

Rehabilitation of Maxillary Edentulism With Implant-Supported Milled-Bar Prostheses

Fabiana Gouveia Straioto, DDS,* Alessandra Miranda de Azevedo, DDS,* Célio Jesus do Prado, DDS, MS, PhD,† Flávio Domingues das Neves, DDS, MS, PhD,‡ and Alfredo Júlio Fernandes Neto, DDS, MS, PhD§

Rehabilitation of the edentulous maxilla is a prosthetic challenge, especially when the alveolar ridge is resorbed.¹ The conventional removable denture, even when fabricated according to scientific principles described in the literature, does not provide comfort and safety to all users.²⁻⁴ Fortunately, because of the predictable success of therapy with dental implants,⁵ patients dissatisfied with their conventional removable dentures over resorbed alveolar ridges have other alternatives for their prosthetic rehabilitation. Now, it is possible to allow the patient to choose another prosthetic-rehabilitative option such as the implant-supported fixed complete denture, dramatically changing the characteristics of retention and stability.

Regardless of the type of prosthesis to be fabricated, it should be rigid, provide proper lip support for good esthetics, and allow good speech and easy accomplishment of oral hygiene. The design of the prostheses is based on the amount of resorption of the alveolar ridge, and fulfillment of the requirements of support, retention, and stability. Considering the anatomic limitations of an edentulous maxilla, the need for an adequate type of prosthesis that results in the favorable dis-

Implantology has allowed more options for rehabilitation of complete and partially edentulous patients. The professional should describe all possible alternatives to the patient, addressing all the positive and negative aspects of each possibility, such as treatment time, complexity of surgical procedures, and the final cost. The patient should select the best cost-benefit relationship because fixed prostheses are often not the option of choice for the patient. The aim of this article is to present one possible treatment option

for the completely edentulous patient by use of implants to support and retain a removable complete or partial prosthesis. The clinical situations were rehabilitated by the use of a milled bar screwed to the implants to support a removable prosthesis with attachments and a milled metallic groove, which provide many advantages to the patient. (Implant Dent 2006;15:366-371)

Key Words: *implantology, milled-bar, edentulous maxilla, removable prostheses*

tribution of stresses, esthetics, speech, comfort, and hygiene, an overdenture prosthesis is usually the option of choice.^{6,7} However it is supported anteriorly by implants and posteriorly by the residual alveolar ridge.

Another option is the milled-bar implant-supported overdenture,⁶ which has all the advantages of an overdenture prosthesis in addition to support, stability, retention, and is completely implant supported, providing comfort and masticatory ability similar to a fixed prosthesis. It is characterized by a milled-metallic bar screw retained to the implants and a removable prosthesis (overdenture), which includes a counter bar inside it. The retention is achieved by friction between the bar and counter bar, and the precision attachments.

The dental surgeon should inform the patient of all the options possible for the specific rehabilitation of each case, addressing the limitations, advantages, disadvantages, costs, approximate time required for completion of treat-

ment, also allowing for the optimum estimate of esthetics.^{8,9} The expectations of the patient and success in implant integration do not necessarily ensure patient satisfaction.¹⁰⁻¹² Selection of the type of prosthesis depends, in part, on the financial conditions of the patient, bone quantity and quality, patient's preference for the type of oral hygiene, smile line, and lip support.^{8,10,13}

CLINICAL REPORTS

Treatment Study 1

A 61-year-old man wanted to replace his removable partial denture with an implant-supported prosthesis. The selection was based on the fact that he did not want to undergo surgical procedures for bone grafting at the anterior region and also believed it would be more comfortable to remove the prosthesis to perform oral hygiene. There were 5 implants placed, and the second surgery was performed after 6 months (Fig. 1). Four weeks later, a partial milled-bar implant-supported overdenture with retention by 2 attach-

*Postgraduate student, Department of Occlusion, Fixed Prosthesis, and Dental Materials, Federal University of Uberlândia, School of Dentistry, Uberlândia/MG Brazil.
†Assistant Professor, Department of Removable Prosthodontics, Federal University of Uberlândia, School of Dentistry, Uberlândia/MG Brazil.
‡Adjunct Professor, Department of Occlusion, Fixed Prosthesis, and Dental Materials, Federal University of Uberlândia, School of Dentistry, Uberlândia/MG Brazil.
§Professor and Chairman, Department of Occlusion, Fixed Prosthesis, and Dental Materials, Federal University of Uberlândia, School of Dentistry, Uberlândia/MG Brazil.

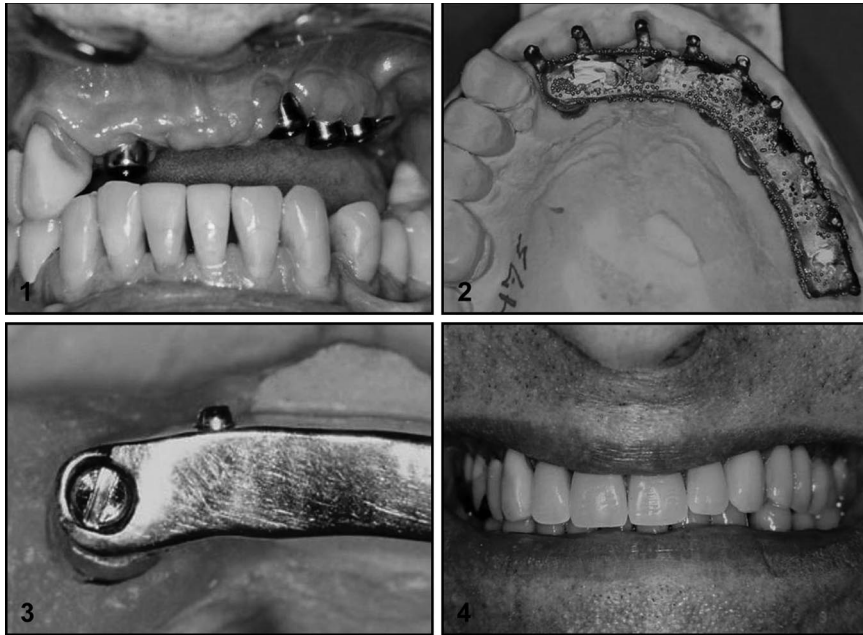


Fig. 1. Partially edentulous maxilla unilaterally presenting 5 implants.
Fig. 2. Positioned on milled bar, the counter bar contains mechanical retentions for artificial teeth.
Fig. 3. End of post of attachment.
Fig. 4. Definitive esthetic result.



Fig. 5. Clinical evaluation of milled bar.
Fig. 6. External view of completed prosthesis.
Fig. 7. Internal view of completed prosthesis.
Fig. 8. Patient's profile, smiling, with satisfactory lip support.

ments was fabricated. The bar, whose buccal and palatal aspects presented nearly 10 degrees of convergence in an occlusal direction, was evaluated in the mouth, followed by fabrication of the metallic counter bar (Fig. 2). The precision attachments present in the

bar (Fig. 3) allowed achievement of adjustable and adequate mechanical retention. The resin applied on the prosthesis cannot have a thickness less than 3 mm. Pink opaque should be applied over the metal to mask its gray shade. In the clinical appointment for

placement of the prosthesis, the bar is initially placed, and torque is applied on the screws (20 Ncm). The access orifices are restored with light-polymerized resin. The removable prosthesis is then placed, and the occlusal and esthetic adjustments are performed (Fig. 4). The patient has been wearing the prosthesis for 3 years, and no adjustments have been required to this date.

Treatment Study 2

A 45-year-old woman wanted to replace her removable complete prosthesis with an implant-supported fixed prosthesis. She reported that she had been wearing this type of prosthesis for nearly 8 years. The diagnostic test for fixed or removable prosthesis⁸ revealed that artificial gingiva was needed to allow esthetic reestablishment of lip support and lip line. Therefore, the fixed prosthesis was contraindicated because it would be impossible to perform oral hygiene under the pontics and also because the patient was not willing to undergo surgical procedures for bone grafting. The correct option was an overdenture. This prosthesis may be either mucosa-implant-supported or completely implant-supported. Because the patient wanted a prosthesis with no palatal coverage, the option of choice was the overdenture with a milled bar. There were 7 implants placed, and after 8 months, the restorative treatment was initiated with the fabrication of a milled-bar implant-supported overdenture, according to Davodi *et al*⁶ (Figs. 5–8).

DISCUSSION

Considering the difficulties involved in the restoration of an edentulous arch with implant-supported fixed prostheses, an implant-supported overdenture with a milled bar and precision attachments has proven to be an efficient, cost-effective treatment, providing comfort to the patient. This type of prosthesis has several advantages. The close fit between the milled bar and its cast metallic framework allow achievement of frictional retention and stability that is not possible with the other types of mucosa-implant-supported prostheses. The prosthesis is rigid, connects the implants, and does not present a cantilever, thereby allowing for favorable mechanical force distribution. The esthetic and speech outcomes are favorable, even in

the presence of severe vertical and horizontal bone resorption. The acrylic resin may be characterized to resemble the natural aspect. It is much more difficult to clean a fixed prosthesis than an overdenture. The minimal coverage of the palatal mucosa provides more comfort and satisfaction during eating. Depending on the type of attachment, it may be adjusted to provide more or less retention and even be replaced without demanding great alterations in the prosthesis. The laboratory procedures required for such treatment are not substantially different from those routinely required for fabrication of implant-supported prostheses; however, the dental technician should have a milling machine. The great disadvantage of this type of prosthesis is the height of the framework (prosthesis and metallic bar) and technical knowledge required for its fabrication in the laboratory.⁷

Implant-retained, implant-supported fixed prostheses are commonly used. However, if the patient presents remarkable alveolar ridge resorption, the esthetic and speech problems may be worsened¹ as a result of excess air and saliva escaping through the empty spaces of the metallic framework.^{10,13} These prostheses require more careful hygiene procedures for cleaning. The treatment planning for positioning of implants for fixed prostheses is more critical when compared to that required for the fabrication of overdentures.¹¹

CONCLUSIONS

The implant-supported overdenture retained by a milled bar allows the dentist to solve some unique difficul-

ties in treatment involving implants, especially in the maxilla:

1. This may provide a solution for problems associated with placement of implants outside their ideal positions for a fixed prosthesis, either because of failures in the surgical technique or the patient's lack of willingness and/or time to undergo bone-grafting procedures.
2. This alternative may be used to restore the edentulous mandible, especially in patients with maxillofacial resections and situations of partial edentulism.
3. It may also be an option for patients with esthetic problems related to the lip line, lip support, or hygiene, who would like to have a stable, esthetic, and easy to clean prosthesis.

Disclosure

The authors have no financial interest or arrangement with any entity for which interest or arrangement might be perceived to bear on the objectivity of this article.

REFERENCES

1. Lothigius E, Smedberg JI, De Buck V, et al. A new design for a hybrid prosthesis supported by osseointegrated implants: 1. Technical aspects. *Int J Oral Maxillofac Implants.* 1991;6:80-86.
2. Carlsson GE, Otterland A, Wennstrom A, et al. Patient factors in appreciation of complete dentures. *J Prosthet Dent.* 1967;17:322-328.
3. Van Waas MA. Determinants of dissatisfaction with dentures: A multiple regression analysis. *J Prosthet Dent.* 1990;64:569-572.
4. Kalk W, de Baat C. Patients' complaints and satisfaction 5 years after com-

plete denture treatment. *Community Dent Oral Epidemiol.* 1990;18:27-31.

5. Adel R, Eriksson B, Lekholm U, et al. Long-term follow up study of osseointegrated implants in the treatment of totally edentulous jaws. *Int J Oral Maxillofac Implants.* 1990;5:347-359.

6. Davodi A, Nishimura R, Beumer J III. An implant-supported fixed-removable prosthesis with a milled tissue bar and Hader clip retention as a restorative option for the edentulous maxilla. *J Prosthet Dent.* 1997;78:212-217.

7. Wicks RA. A systematic approach to definitive planning for osseointegrated implant prostheses. *J Prosthodont.* 1994;3:237-242.

8. Neves FD, Mendonca G, Fernandes Neto AJ. Analysis of influence of lip line and lip support in esthetics and selection of maxillary implant-supported prosthesis design. *J Prosthet Dent.* 2004;91:286-288.

9. Preiskel HW. In: *Overdenture Made Easy: A Guide to Implant and Root Supported Prosthesis.* London: Quintessence Publishers; 1996:206-215.

10. Sones AD. Complications with osseointegrated implants. *J Prosthet Dent.* 1989;62:581-585.

11. Van Roekel NB. Prosthesis fabrication using electrical discharge machining. *Int J Oral Maxillofac Implants.* 1992;7:56-61.

12. Parel SM. Implants and overdentures: The osseointegrated approach with conventional and compromised applications. *Int J Oral Maxillofac Implants.* 1986;1:93-99.

13. DeBoer J. Edentulous implants: Overdenture versus fixed. *J Prosthet Dent.* 1993;69:386-390.

Reprint requests and correspondence to:

Alfredo Julio Fernandes Neto, DDS, MS, PhD
Universidade Federal de Uberlândia
Av. Pará, 1720
Campos Umuarama BI 2B
Sala 2B01
CEP: 38400-902, Uberlandia/MG Brazil
Fax: (55) 34-3232-9286
E-mail: alfredon@ufu.br

ID Abstract Translations

GERMAN/DEUTSCH

AUTOR(EN): Fabiana Gouveia Straioto, DDS*, Alessandra Miranda de Azevedo, DDS*, Célio Jesus do Prado, DDS, MS, PhD**, Flávio Domingues das Neves, DDS, MS, PhD#, Alfredo Júlio Fernandes Neto, DDS, MS, PhD###. *Student des Postgraduiertenkollegs, Abteilung für Okklusion, feste Prothetik und Dentalmaterialien, staatliche Universität von Uberlandia, Zahnmedizinische Fakultät, Uberlandia/MG Brasilien. **Assisten-

zprofessor, Abteilung für herausnehmbare zahnärztliche Prothetik, staatliche Universität von Uberlandia, Zahnmedizinische Fakultät, Uberlandia/MG Brasilien. #Professor Adjunctus, Abteilung für Okklusion, feste Prothetik und Dentalmaterialien, staatliche Universität von Uberlandia, Zahnmedizinische Fakultät, Uberlandia/MG Brasilien. ##Professor und Leiter, Abteilung für Okklusion, feste Prothetik und Dentalmaterialien, staatliche Universität von Uberlandia, Zahnmedizinische Fakultät, Uberlandia/MG Brasilien. Schriftverkehr: Dr. Alfredo Julio

Fernandes Neto, Universidade Federal de Uberlândia, Av. Pará, 1720, Campos Umuarama BI 2B, Sala 2B01, CEP: 38400-902, Uberlandia/MG Brasilien. Fax: (55) 34-3232-9286, e-Mail: alfredon@ufu.br

Wiederherstellung bei Zahnlosigkeit im Oberkiefer mittels Implantatgestützter Prothese mit gefräster Schiene

ZUSAMMENFASSUNG: Die Implantologie bietet teilweise und komplett zahnlosen Patienten eine immer größere Bandbreite an Wiederherstellungsoptionen. Der behandelnde Facharzt sollte dem Patienten alle verfügbaren Alternativen vorstellen und dabei alle positiven wie auch negativen Aspekte jeder einzelnen Behandlungsmöglichkeit aufzeigen, wie beispielsweise die Behandlungsdauer, Komplexität des chirurgischen Vorgehens und die Gesamtkosten. Der Patient sollte sich daraus die Option mit dem aus seiner Sicht besten Kosten-Nutzen-Verhältnis wählen, da feste Prothesen bei den Patienten häufig nicht erste Wahl sind. Der aktuelle Artikel zielt darauf ab, eine mögliche Behandlungsvariante für komplett zahnlose Patienten vorzustellen, bei der Implantate zur Unterstützung und Befestigung einer herausnehmbaren Komplet- oder Teilprothese eingesetzt werden. Die klinische Ausgangssituation wurde durch die Verwendung einer gefrästen Schiene bereinigt, die auf die Implantate aufgeschraubt wurde, um die herausnehmbare Prothese inklusive Geschiebe zu stützen. Diese Schiene sowie der Einsatz einer gefrästen metallischen Rinne bieten dem Patienten viele Vorteile.

SCHLÜSSELWÖRTER: Implantologie, gefräste Schiene, zahnloser Oberkiefer, herausnehmbare Prothesen.

SPANISH/ESPAÑOL

AUTOR(ES): Fabiana Gouveia Straioto, DDS*, Alessandra Miranda de Azevedo, DDS*, Célio Jesus do Prado, DDS, MS, PhD**, Flávio Domingues das Neves, DDS, MS, PhD#, Alfredo Júlio Fernandes Neto, DDS, MS, PhD###. *Estudiante de postgrado, Departamento de Oclusión, Prótesis Fijas y Materiales Dentales, Universidad Federal de Uberlandia, Facultad de Odontología, Uberlandia/MG Brasil. **Profesor Asistente, Departamento de Protopodóntica Removible, Universidad Federal de Uberlandia, Facultad de Odontología, Uberlandia/MG Brasil. #Profesor Adjunto, Departamento de Oclusión, Prótesis Fijas y Materiales Dentales, Universidad Federal de Uberlandia, Facultad de Odontología, Uberlandia/MG Brasil. ##Profesor y Jefe, Departamento de Oclusión, Prótesis Fijas y Materiales Dentales, Universidad Federal de Uberlandia, Facultad de Odontología, Uberlandia/MG Brasil. Correspondencia a: Dr. Alfredo Julio Fernandes Neto, Universidade Federal de Uberlândia, Av. Pará, 1720, Campos Umuarama BI 2B, Sala 2B01, CEP: 38400-902, Uberlandia/MG Brazil. Fax: (55) 34-3232-9286, Correo electrónico: alfredon@ufu.br

La rehabilitación del edentulismo maxilar con una prótesis con barra maquinada apoyada con implantes

ABSTRACTO: La implantología ha permitido más opciones para la rehabilitación de pacientes completa y parcialmente

edentulosos. El profesional debería describir al paciente todas las alternativas, explicando todos los aspectos positivos y negativos de cada posibilidad, tal como tiempo de tratamiento, complejidad de los procedimientos quirúrgicos y el costo final. El paciente deberá seleccionar la mejor relación entre costo y beneficio, ya que las prótesis fijas a menudo no son la opción preferida por el paciente. El objetivo de este artículo es presentar una posible opción de tratamiento para el paciente completamente edentuloso a través de la utilización de implantes para apoyar y retener una prótesis removible completa o parcial. Las situaciones clínicas se rehabilitaron usando una barra maquinada atornillada a los implantes para apoyar una prótesis removible con accesorios y una ranura metálica maquinada que ofrece muchas ventajas al paciente.

PALABRAS CLAVES: implantología, barra maquinada, maxila edentulosa, prótesis removible.

PORTUGUESE/PORTUGUÊS

AUTOR(ES): Fabiana Gouveia Straioto, Cirurgiã-Dentista*, Alessandra Miranda de AZEVEDO, Cirurgiã-Dentista*, Célio Jesus do Prado, Cirurgião-Dentista, Mestre em Ciências, PhD**, Flávio Domingues das Neves, Cirurgião-Dentista, Mestre em Ciências, PhD#, Alfredo Júlio Fernandes Neto, Cirurgião-Dentista, Mestre em Ciências, PhD###. *Estudante de Pós-graduação, Depto. de Oclusão, Prótese Fixa e Materiais Dentários, Universidade Federal de Uberlândia, Faculdade de Odontologia, Uberlândia/MG Brasil. **Professor Assistente, Depto. de Próteses Dentárias Removíveis, Universidade Federal de Uberlândia, Faculdade de Odontologia, Uberlândia/MG Brasil. #Professor Adjunto, Depto. de Oclusão, Prótese Fixa e Materiais Dentários, Universidade Federal de Uberlândia, Faculdade de Odontologia, Uberlândia/MG Brasil. ##Professor e Chefe do Depto. de Oclusão, Prótese Fixa e Materiais Dentários, Universidade Federal de Uberlândia, Faculdade de Odontologia, Uberlândia/MG Brasil. Correspondência para: Dr. Alfredo Julio Fernandes Neto, Universidade Federal de Uberlândia, Av. Pará, 1720, Campos Umuarama BI 2B, Sala 2B01, CEP: 38400-902, Uberlândia/MG Brazil. Fax: (55) 34-3232-9286, E-Mail: alfredon@ufu.br

Reabilitação de desdentamento maxilar com próteses de barra serrilhada suportadas por implantes

RESUMO: A implantologia permitiu que mais opções para reabilitação de pacientes completa e parcialmente desdentados. O profissional deve descrever todas as alternativas possíveis para o paciente, recorrendo a todos os aspectos positivos e negativos de cada possibilidade, tais como tempo de tratamento, complexidade de procedimentos cirúrgicos e o custo final. O paciente deve selecionar a melhor relação custo-benefício, já que próteses fixas não são frequentemente a opção de escolha para o paciente. O objetivo deste artigo

é apresentar uma opção de tratamento possível para o paciente completamente desdentado pela utilização de implantes para suportar e reter uma prótese removível completa ou parcial. As situações clínicas foram reabilitadas pelo uso de uma barra serrilhada aparafusada aos implantes para

suportar uma prótese removível com attachments e um encaixe metálico serrilhado que fornece muitas vantagens ao paciente.

PALAVRAS-CHAVE: implantologia, barra serrilhada, maxila desdentada, próteses removíveis.

JAPANESE / 日本語

上顎無歯のインプラント支持milled-bar prosthesisによるリハビリ

著者: ファビアナ・ゴウヴェイア・ストライオト、DDS*、アレッサンドラ・ミランダ・デ・アゼヴェド、DDS*、セリオ・ジェスス・ド・ブラド、DDS、MS、PhD**、フラヴィオ・ドミンゲス・ダス・ネヴェス、DDS、MS、PhD#、アルフレド・ジュリオ・フェルナンデス・ネト、DDS、MS、PhD##

概要: インプラント歯科学によって、完全または部分無歯の患者のリハビリに関する選択肢は多くなった。歯科医は可能なすべての方法を患者に説明し、処置にかかる時間、外科処置の難易度、コストなどについて各方法の長所短所も説明すれば、患者は経費利益関係のもっとも良い方法を選ぶことができる。しかし固定補綴が選ばれることは少ないのが現状である。本論文の目的は、完全無歯の患者に、インプラントで支持され保全されたremovable complete or partial prosthesisによる治療オプションを提供することにある。臨床的には、インプラントにねじ込まれたmilled barによってattachmentとmilled metallic grooveとともに着脱補綴を支持するという、長所が多い方法によって修復が行われた。

キーワード: インプラント歯科学、milled bar、無歯上顎、着脱補綴

*フェデラル・ユニバーシティー・オブ・ウペーランディア、スクール・オブ・デンティストリー 嚙合・固定補綴・歯科材料学部 研究生 (ウペーランディア / MG、ブラジル)

**フェデラル・ユニバーシティー・オブ・ウペーランディア、スクール・オブ・デンティストリー 着脱型補綴学部 助教授 (ウペーランディア / MG、ブラジル)

#フェデラル・ユニバーシティー・オブ・ウペーランディア、スクール・オブ・デンティストリー 嚙合・固定補綴・歯科材料学部 客員教授 (ウペーランディア / MG、ブラジル)

##フェデラル・ユニバーシティー・オブ・ウペーランディア、スクール・オブ・デンティストリー 嚙合・固定補綴・歯科材料学部長、教授 (ウペーランディア / MG、ブラジル)

問い合わせ先: Dr. Alfredo Julio Fernandes Neto, Universidade Federal de Uberlândia, Av. Pará, 1720, Campos Umuarama Bl 2B, Sala 2B01, CEP:38400-902, Uberlandia/MG Brazil

ファックス: (55) 34-3232-9286 Eメール: alfredon@ufu.br

以植體支持之加工門假牙進行上頷缺牙修復

作者：Fabiana Gouveia STRAIOTO, DDS*、Alessandra Miranda de AZEVEDO, DDS*、Célio Jesus do PRADO, DDS, MS, PhD**、Flávio Domingues das Neve, DDS, MS, PhD#、Alfredo Júlio FERNANDES NETO, DDS, MS, PhD ##

摘要：口腔移植讓全部或部分缺牙患者有更多修復的選擇。專業人員應向患者說明所有可能選項、以及每個可能選擇的優點與缺點，例如治療時間、外科手術複雜度及最終成本等。患者應選擇最具成本效益者，因為固定假牙經常不是對患者最好的選擇。本文的目的旨在為完全缺牙的患者提出一種可能的治療選項：透過植體使用以支持並維持全部或部分活動假牙。臨床時的修復則是用鎖入植體的加工門支持含附連以及加工金屬槽的活動假牙，帶給患者許多好處。

關鍵字：口腔移植、加工門、上頷缺牙、活動假牙

* 巴西／烏貝蘭迪亞，國立烏貝蘭迪亞大學牙醫學院咬合、固定贖復與牙科材料學系研究生

** 巴西／烏貝蘭迪亞，國立烏貝蘭迪亞大學牙醫學院活動贖復學系助理教授

巴西／烏貝蘭迪亞，國立烏貝蘭迪亞大學牙醫學院咬合、固定贖復與牙科材料學系兼任教授

巴西／烏貝蘭迪亞，國立烏貝蘭迪亞大學牙醫學院咬合、固定贖復與牙科材料學系教授兼主任

轉載申請與通訊方式：Dr. Alfredo Julio Fernandes Neto, Universidade Federal de Uberlândia, Av. Pará, 1720, Campos Umuarama BI 2B, Sala 2B01, CEP: 38400-902, Uberlandia/MG Brazil

傳真：(55) 34-3232-9286 電郵信箱：alfredon@ufu.br