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Insight - April 2018

Dugoni School of Dentistry

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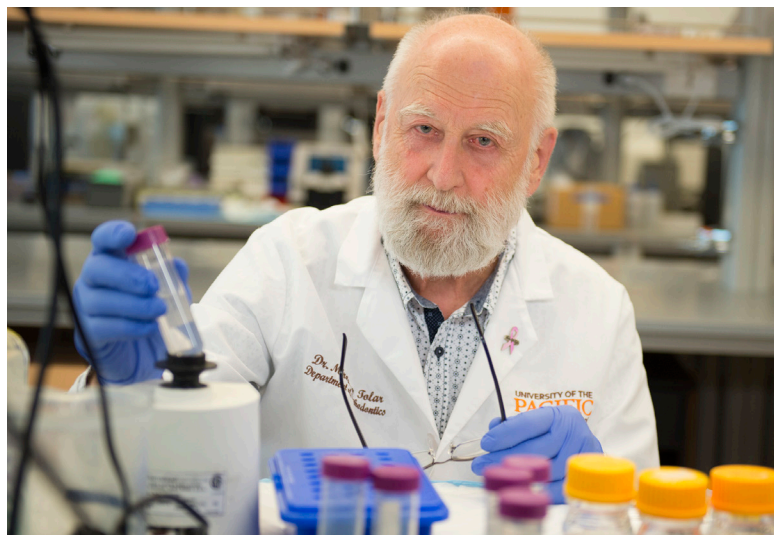
Spring 2018

Research and Scholarship

Welcome to the Spring 2018 edition of *Insight*, a quarterly newsletter celebrating some of the many accomplishments of our community of researchers. Whether you are involved in clinical research, biomedical research, the scholarship of teaching and learning, improvement of the health care system, or professional partnerships that advance the field, we aim to spotlight insights from people at the Dugoni School.

RESEARCH IN THE SPOTLIGHT

Collaboration between faculty from the Dugoni School's Department of Orthodontics and Pacific's Department of Mechanical Engineering and Computer Science, with involvement from an undergraduate mechanical engineering student (and co-author) led to a recent publication in the *Journal of Biomechanics*. Congratulations to those involved in this cross-disciplinary research looking at the current techniques of bone drilling and examining the effects of bone structure, drill-bit geometry and more.



Parameters Affecting Mechanical and Thermal Responses in Bone Drilling: a Review

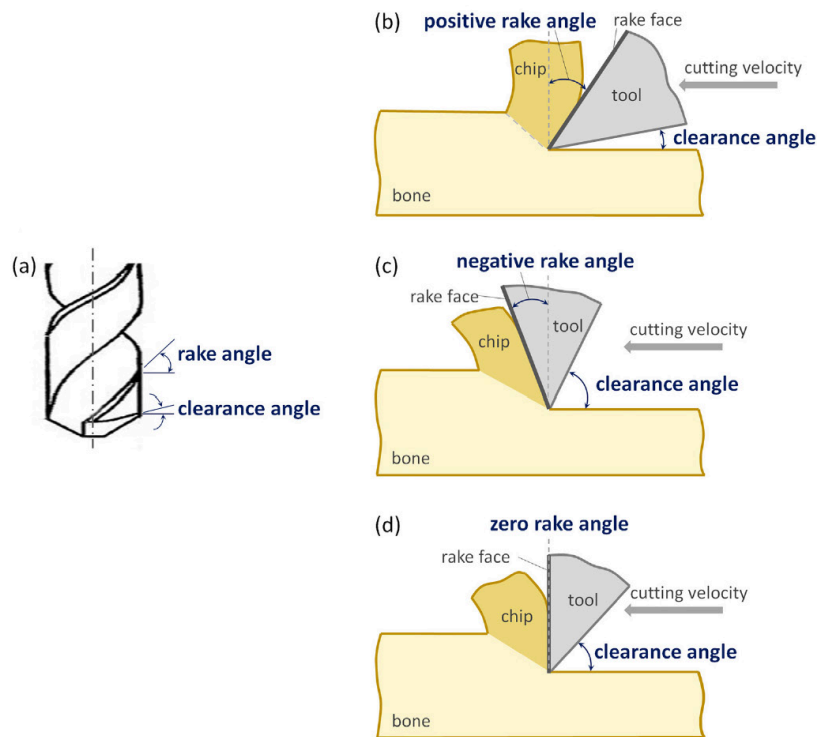


Fig. 6. Rake and clearance angles of a twist drill bit: (a) geometry of rake and clearance angles; (b) positive rake angle; (c) negative rake angle; (d) zero rake angle.

What is it?

Research looking at the current techniques of bone drilling and examining the parameters and effects of bone structure, drill-bit geometry, operating conditions and material evacuation (removal).

What problem does it aim to solve?

Surgical bone drilling is performed for a variety of reasons including installing prosthetics and correcting bone fractures. Making sure that drilling doesn't cause further damage—be it from the force of the drill itself or from the heat generated during drilling—is critical.

How does it work?

The researchers looked at multiple factors involved in drilling and their effects on the bone being drilled: thrust force, torque, heat accumulation/dissipation, cutting direction, bone density, the thickness of the bone's outer layer, drill rotation and feed rate, drill bit shape, angles and wear and techniques used.

What are the real-world implications?

A set of recommendations emerged from this review. “In general, a point angle of 70–90 or 120–140 and a clearance angle of 12–15 can provide lower friction with unworn cutting edges in bone drilling. A helix angle of 24–36 is also recommended to reduce the risk of chip clogging during bone drilling. The chips generated during bone drilling can increase friction and temperature significantly if not evacuated efficiently. Using coolant fluid as external irrigation can help both chip clogging prevention and temperature elevation reduction, assisting chip evacuation. Intermittent drilling can be used for better chip evacuation, especially from deeper holes. For implantation, predrilling can reduce the maximum forces and temperature significantly. The recommended diameter of the pilot hole in predrilling is the inner diameter of the insertion screw.”

What are the next steps?

A larger, more comprehensive study would be the logical next step. In the meantime, dentists can start putting some of these recommendations into practice now, and students can learn from them as well.

Source

“Parameters affecting mechanical and thermal responses in bone drilling: A review”,
Journal of Biomechanics, 71 (2018) 4–21

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View more “Research in the Spotlight” highlights at:

dental.pacific.edu/faculty-and-research/research-in-the-spotlight



NOTEWORTHY PUBLICATIONS

Congratulations to Dugoni School faculty, staff, student and resident researchers involved in the following research publications within the last three months as sourced by Scopus, the abstract and citation database of peer-reviewed literature. Visit the abstract links to learn more.

Arias, A., Macorra, J.C., Govindjee, S., Peters, O.A.
Correlation between Temperature-dependent Fatigue Resistance and Differential Scanning Calorimetry Analysis for 2 Contemporary Rotary Instruments
(2018) *Journal of Endodontics*, Volume 44 (4), pp. 630-634
[Abstract >](#)

Chávez, E.M., Wong, L.M., Subar, P., Young, D.A., Wong, A.
Dental Care for Geriatric and Special Needs Populations
(2018) *Dental Clinics of North America*, 62 (2), pp. 245-267.
[Abstract >](#)

Xiao, N., Yu, W.Y., Liu, D.
Glial cell-derived neurotrophic factor promotes dental pulp stem cell migration
(2018) *Journal of Tissue Engineering and Regenerative Medicine*, 12 (3), pp. 705-714.
[Abstract >](#)

Schachter, J., Martel, J., Lin, C.-S., Chang, C.-J., Wu, T.-R., Lu, C.-C., Ko, Y.-F., Lai, H.-C., Ojcius, D.M., Young, J.D.
Effects of obesity on depression: A role for inflammation and the gut microbiota
(2018) *Brain, Behavior, and Immunity*, 69, pp. 1-8.
[Abstract >](#)

Skupin-Mrugalska, P., Szczolko, W., Gierlich, P., Konopka, K., Goslinski, T., Mielcarek, J., Düzgüneş, N.
Physicochemical properties of liposome-incorporated 2-(morpholin-4-yl)ethoxy phthalocyanines and their photodynamic activity against oral cancer cells
(2018) *Journal of Photochemistry and Photobiology A: Chemistry*, 353, pp. 445-457.
[Abstract >](#)

Roy, D.K., Cohen, S., Singh, V.P., Marla, V., Ghimire, S.
Endodontic management of mandibular canine with two roots and two canals: A rare case report
(2018) *BMC Research Notes*, 11 (1), art. no. 111, .
[Abstract >](#)

Chang, C.-J., Lu, C.-C., Lin, C.-S., Martel, J., Ko, Y.-F., Ojcius, D.M., Wu, T.-R., Tsai, Y.-H., Yeh, T.-S., Lu, J.-J., Lai, H.-C., Young, J.D.
Antrodia cinnamomea reduces obesity and modulates the gut microbiota in high-fat diet-fed mice
(2018) *International Journal of Obesity*, 42 (2), pp. 231-243.
[Abstract >](#)

Pang, S., Yee, M., Saba, Y., Chino, T.

Artepillin C as a targeting survivin molecule in oral squamous cell carcinoma cells in vitro: A preliminary study

(2018) *Journal of Oral Pathology and Medicine*, 47 (1), pp. 48-52.

[Abstract >](#)

Kim, K.A., Hwang, H.-S., Chung, K.-R., Kim, S.-H., Nelson, G.

Recovery of multiple impacted maxillary teeth in a hyperdivergent Class I patient using Temporary Skeletal Anchorage Devices and augmented corticotomy

(2018) *Angle Orthodontist*, 88 (1), pp. 107-121.

[Abstract >](#)

Estrela, C., Costa e Silva, R., Urban, R.C., Gonçalves, P.J., Silva, J.A., Estrela, C.R.A., Pecora, J.D., Peters, O.A.

Demetallization of enterococcus faecalis biofilm: A preliminary study

(2018) *Journal of Applied Oral Science*, 26, art. no. e20170374, .

[Abstract >](#)

Source: Scopus, the largest abstract and citation database of peer-reviewed literature.

Updated March 28, 2018. For ongoing updates, visit the publications page on the school website:

pacific.edu/faculty-and-research/publications

EXCELLENCE DAY

We are pleased to invite the Dugoni School community to Excellence Day 2018, happening Wednesday, May 23, from noon to 6:00 pm. Join us for a celebration of accomplishments of the brilliant minds here at the Dugoni School of Dentistry.

This event serves as a showcase for research, clinical, and service achievements of our dental students, faculty, residents and staff.

Focusing on our students' outstanding work in clinical comprehensive dentistry, the clinical program is sponsored by the Dugoni School's chapter of Omicron Kappa Upsilon (OKU) National Dental Honor Society.

More details regarding the schedule will be forthcoming. For the first time, abstracts will be submitted to the University of Pacific digital repository, where they will be archived indefinitely at <https://scholarlycommons.pacific.edu/excellence-day/>

To submit abstracts, go to:

https://scholarlycommons.pacific.edu/cgi/ir_submit.cgi?context=excellence-day

We look forward to seeing you in our clinics and at the award ceremonies on May 23!

Contact Insight: Have a suggestion for the next issue of *Insight*? Contact Dr. David Ojcius, Assistant Dean for Research and Chair of the Department of Biomedical Sciences, for editorial suggestions or to learn more about how to get involved in research at the Dugoni School.

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