity.

**Recording of Lectures**
Audio or video recording of lectures (or similar) is prohibited except where explicit permission has been received from the instructor.

**Freedom of Information and Protection of Privacy Act**
Student information will be collected in accordance with typical (or usual) classroom practice. Students’ assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

**Appeals**
If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section I of the University Calendar. Students must follow the official reappraisal/appeal process and may contact the Student Ombuds’ Office (http://www.ucalgary.ca/ombuds) for assistance with this and with any other academic concerns, including academic and non-academic misconduct. Students should be aware that concerns about graded term work may only be initiated within 10 business days of first being notified of the grade. https://www.ucalgary.ca/pubs/calendar/current/i-2.html

**Media recording for self-assessment of teaching practices**
The instructor may use media recordings as a tool for self-assessment of their teaching practices. Although the recording device will be fixed on the instructor, it is possible that student participation in
the course may be inadvertently captured. These recordings will be used for instructor self-assessment only and will not be used for any other purpose.

**Sexual Violence Policy**
The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary’s sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at [https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf](https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf)

**Resources for Support of Student Learning, Success, Safety and Wellness**

- **Student Success Centre**
  [http://www.ucalgary.ca/ssc/](http://www.ucalgary.ca/ssc/)
- **Student Wellness Centre**
  [http://www.ucalgary.ca/wellnesscentre/](http://www.ucalgary.ca/wellnesscentre/)
- **Distress Centre**
- **Library Resources**
  [http://library.ucalgary.ca](http://library.ucalgary.ca)

**Wellness and Mental Health Resources**
The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre ([https://www.ucalgary.ca/wellnesscentre/services/mental-health-services](https://www.ucalgary.ca/wellnesscentre/services/mental-health-services)) and the Campus Mental Health Strategy ([http://www.ucalgary.ca/mentalhealth/](http://www.ucalgary.ca/mentalhealth/)).

**Student Ombuds' Office**
The Student Ombuds’ Office supports and provides a safe, neutral space for students. For more information, please visit [www.ucalgary.ca/ombuds/](http://www.ucalgary.ca/ombuds/) or email ombuds@ucalgary.ca

**BHSc Student Faculty Liaison Committee (SFLC)**
The BHSc SFLC, with elected representatives from all majors, serves to raise issues of interest to BHSc students to the program administration, including items pertaining to curriculum, scheduling and events. A list of current representatives can be found on the BHSc website.

**Student Union (SU) Information**
The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; the SU representatives for the Cumming School of Medicine can be reached at medrep1@su.ucalgary.ca or medrep2@su.ucalgary.ca.

**Student Success Centre**
The Student Success Centre provides services and programs to ensure students can make the most of their time at the University of Calgary. Our advisors, learning support staff, and writing support staff assist students in enhancing their skills and achieving their academic goals. They provide tailored learning support and advising programs, as well as one-on-one services, free of charge to all undergraduate and graduate students. For more information visit: [https://www.ucalgary.ca/student-services/student-success](https://www.ucalgary.ca/student-services/student-success)
Emergency Evacuation/Assembly Points
As part of the University of Calgary Emergency Evacuation plan, students, faculty, and staff should locate the closest Assembly Point in case of Fire Alarm. Safety signage is posted throughout the campus showing the locations and the possible route to these locations. All students, faculty, and staff are expected to promptly make their way to the nearest Assembly Point if the Fire Alarm is activated. No one is to return into campus facilities until an all clear is given to the warden in charge of the Assembly Area. For more information, see https://www.ucalgary.ca/emergencyplan/building-evacuation/assembly-points

Safewalk
Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit http://www.ucalgary.ca/security/safewalk. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.
Class Schedule
The following is a list of topics for class and assignment due dates. Please note unforeseen circumstances may cause changes to the schedule with respect to the timing of topics and readings. Students will be notified of all changes in a timely manner by way of email and D2L announcements.

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPICS</th>
<th>Instructor/Guest Lecturer</th>
<th>Assignment dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. Sept 7th</td>
<td>FALL CLASSES START</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Sept 8th</td>
<td>Introduction to Pharmacology</td>
<td>Donna M Slater</td>
<td></td>
</tr>
<tr>
<td>M. Sept 13th</td>
<td>Targets for Drug Action</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>W. Sept 15th</td>
<td>Pharmacodynamics I</td>
<td>Mark Giembycz</td>
<td></td>
</tr>
<tr>
<td>M. Sept 20th</td>
<td>Pharmacodynamics II</td>
<td>MG</td>
<td></td>
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<tr>
<td>W. Sept 22nd</td>
<td>Pharmacokinetics I (ADME)</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>M. Sept 27th</td>
<td>Pharmacokinetics II (ADME)</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>W. Sept 29th</td>
<td>Personalized Medicine I (age/disease/sex/ethnicity)</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>M. Oct 4th</td>
<td>Personalized Medicine II (Pharmacogenomics)</td>
<td>Chad Bousman</td>
<td></td>
</tr>
<tr>
<td>W. Oct 6th</td>
<td>Anti-inflammatory drugs</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>M. Oct 11th</td>
<td>Thanksgiving No Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. Oct 13th</td>
<td>TUTORIAL case reports</td>
<td>DMS</td>
<td>#1 released after class</td>
</tr>
<tr>
<td>F. Oct 15th</td>
<td>Assignment #1</td>
<td></td>
<td>#1 due 11.59pm – D2L</td>
</tr>
<tr>
<td>M. Oct 18th</td>
<td>Asthma and COPD</td>
<td>MG</td>
<td></td>
</tr>
<tr>
<td>W. Oct 20th</td>
<td>CV I (Blood pressure control - ABCDs)</td>
<td>Justin Deniset</td>
<td></td>
</tr>
<tr>
<td>M. Oct 25th</td>
<td>CV I (Blood pressure control - ABCDs)</td>
<td>JD</td>
<td></td>
</tr>
<tr>
<td>W. Oct 27th</td>
<td>Gastrointestinal Pharmacology</td>
<td>Kyle Flannigan</td>
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<tr>
<td>M. Nov 1st</td>
<td>Analgesia (Opioids / Cannabinoids)</td>
<td>Charlie Kwok</td>
<td></td>
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<tr>
<td>W. Nov 3rd</td>
<td>Neuropsychopharmacology (affective disorders)</td>
<td>Stephanie Borgland</td>
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<tr>
<td>Nov 8 - 12th</td>
<td>Reading Week - No Class</td>
<td></td>
<td></td>
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<tr>
<td>M. Nov 15th</td>
<td>Reproductive Pharmacology I</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>W. Nov 17th</td>
<td>Reproductive Pharmacology II</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>M. Nov 22nd</td>
<td>Harmful effects of drugs</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>W. Nov 24th</td>
<td>TUTORIAL case reports</td>
<td>DMS</td>
<td>#2 released after class</td>
</tr>
<tr>
<td>F Nov 26th</td>
<td>Assignment #2</td>
<td></td>
<td>#2 due 11:59pm – D2L</td>
</tr>
<tr>
<td>M. Nov 29th</td>
<td>Student Presentations</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>W. Dec 1st</td>
<td>Student Presentations</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>M. Dec 6th</td>
<td>Student Presentations</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>W. Dec 8th</td>
<td>Student Presentations</td>
<td>DMS</td>
<td></td>
</tr>
<tr>
<td>Th. Dec 9th</td>
<td>FALL CLASSES END</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Dec 10th</td>
<td>Individual Drug Report</td>
<td></td>
<td>Due 11:59pm-D2L</td>
</tr>
</tbody>
</table>